Original Article

Time trends of causes of upper gastrointestinal bleeding and endoscopic findings

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Abstract

Background: Upper gastrointestinal bleeding (UGIB) is a frequent cause for emergency endoscopy and, in a proportion, requires the application of endotherapy. We aim to evaluate the proportion of variceal and nonvariceal upper gastrointestinal bleeding (NVUGIB), the endoscopic findings that were detected, as well as the temporal trends of endoscopic findings over a period of 13 years.

Methods: This is a retrospective study of patients who underwent an esophagogastroduodenoscopy with an indication of UGIB or presented with hematemesis, melena, or both, as well as those who had hematochezia, from January 2004 to December 2016 (13 years).

Results: A total of 2075 patients were included with a mean age of 56.8 years (range 18–113) and males constituted 67.9%, while 65.9% had at least one comorbidity. Symptoms on presentation included hematemesis (52.5%), melena (31.2%), both hematemesis & melena (15.1%), and hematochezia (1.2%). The majority of UGIB were from a NVUGIB source (80.5%) and a variceal source was found in 13.1%, while no endoscopic findings were found in 6.4% of cases. The most common endoscopic diagnosis was gastroduodenal erosions (23.8%), duodenal ulcers (23.5%), reflux esophagitis (16.0%), esophageal varices (12.1%), and gastric ulcers (10.8%). There was no change in the endoscopic findings over the time period of the study. A third of duodenal ulcers (33.3%) as well as 21.9% of gastric ulcers were actively bleeding at the time of endoscopy, while 3.3% of duodenal ulcers had an adherent clot.

Conclusions: NVUGIB composed the majority of cases presenting with UGIB and variceal bleeding was lower than that described in prior studies, but there were no clear trends in the proportion of causes of UGIB during the study duration.

Keywords: Nonvariceal bleeding, peptic ulcer disease, Saudi Arabia, upper gastrointestinal bleeding, variceal bleeding

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INTRODUCTION

Upper gastrointestinal bleeding (UGIB) remains a frequent cause for emergency endoscopy, and despite the decrease in its incidence, the mortality remains significant and was reported to be as high as 11% at 30 days in cases of peptic ulcer disease[1] with even worse outcomes in

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those who develop UGIB as inpatients[2] or those with severe comorbidities.[3,4] In cases of nonvariceal upper gastrointestinal bleeding (NVUGIB), the major cause is peptic ulcer disease and trends indicate that the rate of hospitalizations from UGIB has decreased.[5-7]

The causes of UGIB and the proportion of each cause varies across geographical regions[7] and is influenced by many factors like the prevalence of H. pylori,[8,9] viral hepatitis, as well as the age demographics of nations which would influence the burden of noncommunicable diseases and their associated morbidities.[10,11] Also, the prevalence of H pylori has changed as well as the age composition of the population and the type and burden of disease in the region, and it has been noticed that the type of endoscopic lesions that are identified on esophagogastroduodenoscopy (EGD) for patients with dyspepsia has changed over time.[12,13]

In prior studies, it was noticed that the prevalence of variceal bleeding was relatively high,[14,15] which might be attributed to numerous reasons. To better understand the current status, we aim in this study to describe the presenting symptoms of UGIB as well as the proportion of NVUGIB as apposed to variceal sources and the temporal trends of endoscopic findings in patients presenting with UGIB over more than a decade.

MATERIALS AND METHODS

This is a retrospective study that was performed at a major tertiary care public hospital in Riyadh (King Saud Medical City), which serves a large population. All patients who underwent an EGD with an indication of UGIB or it was described that the patient presented with hematemesis (including coffee ground vomiting), melena, or both as well as those who had hematochezia, from January 2004 to December 2016 (13 years), were included in the study. Endoscopy reports were reviewed and data collected included: age, sex, comorbidities, antiplatelet or anticoagulation use, whether the patient presented through the emergency room or was an inpatient as apposed to being referred from another institution. The findings on EGD were recorded as well as the description of the lesions that were identified.

Inclusion criteria were: being more than 18 years of age, Saudi nationals. Those with incomplete data as well as those undergoing repeat EGDs for any reason were excluded. No personal identification information or other personal identifiers were recorded to ensure patient confidentiality. The Institutional Review Board approved the study (H1RI-23-Apr18-01).

Statistical analysis

Descriptive statistics were computed for continuous variables, including minimum and maximum values, means, standard deviations, as well as frequencies for categorical variables, when appropriate. If hypothesis testing was used, Pearson's Chi-square *t*-test and, where appropriate, Fisher's exact tests were used. A one-way analysis of variance to test for differences among groups when comparing more than one group was performed when appropriate.

R Studio[16] was used for analysis using the R statistical language. Numerous statistical packages were used for statistical calculations and data visualization. A statistical significance threshold of $P = 0.05$ was adopted. No attempt at imputation was made for missing data.

RESULTS

Demographics

A total of 2075 patients who underwent an EGD for the evaluation of UGIB were included in the study with a mean age of 56.8 years (range 18-113) and males constituted 67.9% of the study population. The majority of patients either presented from the emergency room or were inpatients (93.6%), while the rest were referred from other institutions. Symptom on presentation included: hematemesis (52.5%), melena (31.2%), both hematemesis & melena (15.1%), and hematochezia (1.2%) [Table 1]. Of the complete cohort, 1368 (65.9%) had comorbidities with the most common being hypertension (32.7%) followed by diabetes mellitus (30.4%), cardiac disease (8%), chronic liver disease (7.8%) as well as others. Of the complete cohort, 11.4% were documented to be using antiplatelets, anticoagulants, or both.

Table 1: Characteristics of the study population

Variable	Number = 2075 (mean or %)
Age (years)	56.8
Sex	
Male	1408 (67.9%)
Female	667 (32.1%)
Patient source	
Emergency room or inpatient	1943 (93.6%)
Referred from another hospital	132 (6.4%)
Comorbidities	1367 (65.9%)
Hypertension	679 (32.7%)
Diabetes mellitus	631 (30.4%)
Cardiac disease	166 (8%)
Chronic liver disease	162 (7.8%)
Using antiplatelets, anticoagulants, or both	237 (11.4%)
Presenting symptom	
Hematemesis	1089 (52.5%)
Melena	648 (31.2%)
Hematemesis & melena	313 (15.1%)
Hematochezia	25 (1.2%)

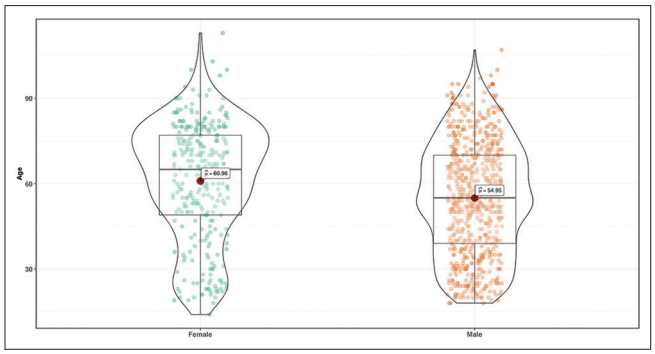

Figure 1: Age of those who presented with upper gastrointestinal bleeding by sex

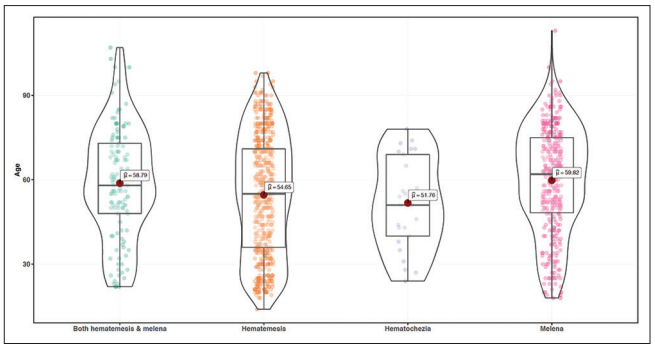

Figure 2: Age of those who presented with upper gastrointestinal bleeding by presenting symptom

In this cohort, females were older than males (61.0 years vs. 55.0 years, $P < 0.01$) [Figure 1]. Also, those presenting with hematochezia tended to be younger (51.8 years) than those with hematemesis (54.7 years), both hematemesis & melena (58.8 years), or melena (59.8 years) ($P < 0.01$) [Figure 2].

Variceal vs. nonvariceal sources of bleeding

The majority of UGIB were from a NVUGIB source (80.5%), while those who had a variceal source of bleeding represented 13.1% of the cohort. No endoscopic findings were found in 6.4% of the cohort [Table 2]. Those with a variceal source of bleeding tended to be older than those with a NVUGIB (60.0 years vs. 56.6 years, $P = 0.03$), respectively [Figure 3]. There was no difference between males (14.2%) or females (13.8%) in the proportion of variceal bleeding ($P = 0.87$). There was no difference between those who had variceal or NVUGIB in terms of those presenting with hematemesis (52.9% vs. 53.9%, $P = 0.81$) or hematochezia (7.0% vs. 10.0%, $P = 0.91$), respectively. Those presenting only with melena are more likely to have a NVUGIB as apposed to a variceal source (30.8% vs. 20.6%, $P < 0.01$), while those presenting with both hematemesis and melena were more likely to have a variceal source compared to a NVUGIB (25.7% vs. 14.2%, $P < 0.01$), respectively [Table 3 and Figure 4].

Endoscopic diagnosis

The most common endoscopic diagnosis for those presenting with a UGIB was gastroduodenal erosions (23.8%), duodenal ulcers (23.5%), reflux esophagitis (16.0%), esophageal varices (12.1%), and gastric ulcers (10.8%). Their remainder of the endoscopic diagnoses as well as the frequency of presentation is presented in Table 2.

Characteristics of ulcers

Duodenal ulcers

These were more common than gastric ulcers and most had low-risk stigmata, comprising of either; clean-based ulcers (38.4%) or pigmented spots (3.9%). A third (33.3%) of them were actively bleeding at the time of endoscopy, while 3.3% had an adherent clot. The stigmata were not described in the endoscopy report in 21.1% of cases [Table 4 and Figure 5a].

Gastric ulcers

These had low-risk stigmata in the form of clean-based ulcers in 33.0% and pigmented spots in 6.3%. Gastric ulcers

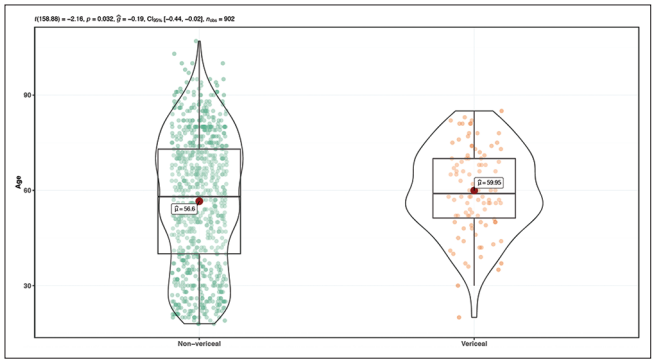

Figure 3: Age comparison between those with a variceal compared to a nonvariceal source of bleeding

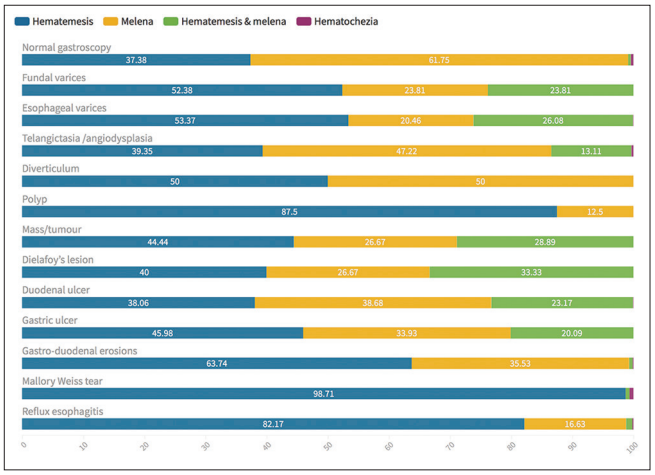

Figure 4: Endoscopic findings in relationship with presenting symptoms

Table 2: Findings on endoscopy (a single patient could have more than one finding on endoscopy)

Variable	Presentation				*P*	Total *N* = 2075
	Hematemesis	Melena	Hematemesis & melena	Hematochezia		
Nonvariceal causes						1671(80.5%)
Reflux esophagitis	247 (74.4%)	50 (15.1%)	30 (9.0%)	5 (1.5%)	< 0.01	332 (16.0%)
Mallory Weiss tear	21 (91.3%)	0 (0.0%)	1 (4.3%)	1 (4.3%)	< 0.01	23 (1.1%)
Gastro-duodenal erosions	296 (59.9%)	165 (33.4%)	27 (5.5%)	6 (1.2%)	< 0.01	494 (23.8%)
Gastric ulcer	103 (46.0%)	76 (33.9%)	45 (20.1%)	0 (0.0%)	0.02	224 (10.8%)
Duodenal ulcer	184 (37.8%)	187 (38.4%)	112 (23.0%)	4 (0.8%)	< 0.01	487 (23.5%)
Dielafoy's lesion	6 (40.0%)	4 (26.7%)	5 (33.3%)	0 (0.0%)	0.25	15 (0.7%)
Mass/tumor	20 (44.4%)	12 (26.7%)	13 (28.9%)	0 (0.0%)	0.06	45 (2.2%)
Polyp	7 (87.5%)	1 (12.5%)	0 (0.0%)	0 (0.0%)	0.25	8 (0.4%)
Diverticulum	2 (50.0%)	2 (50.0%)	0 (0.0%)	0 (0.0%)	0.77	4 (0.2%)
Telangictasia /angiodysplasia	15 (38.5%)	18 (46.2%)	5 (12.8%)	1 (2.6%)	0.17	39 (1.9%)
Variceal source						272 (13.1%)
Esophageal varices	133 (53.0%)	51 (20.3%)	65 (25.9%)	2 (0.8%)	< 0.01	251 (12.1%)
Fundal varices	11 (52.4%)	5 (23.8%)	5 (23.8%)	0 (0.0%)	0.68	21 (1.0%)
Normal gastroscopy	46 (34.8%)	76 (57.6%)	5 (3.8%)	5 (3.8%)	< 0.01	132 (6.4%)

were actively bleeding in 21.9%, or there was a nonbleeding visible vessel in 1.3%. There was an adherent clot found in 2.7% of cases, while the stigmata were not described in 34.8% [Table 4 and Figure 5b].

Time trends

In Figure 6a and b, we demonstrate time trends from January 2004 to December 2016 with regards to the proportion of variceal to NVUGIB as well as the different endoscopic diagnoses. It appears that there has not been much change over time. In 2004, NVUGIB represented 81.7%, while variceal cases were 17.6% of those presenting with UGIB. In 2016, NVUGIB represented 81.2% while variceal cases were 12.8%. There was no identified lesion in 0.8 and 6.7% of cases, respectively, in those years, [Figure 6a and b].

DISCUSSION

UGIB remains a medical emergency and despite the significant advancements made in this field, there remains a question that needs to be addressed in terms of the optimal method of fluid resuscitation (in terms of timing and volume), the role of risk stratification, the optimal timing of endoscopy in relation to the hemodynamic status of patients, in addition to others,[6] and evidence is evolving to further define the optimum management of this patient population.[17]

Table 3: Characteristics comparing patients who were found to have a variceal as apposed to those with a nonvariceal bleed

Variable	Variceal	Non-variceal	*P*
Gender			
Male	14.2%	85.8%	0.87
Female	13.8%	86.2%	
Presenting symptom			
Hematemesis	52.9%	53.9%	0.81
Melena	20.6%	30.8%	< 0.01
Hematemesis & melena	25.7%	14.2%	< 0.01
Hematochezia	7.0%	10.0%	0.91

There has been a major shift in the demographic landscape in Saudi Arabia with a shift from communicable to noncommunicable diseases,[18,19] and we thought it would be worthwhile to evaluate the causes and trends of UGIB in our region.

This study was conducted in a large tertiary care center, open to all strata of the society and thus having a large,

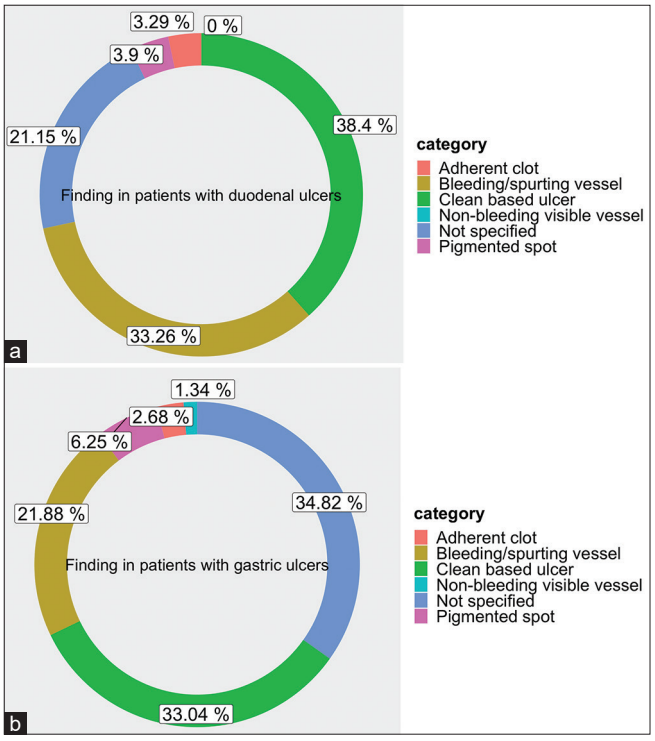

Figure 5: (a). Stigmata found in duodenal ulcers. (b). Stigmata found in gastric ulcers

Table 4: Characteristics of gastric and duodenal ulcers found on endoscopy

Variable	*N* (%)
Gastric Ulcer	(*n* = 224)
Clean based	74 (33.0%)
Bleeding/spurting	49 (21.9%)
Nonbleeding visible vessel	3 (1.3%)
Pigmented spot	14 (6.3%)
Adherent clot	6 (2.7%)
Not specified	78 (34.8%)
Duodenal ulcer	(*n* = 487)
Clean based	187 (38.4%)
Bleeding/spurting	162 (33.3%)
Nonbleeding visible vessel	0 (0%)
Pigmented spot	19 (3.9%)
Adherent clot	16 (3.3%)
Not specified	103 (21.1%)

catchment area and has the advantage of easy access to all nationals, which is in contrast to other major healthcare institutions, which serve specified sectors in the population. This might make the results more generalizable. A considerable proportion of the study population had comorbidities, which is higher than that which was reported in a large population-based study from the United Kingdom (UK), where 46% of those who presented with UGIB had at least one comorbidity and 9% had known cirrhosis.[2] In that study, 36% were found to have peptic ulcer disease and 11% had bleeding varices,[2] which is similar to our findings. Also, in the same study, 28% were using aspirin,[2] which is much higher than that in our study (11.4%). We think that the proportion of patients that were actually using antiplatelets and/or anticoagulants in our study was higher than that reported, but was not documented in the endoscopy reports, considering the proportion of patients with comorbidities.

Although the rate of UGIB related to esophagitis in our study appears to be high (16%), this is less in comparison to a population-based study in the UK (24%).[2] This might be due to the tertiary care nature of the center and the presentation of more severe cases. Also, the rates of gastrodeudenal erosions were similar between this study and the one reported by Hearnshaw *et al*.[2] 23.8% vs. 22%, respectively. Interestingly, the rates of normal EGDs in our study were lower than those reported in the UK (6.4% vs. 17%)[2] which might reflect the composition of the patients seen at our center as apposed to the community. Compared to a study from Iran, the rates of gastric and duodenal ulcers were lower in our study (44% vs. 34%), but the patients in the former study reported a high rate of use of Asprin or nonsteroidal anti-inflammatory drugs (75%).[20]

The characteristics of the bleeding stigmata of ulcers are time sensitive and are subject to change based on the

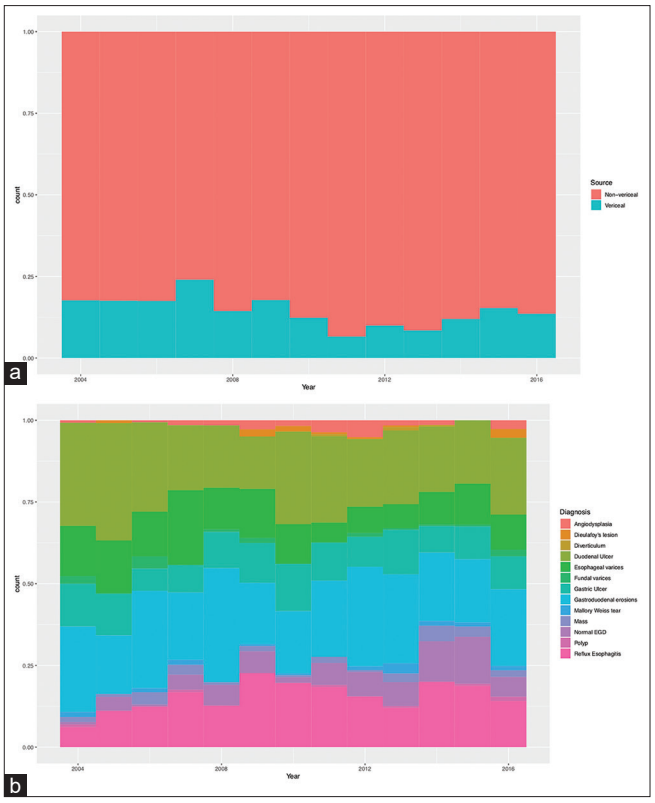

Figure 6: (a). Time trends comparing variceal and nonvariceal source of upper gastrointestinal bleeding. (b). Time trends comparing different endoscopic diagnoses of upper gastrointestinal bleeding

timing of the endoscopy from presentation, as well as the pre-endoscopic management that is given to patients, with a longer duration of therapy associated with the down-staging of bleeding lesions.[16,21] Although the usual practice is that EGDs are performed within 24 h of presentation, unfortunately our study did not capture that variable and as such we could not ascertain whether pre-endoscopic management affected the stigmata that were identified.

In a study from the eastern region of Saudi Arabia, that included 200 patients who had UGIB, the two most common findings were duodenal ulcers followed by esophageal varices.[15] While a study from our center that looked at patients who were admitted to a UGIB unit from May 1996 to April 1998 found that 45% of patients had esophageal varices (14.5% had associated fundal varices) as a cause of bleeding and the mortality was 15.8%.[14] Of note, only about half of the patients in that study were Saudi nationals and the hospital was known for caring for expatriates with portal hypertension either due to cirrhosis from viral hepatitis or Schistosomiasis. A second study prior to that from the same hospital over a 5-year period after 1981 and that included 1,593 patients found esophageal varices (19.3%) and peptic ulcer disease (16.5%)

were the most common causes of UGIB.[22] While during that period in 1988, a study from the same region described the prevalence of esophageal varices to be 40% in those with UGIB.[23] Similarly, a report from the western region of Saudi Arabia described a high prevalence in esophageal varices as a cause of bleeding (29.8%), which was still high even while evaluating data of only Saudi nationals (27%).[24] These studies span back to more than two decades and the prevalence of HBV at the time was high in the country but has decreased since then,[25] but at the same time those who are affected by the virus have aged and are more likely to manifest long-term complications associated with HBV, which include portal hypertension.[26]

It is clear from the prior studies in the region that variceal bleeding used to be a major cause of UGIB.[14,15,22,24,27,28] It is possible that the relatively short duration of our study could not capture the changes that were described in these studies. Whether this decrease in variceal bleeding reflects better primary prevention through vaccination for HBV or treatment of HCV, or reflects better secondary prevention in terms of the use of beta-blockers or prophylactic variceal banding remains to be proven.

Due to the retrospective nature of the study, there were missing values especially in the description of stigmata of duodenal and gastric ulcers. The H pylori status in this cohort was also not available to us and would have been an important factor in the explanation of the proportion of causes of UGIB in our population. It would have been of value to have pertinent clinical data for this cohort of patients including their presenting vital signs, laboratory investigations, and the clinical outcomes of these episodes of UGIB in terms of length of hospitalization, intensive care admission, and mortality. This would be a field of future research as this study focused on describing the basic findings on EGD of those presenting with UGIB.

In conclusion, this study demonstrated that NVUGIB compose the majority of cases presenting with UGIB and that variceal bleeding is lower than that described in prior studies but there were no clear trends in the proportion of causes of UGIB during the study duration. Future studies looking into the 30-day mortality as well as other important patient reported outcomes are needed.

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Conflicts of interest

There are no conflicts of interest.

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