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Health Service Research

Consultations for gastroenteritis in general practice and out-of-hours services in Norway 2006–15

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Abstract

Background. Most of the patients with gastroenteritis seeking health care services are managed in primary care; yet, little is known about these consultations. Syndromic-based surveillance of gastrointestinal infections is used in several countries, including Norway.
Aim. To investigate the extent of, and explore characteristics associated with, consultations for gastroenteritis in primary care and to compare consultations in daytime general practice and out-of-hours (OOH) services in Norway.
Design and Setting. Registry-based study using reimbursement claims data from all consultations in general practice and OOH services in Norway over the 10-year period, 2006–15.
Methods. The main outcome variable was whether the consultation took place in general practice or OOH services. Possible associations with patient age and sex, time and use of point-of-care C-reactive protein (CRP) testing and sickness certificate issuing were investigated.
Results. Gastroenteritis consultations (n = 1 281 048) represented 0.9% of all consultations in primary care (n = 140 199 637), of which 84.4% were conducted in general practice and 15.6% in OOH services. Young children and young adults dominated among the patients. Point-of-care CRP testing was used in 36.1% of the consultations. Sickness certificates were issued in 43.6% of consultations with patients in working age. Age-specific time variations in consultation frequencies peaking in winter months were observed.
Conclusions. The proportion of gastroenteritis consultations was higher in the OOH services when compared with daytime general practice. Young children and young adults dominated among the patients. The seasonal variation in consultation frequency is similar to that shown for gastroenteritis caused by norovirus.

Key words: Epidemiology, gastroenteritis, general practice, health services research, primary health care.

Background

Gastroenteritis is an inflammation of the gastrointestinal tract caused by a pathogenic microbe. A common, symptom-based definition of a gastroenteritis case is an individual who experiences ≥3 loose stools, or any vomiting, in 24 hours, excluding cases where these symptoms are explained by known noninfectious reasons (1). Gastroenteritis is one of the leading causes of morbidity and mortality in low-income countries (2). In high-income countries, gastroenteritis is rarely lethal, and most patients experience self-limiting symptoms without seeking medical care (3–6). Still, in these countries, gastroenteritis has considerable socioeconomic costs (3, 7) and is of public health interest as the condition tends to appear in outbreaks (8–10).

Key Messages

- Consultations for gastroenteritis represented 0.9% of all consultations.
- Young children and young adults were the most common patients.
- Number of consultations for gastroenteritis was higher in winter months.

The agents causing gastroenteritis include a variety of viruses, bacteria, parasites and toxins. Stool samples are generally not submitted from primary care as most infections resolve in a few days without treatment. When stool samples are submitted, the infective agent is most commonly either viral or not identified (11–14). Spread of infections through international travel is of concern (15), and several of the microbes known to cause gastroenteritis are on the WHO priority list of antibiotic-resistant bacteria (16). Previous studies describe trends in seasonality for different agents causing gastroenteritis (17–23), although studies of seasonal trends in gastrointestinal infections in primary care are lacking.

Infectious disease surveillance systems are traditionally based on laboratory-confirmed cases. However, near real-time syndromic-based surveillance systems based on data from primary care that are not laboratory confirmed are established in several European countries, including Norway (24, 25). In the Norwegian Syndrome Surveillance System (NorSySS), gastroenteritis is defined by the ICPC diagnoses 'D11 Diarrhoea', 'D70 Gastrointestinal infection' and 'D73 Gastroenteritis, presumed infection'.

Most of the consultations in primary care in Norway are carried out in the general practice surgery during opening hours, including daytime emergency consultations. Additionally, emergency medical services are organized as out-of-hours (OOH) services either with general practitioners on duty in the municipalities, or as 24-hour emergency services in some of the larger cities.

When individuals with gastroenteritis seek health care, they are generally managed in primary care. Yet, little is known about these consultations in terms of prevalence in primary care, patient characteristics and seasonal variations. Scientific knowledge about gastroenteritis in primary care is useful for clinicians, public health professionals interpreting surveillance data and for health service planners.

The aims of this study were to investigate the extent of, and explore characteristics associated with, consultations for gastroenteritis in primary care and to compare consultations in daytime general practice and OOH services in Norway.

Materials and methods

All residents in Norway are entitled to have a general practitioner (GP) as part of the national public health care system. The GPs are the first port of call, provide comprehensive care and act as gatekeepers to secondary care. Point-of-care C-reactive protein (CRP) testing is widely used in general practice and OOH services in Norway.

Doctors in general practice and OOH services send reimbursement claims electronically to the Norwegian Health Economics Administration (HELFO). The reimbursement claims include information about the doctor (ID-number) and patient (unique personal identifier and sex), date and time for the contact and diagnoses for each contact. The reimbursement claims also contain information on actions such as point-of-care CRP testing and issues of sickness certificate as part of the individual consultations, as these actions are reimbursed.

The data from the reimbursement claims are registered prospectively in real-time and collected in the national KUHR database. In this study, we used data from KUHR from all consultations by attendance in general practice and OOH services during the 10-year period, 2006–15. Daytime activity data from work days from the 24-hour emergency services in Bergen (the second largest city in the country) are not included in this study, as they are not registered in the KUHR database.

Variables

We defined a consultation as a patient's physical encounter with a doctor, focusing on clinical cases being eligible to further examination and treatment. Consultations made electronically, by home visits or telephone were not included in this study. We defined a 'gastroenteritis consultation' as a consultation with one or more of the following ICPC codes: 'D11 Diarrhoea', 'D70 Gastrointestinal infection' and 'D73 Gastroenteritis, presumed infection', which are the codes defining gastroenteritis in NorSYSS (25).

The registry predefines type of service, and we could further categorize this variable into 'general practice' and 'OOH service'. We categorized patient age into the following ten categories: 0–4, 5–14, 15–24, 25–34, 35–44, 45–54, 55–64, 65–74, 75–84, and ≥85 years. Patient sex is predefined in the registry. Due to privacy concerns, the Norwegian Data Protection Authority would only accept quarter of a year as the most detailed level of the time variable for this study. Quarter refers to time period of year for the consultations as follows: January–March, April–June, July–September and October–December. We further categorized time period into summer (combining April–June and July–September quarters) and winter seasons (combining October–December and January–March quarters). For the analyses of sickness certificate issues, we included consultations with patients aged 20–67 years only.

Statistics

The data were analysed using Stata/MP 15.0 for Windows and Microsoft Excel 2010 for frequency and bivariate analyses.

We calculated the proportion of gastroenteritis consultations as the percentage of total consultations for any diagnosis. The main outcome variable was whether the consultations took place in general practice or in the OOH services. Possible associations with patient age and sex, time of year for the consultations, use of point-of-care CRP testing and sickness certificate issuing in the consultations were investigated by bivariate statistics. The high numbers of observations in the data material made even small differences and associations significant at the <.05 significance level.

Results

Over the 10-year period, 2006–15, there were 140 199 637 consultations in primary care in Norway. Of these, 127 389 382 (90.9%) were in general practice and 12 810 255 (9.1%) in OOH services. There were 1 281 048 gastroenteritis consultations: of these 1 081 774 (84.4%) were conducted in general practice and 199 274 (15.6%) in the OOH services. This constitutes 0.9% of all consultations in primary care, corresponding to 0.8% of consultations in general practice and 1.6% of consultations in the OOH services.

Female patients contributed to 57.9% of consultations for any diagnosis: 58.4% in general practice and 52.5% in OOH services. The sex difference was less pronounced in the gastroenteritis consultations, with 52.8% female patients: 53.2% in general practice and 50.5% in OOH services (Table 1).

Mean patient age was 46.1 years for consultations for any diagnosis: 47.2 years in general practice and 35.1 years in OOH services (Table 1). Patients aged 55–64 years had the highest number of consultations (14.2%). Mean age was 32 years for the patients in gastroenteritis consultations: 33.6 years in general practice and 22.8 years in OOH services (Table 1). Children aged 0–4 years accounted for the highest number of gastroenteritis consultations, followed by young adults aged 25–34 years, in general practice and OOH services (Fig. 1).

Sex distribution by age for consultations with any diagnosis in primary care showed a majority of boys in the two lowest age categories 0–4 years (54.3%) and 5–14 years (50.7%): 54.0% and 50.4%, respectively, in general practice, and 55.2% and 52.2%, respectively, in OOH services. This finding was also observed for the gastroenteritis consultations in primary care (55.5% and 55.6% for the two age groups, respectively): both in general practice (55.9% and 56.4%) and OOH services (54.5% and 52.9%).

The numbers of all consultations for any diagnosis increased steadily every year over the 10-year period, from 12 295 867 consultations in 2006 to 15 185 884 consultations in 2015 (23.5% increase). This increase was seen in both general practice and OOH services until 2012, but in the following years, there was a slight decrease in the number of consultations in OOH services. Mean annual number of gastroenteritis consultations was 128 104, and the overall trend in number of gastroenteritis consultations was an increase from 120 624 in 2006 to 133 091 consultations in 2015 (10.3% increase). However, the proportion of gastroenteritis consultations decreased from 1% in 2006 to 0.9% in 2015, due to an even higher increase in consultations for any diagnosis.

The number and proportion of gastroenteritis consultations showed a bi-annual cycle through the whole period. This pattern of

Table 1. Characteristics of consultations for any diagnosis and for gastroenteritis in primary care (general practice and OOH services) in Norway 2006–15

	Consultations for any diagnosis						Gastroenteritis consultations					
	GP + OOH		GP		OOH		GP + OOH		GP		OOH	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Total	140199637	100[a]	127389382	90.9[a]	12810255	9.1[a]	1281048	100[a]	1081774	84.4[a]	199274	15.6[a]
Sex												
Male	59049592	42.1	52958422	41.6	6091170	47.6	604732	47.2	506176	45.8	98556	49.5
Female	81149996	57.9	74430921	58.4	6719075	52.5	676314	52.8	575597	53.2	10717	50.5
Missing	49		39		10		2		1		1	
Age (years)												
Mean age	46.1		47.2		35.1		32		33.6		22.8	
0–4	7469970	5.3	5699054	4.5	1770916	13.8	272460	21.3	197329	18.2	75131	37.7
5–14	8044813	5.7	6632863	5.2	1411950	11.0	99295	7.8	76687	7.1	22608	11.4
15–24	12912593	9.2	10962960	8.6	1949633	15.2	159053	12.4	134797	12.5	24256	12.2
25–34	17936332	12.8	16204321	12.7	1732011	13.5	210226	16.4	185194	17.1	25032	12.6
35–44	19466283	13.9	17906604	14.1	1559679	12.2	157587	12.3	142206	13.2	15381	7.7
45–54	19361034	13.8	18077251	14.2	1283783	10.0	121612	9.5	111026	10.3	10586	5.3
55–64	19962550	14.2	18834073	14.8	1128477	8.8	108508	8.5	99578	9.2	8930	4.5
65–74	16469661	11.8	15611736	12.3	857925	6.7	74381	5.8	67453	6.2	6928	3.5
75–84	13145913	9.4	12430614	9.8	715299	5.6	54530	4.3	48060	4.4	6470	3.3
85–	5430438	3.9	5029866	4.0	400572	3.1	23394	1.8	19443	1.8	3951	2.0
Missing	50		40		10		2	0	1	0	1	0
Season												
January–March	36239587	25.9	33101417	26.0	3138170	24.5	375655	29.3	315345	29.2	60310	30.3
April–June	34630198	24.7	31357589	24.6	3272609	25.6	296551	23.2	244100	22.6	52451	26.3
July–September	32226854	23.0	29069703	22.8	3157151	24.7	288290	22.5	246625	22.8	41665	20.9
October–December	37102998	26.5	33860673	26.6	3242325	25.3	320552	25.0	275704	25.5	44848	22.5
CRP												
Yes	21663935	15.5	17534547	13.8	4129388	32.2	462609	36.1	348200	32.2	114409	57.4
No	118535702	84.6	109854835	86.2	8680867	67.8	818439	68.9	733574	67.8	84865	42.6
Sickness cert.[b]												
Yes	20658152	23.1	19997369	24.2	660783	9.3	320313	43.6	300743	45.9	19570	24.8
No	68938272	76.9	62522490	75.8	6415782	90.7	414071	56.4	354848	54.1	59223	75.2
Total	89596424	100	82519859	100	7076565	100	734384	100	655591	100	78793	100

Distribution within sex, age, season, centrality, point-of-care CRP and sickness certificate is given by column if not otherwise stated.

[a]Distribution of service type (GP and OOH services) within consultations for any diagnosis and gastroenteritis consultations, respectively

[b]Analyses of sickness certificate are restricted to patients aged 20–67 years.

variation was observed for both general practice and OOH services (Fig. 2), and most pronounced for the age category 0–4 years in both service types (data not shown). To further investigate this pattern, we organized the data according to winter and summer seasons, as the shift of the year splits each winter season. These analyses did not show a similar bi-annual cycle from one winter season to the next (data not shown).

Quarterly distribution of consultations for any diagnosis in primary care was nearly equal throughout the four quarters, although slightly more of the consultations were observed during the months October–December (26.5%) and January–March (25.9%). In contrast, gastroenteritis consultations peaked during January–March (29.3%) followed by October–December (25.0%), both in general practice and OOH services (Table 1). This variation for gastroenteritis consultations by quarter was most evident for the age categories, 0–4, 5–14 and 25–34 years (Fig. 3). For other age groups, the number of gastroenteritis consultations in both service types was more equally distributed through the quarters.

Point-of-care CRP testing took place in 15.5% of the consultations for any diagnosis: in 13.8% of the consultations in general practice and in 32.2% of the consultations in the OOH services (Table 1). Among gastroenteritis consultations, point-of-care CRP testing was used in 36.1% of the consultations: in 32.2% of the consultations in general practice, when compared with 57.4% in OOH services (Table 1).

Among patients in the working age (age group 20–67 years), sickness certificates were issued in 23.1% of the consultations with any diagnosis: 24.2% in general practice and 9.3% in the OOH services (Table 1). Sickness certificates were issued in 43.6% of the gastroenteritis consultations: 45.9% in general practice and 24.6% in OOH services (Table 1). We observed an equal sex distribution among patients in gastroenteritis consultations with sickness certificates issued in both general practice and OOH services (data not shown).

Discussion

Summary

Gastroenteritis consultations represented 0.9% of all consultations by encounter in primary care in Norway during the years 2006–15, of which 84.4% took place in general practice and 15.6% in OOH services. The number of gastroenteritis consultations was higher during the winter months with little change from one winter season to the next. The most common patient was either a young child or young adult, with young children dominating even more so in the OOH services. These two age groups also contributed the most to the observed peak in number of gastroenteritis consultations in the winter months.

Strengths and limitations

A main strength of this study was the use of complete registry data from nearly all consultations in general practice and OOH services in

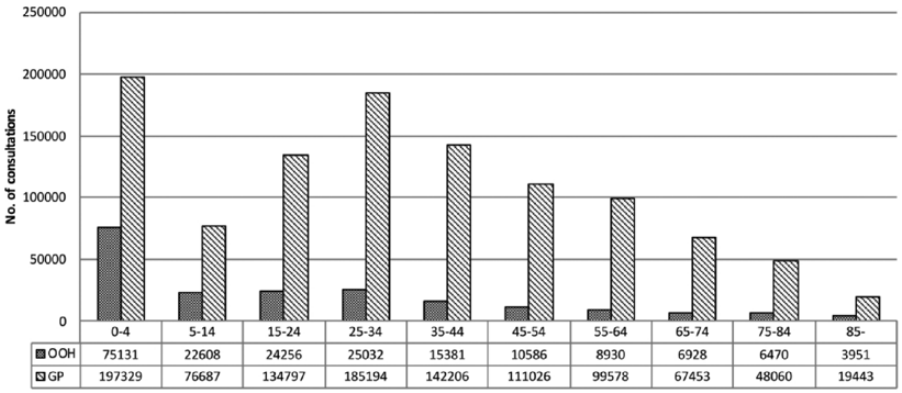


Figure 1. Number of gastroenteritis consultations in primary care by age group and service type [general practice (GP) and OOH services]. Norway, 2006–15. Total number of gastroenteritis consultations = 1281046 (2 missing).

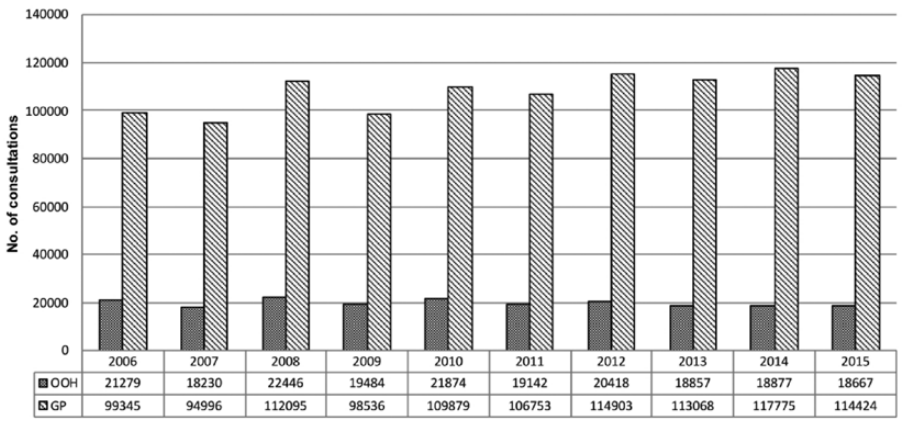
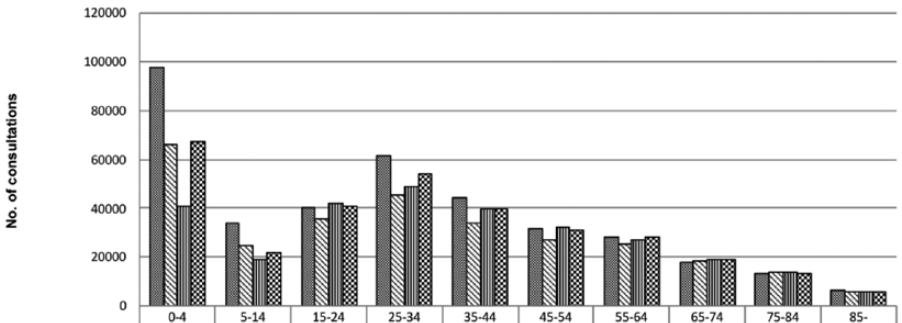


Figure 2. Gastroenteritis consultations in primary care by year and service type [general practice (GP) and OOH services]. Norway, 2006–15. Total number of gastroenteritis consultations = 1281048.



	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85-
January-March	97746	34184	40432	61663	44412	31486	28063	18104	13407	6157
April-June	66291	24712	35646	45725	34087	26772	25196	18247	13950	5925
July-September	40938	18744	41912	48994	39664	32502	27086	18756	13877	5817
October-December	67486	21655	41063	53844	39424	30852	28163	19274	13296	5495

Figure 3. Number of gastroenteritis consultations in primary care (general practice and OOH services) by age group and quarter of a year. Norway, 2006–15. *N* = 1281047 (1 missing).

Norway, thereby considerably reducing selection bias. Reimbursement claims data have been shown to be informative in monitoring disease activity in primary care, and promising in syndromic surveillance of gastrointestinal disease but yet having low sensitivity and low positive predictive value in detecting outbreaks (14, 26, 27). The current study has some limitations. A part of reimbursement claims from the 24-hour emergency services in Bergen (daytime consultations from work days) are not reported, leading to a minor underreporting of consultations in OOH services. Further, claims from consultations by e-mail, home visits and telephone were not included in the current study. Due to the nature of gastroenteritis as a contagious disease, we believe that the use of telephone consultations is considerable, but probably more for administrative purposes, such as sickness certificates, than for disease management. The lack of telephone consultations and home visits may challenge the external validity specifically in the context of syndromic surveillance, as our findings do not reflect the total activity in primary care. However, this study was designed to analyze the face-to-face consultation activity concerning gastroenteritis. Another limitation is the lack of precision in the time variable. Ideally for the analyses of seasonality, we should have had information about the exact date or week number for the consultations.

Possible misclassification of the disease (gastroenteritis) may challenge the internal validity. Awareness of different coding behaviour in general practice and OOH services, as well as specific diagnosis being chosen to justify actions (e.g. sickness certificate), is important in interpreting the data. Our definition of a gastroenteritis consultation including D11 'Diarrhoea', but not D10 'Vomiting', is not completely in line with a common definition (1), but was chosen to be in line with the definition used by the Norwegian Syndromic Surveillance System (25). As a result, consultations for diarrhoea of other causes than gastroenteritis are included, but gastroenteritis consultations coded with D10 'Vomiting' are missed. Studies on the validity of these diagnoses and the diagnostic algorithm are lacking.

The perspective of this study was from the health care services, and the entity in the study was the consultation for (not patients with) gastroenteritis. Thus, it cannot be used for estimating the prevalence of gastroenteritis in the Norwegian population nor in primary care. Also, it cannot be used to precisely estimate the extent of absence from work due to gastroenteritis.

Interpretation/comparison with existing literature

Many gastrointestinal infections exhibit some kind of seasonality (28) and the mechanisms of seasonality are thought to vary for the different pathogens (20), including factors such as variability in temperature and humidity, start of school year, geographical localization on either Northern or Southern Hemisphere and level of country development (19,21,23). Norovirus infections seem to have a seasonal pattern with peaks in the cooler months, i.e. December through February in the Northern Hemisphere and June through August in the Southern Hemisphere (17, 29). The present study includes gastroenteritis due to all possible pathogens, but the observed pattern of seasonality is in line with that known for norovirus infection on the European continent (30). Also, our findings of high consultation numbers for gastroenteritis among young children, and that the boys account for the majority of gastroenteritis consultations among those under the age of 15 years, are in line with a Dutch study of norovirus infection in primary care (14). Studies from Sweden (3) and the UK (13, 31) also present highest consultation rates among the youngest children. Our findings of young adults as the second most common patient group suggest transmission between child and carer supported by findings from an Australian population-based study of the risk of gastroenteritis (20). Rotavirus infection should be considered as one major cause of gastroenteritis among children under 2 years of age. In older children and in adults, rotavirus most often presents as asymptomatic or subclinical reinfections. A Norwegian study of hospitalized children reported rotavirus infections peaking in March through May (18). Rotavirus vaccination was introduced in Norway in 2014 (at the end of our study period); thus, we were not able to evaluate any potential effect of the vaccine introduction based on 1 year of observations only.

We observed a bi-annual variation in gastroenteritis consultations, but this was not seen when organizing the data according to winter–summer variation. This likely reflects whether the main impact of winter vomiting disease (probably norovirus) hit the population before or after the shift of each year.

During the 10-year period, there was a small increase in the absolute number of gastroenteritis consultations. This corresponds mainly with the increase in the Norwegian population during the same period.

Our finding of a higher proportion of point-of-care CRP testing in consultations for gastroenteritis in OOH services when compared with general practice has also been described in a previous Norwegian study (32). We find the use of CRP surprisingly high, but we do not have clinical information about the reason for the testing, nor the results of these tests.

Implications for clinical care and research

To the best of our knowledge, this is the first study to present complete national registry data on gastroenteritis patients' encounters with primary care doctors over a 10-year period. The results of this study are highly relevant when interpreting data for syndromic surveillance of gastroenteritis based on routine data from primary care. Increased knowledge of the typical patients (age and sex) expected to be seen in consultations for gastroenteritis throughout the year and service type would be useful for the doctors managing the patients in primary care. We think that our results are generalizable at least to countries in the Northern Hemisphere with a primary care system similar to Norway. Future research should study illness trajectories in patients with gastroenteritis managed in primary care. More detailed information about time and geography of the consultations would be useful in future studies of the syndromic surveillance of gastroenteritis. Adding clinical data from the consultations, such as symptoms and severity, and information about stool sampling and results, would further improve the understanding of gastroenteritis in primary care. Also, further research is needed to investigate any benefits of point-of-care CRP-testing for gastroenteritis.

In conclusion, the proportion of gastroenteritis consultations was higher in the OOH services when compared with daytime general practice. The most frequent patients with gastroenteritis in primary care were young children and young adults, with young children dominating even more so in the OOH services. The observed seasonal variation in consultations frequency is similar to that shown for gastroenteritis caused by norovirus on the Northern Hemisphere. These results should be useful for health service planners as well as surveillance systems and clinicians in countries with a comprehensive primary care system.

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Declaration

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Conflict of interest: None.

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