Original Article

Working Hours Related to Good Quality of Work Life (QoWL) among Doctors Working in Public Hospitals in Northeastern Thailand

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Objective: Our aims were (1) to assess the maximum working hours per week relating to good QoWL among doctors in public hospitals in northeastern Thailand; and, (2) to assess the factors relating to good QoWL.

Materials and Methods: A cross-sectional analytical study was conducted in 206 good QoWL doctors and 428 not-good QoWL doctors. The Thai Work-related Quality of Life Scale questionnaire was used (THQoWL). Descriptive statistics and multiple logistic regressions were applied and odds ratio with 95% CI presented.

Results: Among both the good and not-good QoWL doctors, there were no significant differences vis-a-vis males vs. females, having no underlying disease(s), province worked in, and hospital level (secondary/tertiary). The majority of good QoWL doctors were older than 40, married, working in a university hospital, being a specialist, doing shiftwork (up to 100 h/month), less in working hours per week, and having savings. The majority of not-good QoWL doctors were general practitioners. Maximum working hours of 50, 60, 70, 80, 90, and 100 h/week were associated with good QoWL; however, 50 h/week had the strongest association (AOR 3.11, 95% CI: 1.98, 4.88, $p<0.001$). Other significant related factors were: being in a leadership position; having savings; working at a university hospital; and, doing shift work up to 100 h/month.

Conclusion: Working 50 h/week was most strongly associated with good QoWL; thus, to improve the QoWL among doctors working hours should be limited.

Keywords: Quality of working life (QoWL), Doctors, Working hours, Work-related Quality of Life Scale

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In Thailand, the government policy is 1 doctor per 1,500 population, but the real ratio is much greater[1]. The distribution of doctors is part of the problem. In 2009, the number of practicing physicians was ~30,000; among whom ~12,000 were working in public hospitals, administered by the Permanent Secretary, Ministry of Public Health (MoPH). The MoPH provides medical service for most of the population[2,3]. A study by the MoPH reported that doctors work on average 94 hours per week[4]. Buppasiri et al reported that most interns work more than 80 hours per week[5]. Prolonged working hours affect health and safety of both doctors and patients[6-8], as well as quality of work life (QoWL)[9]. The QoWL of doctors can be assessed using score from Thai work-related quality of life scale-2 (Thai WRQLS-2)[9] which includes the home-work interface dimension taking into account working hours. In the US, the Accreditation Council for Graduate Medical Education (ACGME) developed a duty-hour standard in 2003 (revised in 2010), limiting resident working hours to 80 hours per week[10]. In the UK, the European Working Time Directive (EWTD) was implemented in the UK in 1998 and applied it to junior doctors in 2004, limiting working hours to 48 hours per week: the same as the International Labour Organization (ILO) working time standard[11,12]. The Labour Protection Act (No. 2) 2008 (BE 2551) regulated time worked by Thai employees to not more than 48 hours per week, albeit the Act did not include government employees[13]. The Thai Medical Council began surveying Thai doctors working time and earnings since 2006. Committees were appointed to review previous studies from other countries and to provide guidance. In 2016, the Council recommended working hours not exceed 80 hours per week[14].

According to Somsila et al working hours might play a vital role in good QoWL[9]. The study was done among

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residents at a university hospital and solely referred to cut-off hours of 80 h/week according to the ACGME. The current study thus focused on various maximum working hours per week as related to QoWL among Thai doctors in public hospitals.

Materials and Methods

Study design, setting, and sample size calculation

A cross-sectional analytic study was conducted in 80 public hospitals in 4 provinces (viz., Khon Kaen, Mahasarakham, Roi Et, and Kalasin), constituting Health Area 7, in northeastern Thailand, between 15 May and 15 June 2017. Participants were Thai doctors working in public hospitals; including both men and women, and various positions, specialties, years of work, and hospital levels. The inclusion criteria were Thai doctors working in public hospitals (i.e., regional, general, and university) for at least 3 months until the day of completing the questionnaire. Doctors on sabbatical were excluded.

The sample size was calculated using WinPepi version 9.2. The proportions (multiple logistic regression) of two dependent groups or sample menus were compared. Significance was set at 5%, with a power of 80%. The sample ratio was 1: 2. The odds ratios and proportions were as stated by Somsila et al[9]. As a result, the required sample was at least 128 with good QoWL and 256 with not-good QoWL. To reach 128 with good QoWL, a pool of 585 respondents might be needed. With a 40% expected loss rate, 1,462 questionnaires needed to be distributed. Since there were about 1,995 doctors in the area, all of them were invited to complete the questionnaire. After getting back the responses, we discovered 206 doctors with good QoWL and 428 with not-good QoWL.

Tools

The data were collected using a self-administered online questionnaire, containing 2 parts: (a) work-related quality of life scale-2 online website (THQWL) and personal and occupational information. The THQWL was developed from the paper-based Thai version of a work-related quality of life scale-2 (Thai WRQLS-2), which has been used among Thai doctors and nurses[9,15]. The THQWL comprises 32 questions. Each question uses a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree), with 6 negative questions (reversed scored). The total score of the QoWL was divided into three levels-low (31 to 71 points), moderate (72 to 113 points), and high (114 to 155 points)-and one overall (OVL) with seven subscales (viz., employee engagement (EET); control at work (CAW); home-work interface (HWI); general well-being (GWB); job and career satisfaction (JCS); working condition (WCS), and stress at work (SAW)). A high total score indicated a good QoWL while moderate and low levels indicated not-good QoWL.

Data analyses

Stata 10.1 for Windows and Microsoft Excel 2016 were used for the analyses. The principal analyses using multiple logistic regressions and stratified analyses determined: (a) the participant characteristics (b) the relationship between hours worked and QoWL (c) the crude odds ratios (COR) with 95% confidence intervals (95% CI), and (d) the adjusted odds ratio (AOR) with 95% CI. In order to determine which factors to put into the model, we reviewed the relevant literature, and considered multicollinearity, the results from backward Stepwise regression, and the results from stratified analyses.

Ethical considerations

The study protocol was reviewed and approved by the Ethics Committee for Human Research, Khon Kaen University. The protocol was also approved by other organizations in the Thai Health Area 7. The data collection was permitted by the hospital directors. The participants freely decided to answer the questionnaire. Participant information was kept anonymous and confidential.

Results

Characteristics of the participants

Among the doctors with either good or not-good QoWL, the demographic characteristics that were similar included: sex, having no underlying disease, province worked in (i.e., Khon Kaen, Mahasarakham, Roi Et, Kalasin), and hospital level (i.e., secondary or tertiary hospital). By contrast, the majority of the 206 doctors with good QoWL were over 40 years of age, married, working in a university hospital, a specialist, doing shiftwork up to 100 h/month, working fewer hours per week, and having savings. Of the 428 doctors with not-good QoWL, the majority were general practitioners (Table 1).

Bivariate analyses of personal vs. work factors vis-a-vis QoWL

The result of the bivariate logistic regression analyses revealed that the significantly related factors to good QoWL were: being older than 40 (COR 4.27, 95% CI: 2.75, 6.66, $p<0.001$); being married (OR 2.53, 95% CI: 1.74, 3.67, $p<0.001$); having non-communicable diseases (NCDs; OR 2.15, 95% CI: 1.34, 3.45, $p = 0.007$); not having stress-related diseases (OR 1.55, 95% CI: 1.07, 2.24, $p = 0.015$); working in a university hospital (OR 1.64, 95% CI: 1.15, 2.33, $p = 0.004$); working longer than 10 years (OR 3.80, 95% CI: 2.59, 5.57, $p<0.001$); being a leader (OR 3.40, 95% CI: 2.07, 5.60, $p<0.001$); being a specialist (OR 3.46, 95% CI: 2.41, 4.97, $p<0.001$); having shiftwork not more than 100 h/month (OR 2.49, 95% CI: 1.72, 3.64, $p<0.001$); not having health hazards (OR 4.72, 95% CI: 2.92, 7.69, $p<0.001$); and, having savings (OR 2.64, 95% CI: 1.84, 3.80, $p<0.001$). The bivariate analyses between maximum working hours per week and QoWL showed a significant relationship with good QoWL; the strongest association with good QoWL was at 90 h/week (OR 3.94, 95% CI: 2.56, 6.08, $p<0.001$) and 50 h/week (OR 3.89, 95% CI: 2.58, 5.84, $p<0.001$) (Table 2).

Table 1. Comparison of participant characteristics between the good and not-good QoWL groups (n = 634)

Characteristic	QoWL, n (%)		*p*-value
	Good (206)	Not-good (428)	
Age group			
Up to 30 years	81 (39.3)	284 (66.4)	<0.001
>30 to 40 years	55 (26.7)	98 (22.9)	
>40 to 50 years	33 (16.0)	35 (8.2)	
>50 to 60 years	30 (14.6)	9 (2.1)	
>60 years	7 (3.4)	2 (0.5)	
Sex			
Male	99 (48.1)	182 (42.5)	0.189
Female	107 (51.9)	246 (57.5)	
Marital status			
Single or separate	119 (57.8)	332 (77.6)	<0.001
Married	87 (42.2)	96 (22.4)	
No underlying diseases (n = 226)	76 (36.9)	150 (35.1)	0.649
With underlying diseases (n = 408)			
Allergy	63 (30.6)	143 (33.4)	0.467
Non-communicable diseases (NCDs)	44 (21.4)	48 (11.2)	0.001
Stress-related diseases	64 (31.1)	176 (41.1)	0.015
Others	19 (9.2)	42 (9.8)	0.814
Province			
Khon Kaen	157 (76.2)	311 (72.7)	0.727
Mahasarakham	16 (7.8)	33 (7.7)	
Roi Et	17 (8.3)	46 (10.8)	
Kalasin	16 (7.8)	38 (8.9)	
Organization			
University hospital	127 (61.7)	212 (49.5)	0.004
Permanent secretary, MoPH	79 (38.3)	216 (50.5)	
Hospital level			
Secondary hospitals	31 (15.0)	85 (19.9)	0.142
Tertiary hospital	175 (85.0)	343 (80.1)	
Years of work			
Up to 5 years	74 (35.9)	268 (62.6)	<0.001
>5 to 15 years	62 (30.1)	108 (25.2)	
>15 years	70 (34.0)	52 (12.2)	
Work role			
Leaders	49 (23.8)	36 (8.4)	<0.001
Practitioners	157 (76.2)	392 (91.6)	
Specialty			
Having a specialty	125 (60.7)	132 (30.8)	<0.001
No specialty; GP, intern, resident	81 (39.3)	296 (69.2)	
Shiftwork			
Up to 100 h/month	149 (72.3)	219 (51.2)	<0.001
>100 h/month	57 (27.7)	209 (48.8)	
Working hours			
<40 h/week	17 (8.3)	14 (3.3)	<0.001
41 to 50 h/week	55 (26.7)	38 (8.9)	
51 to 60 h/week	33 (16.0)	46 (10.7)	
61 to 70 h/week	31 (15.0)	46 (10.7)	
71 to 80 h/week	24 (11.7)	59 (13.8)	
81 to 90 h/week	16 (7.8)	53 (12.4)	
91 to 100 h/week	12 (5.8)	57 (13.3)	
101 to 110 h/week	6 (2.9)	49 (11.4)	
111 to 120 h/week	10 (4.9)	27 (6.3)	
>120 h/week	2 (1.0)	39 (9.1)	
Health hazards			
No	61 (29.6)	35 (8.2)	<0.001
Yes	145 (70.4)	393 (91.8)	
Finances			
Savings	138 (67.0)	186 (43.5)	<0.001
No savings	68 (33.0)	242 (56.5)	

Bivariate analyses of personal vs. work factors vis-a-vis QoWL

Table 2. Bivariate logistic regression analyses of personal vs. work factors & QoWL (n = 634)

Factor	Good QoWL, n (%)	Crude OR	95% CI	*p*-value
Age		4.27	2.75, 6.66	<0.001
>40 years old (n = 116)	70 (60.3)			
≤40 years old (n = 518)	136 (26.3)			
Marital status		2.53	1.74, 3.67	<0.001
Married (n = 183)	87 (47.5)			
Single or separate (n = 451)	119 (26.4)			
Underlying diseases: NCDs		2.15	1.34, 3.45	0.007
Yes (n = 394)	44 (47.8)			
No (n = 542)	162 (29.9)			
Underlying disease: stress-related diseases		1.55	1.07, 2.24	0.015
No (n = 394)	142 (36.0)			
Yes (n = 240)	64 (26.7)			
Organization		1.64	1.15, 2.33	0.004
University hospital (n = 339)	127 (37.5)			
Permanent secretary, MoPH (n = 295)	79 (26.8)			
Years at work		3.80	2.59, 5.57	<0.001
>10 years (n = 176)	96 (54.5)			
≤10 years (n = 458)	110 (24.0)			
Job role		3.40	2.07, 5.60	<0.001
Leader (n = 85)	49 (57.6)			
Practitioner (n = 549)	157 (28.6)			
Specialties		3.46	2.41, 4.97	<0.001
Having a specialty (n = 257)	125 (48.6)			
No specialty; GP, intern, resident (n = 377)	81 (21.5)			
Shiftwork		2.49	1.72, 3.64	<0.001
≤100 h/month (n = 368)	149 (40.5)			
>100 h/month (n = 266)	57 (21.4)			
Maximum working hours per week				
50 h/week (n = 124)	72 (58.1)	3.89	2.58, 5.84	<0.001
60 h/week (n = 203)	105 (51.7)	3.50	2.46, 4.99	<0.001
70 h/week (n = 280)	136 (48.6)	3.83	2.70, 5.44	<0.001
80 h/week (n = 363)	160 (44.1)	3.86	2.63, 5.63	<0.001
90 h/week (n = 432)	176 (40.7)	3.94	2.56, 6.08	<0.001
100 h/week (n = 501)	188 (37.5)	3.84	2.26, 6.51	<0.001
Health hazards		4.72	2.92, 7.69	<0.001
No (n = 96)	61 (63.5)			
Yes (n = 538)	145 (27.0)			
Finances		2.64	1.84, 3.80	<0.001
Savings (n = 324)	138 (42.6)			
No savings (n = 310)	68 (21.9)			

Multivariate analyses of maximum working hours per week and good QoW

Multivariate analyses of maximum working hours per week and good QoWL

Multiple logistic regressions of maximum working hours per week and good QoWL showed that maximum working hours was significantly related to good QoWL. The maximum working hours of 50 hours per week had the strongest association with good QoWL (AOR 3.11, 95% CI: 1.98, 4.88, $p<0.001$) (Table 3).

Analysis of maximum working hours per week & good home-work interface (HWI)

Maximum working hours was significantly related to good HWI where 50 hours per week had the strongest association with a good HWI according to both the bivariate and multivariate analyses (OR 5.29, 95% CI: 3.14, 8.24 & AOR 4.17, 95% CI: 2.66, 6.54) (Table 4).

Multivariate logistic regression analysis of related factors & good QoWL

The multivariate logistic regression analysis revealed that the maximum working hours of 50 hours per week had the strongest association with good QoWL (AOR 3.11, 95% CI: 1.98, 4.88, $p<0.001$). Other factors significantly related to good QoWL included: working in a university hospital (AOR 1.82, 95% CI: 1.20, 2.74); being a leader (AOR 2.85, 95% CI: 1.61, 5.06, $p<0.001$); having shiftwork not more than 100 hours per month (AOR 1.53, 95% CI: 1.01, 2.33, $p = 0.046$); and, having savings (AOR 2.29, 95%

CI: 1.55, 3.38, p<0.001) (Table 5).

Discussion

This is the first analytic study focusing on maximum working hours per week of Thai doctors and QoWL. In the study, about 33% of the doctors worked over 80 hours per week, which is comparable to Somsila et al, who found that about 35% of residents worked longer than 80 hours per week[9]. In contrast, with the previous studies, Padungtod et al found that on average MoPH doctors worked 94 hours per week while the doctors in more advanced hospitals trended to work longer hours[4]. Buppasiri et al reported that 80 to 90% of first-year interns worked longer than 80 hours per week[5]. The differences might be due to the different sample sizes. In the current study, data were collected on the diverse characteristics of the participating doctors; for instance, junior vs. senior, intern vs. staff, and working for 1 or more years.

As for the working hours and QoWL, obviously, the numbers of doctors with good QoWL was decreased when increased working hours (Table 1). In the same way of other previous studies, longer working hours was associated with lower quality of life[18,19], higher burnout rate[20-22] and higher quitting work[23-25]. However, it was not mentioned before about working hours that would be associated with the QoWL. Binary logistic regression of maximum working hours per week showed that all cut-off hours were associated and cut-off hours of 90 hours per week had strongest crude odds ratio (Table 2).

QoWL can also be influenced by other personal and occupational factors as presented in Table 2. Comparing to other studies, increasing age and years of work can be related to less burnout[20]. As for being married, having NCDs, and having specialties, the Pearson correlation among the respective factors was relatively high in relation to age and

Table 3. Association of maximum working hours per week and good QoWL (adjusted OR)

Maximum per week	Crude OR	95% CI	Adjusted OR	95% CI	p-value
50 (n = 124)	3.89	2.58, 5.84	3.11	1.98, 4.88	<0.001
60 (n = 203)	3.50	2.46, 4.99	2.52	1.68, 3.78	<0.001
70 (n = 280)	3.83	2.70, 5.44	2.81	1.87, 4.24	<0.001
80 (n = 363)	3.86	2.63, 5.63	2.72	1.76, 4.22	<0.001
90 (n = 432)	3.94	2.56, 6.08	2.69	1.67, 4.35	<0.001
100 (n = 501)	3.84	2.26, 6.51	2.31	1.29, 4.12	0.005

Analysis of maximum working hours per week & good home-work interface (HWI)

Table 4. Association of maximum working hours per week & good HWI (adjusted OR)

Maximum per week	Crude OR	95% CI	Adjusted OR	95% CI	p-value
50 (n = 124)	5.29	3.48, 8.04	4.17	2.66, 6.54	<0.001
60 (n = 203)	4.19	2.89, 6.07	3.04	2.04, 4.52	<0.001
70 (n = 280)	4.80	3.32, 6.96	3.67	2.45, 5.50	<0.001
80 (n = 363)	4.26	2.88, 6.36	2.98	1.94, 4.56	<0.001
90 (n = 432)	4.29	2.75, 6.85	2.93	1.83, 4.69	<0.001
100 (n = 501)	4.82	2.74, 8.96	3.06	1.69, 5.55	<0.001

Multivariate logistic regression analysis of related factors & good QoWL

Table 5. Association between personal & work factors & good QoWL (adjusted OR)

Factor	Crude OR	95% CI	Adjusted OR	95% CI	p-value
Maximum 50 h/week	3.89	2.58, 5.84	3.11	1.98, 4.88	<0.001
Being a leader	3.40	2.07, 5.60	2.85	1.61, 5.06	<0.001
Having savings	2.64	1.84, 3.80	2.29	1.55, 3.38	<0.001
Working in a university hospital	1.64	1.15, 2.33	1.82	1.20, 2.74	0.005
Shiftwork ≤100 h/month	2.49	1.72, 3.64	1.53	1.01, 2.33	0.046
Having specialties	3.46	2.41, 4.97	1.52	0.95, 2.42	0.078
Being older than 40	4.27	2.75, 6.66	1.41	0.81, 2.45	0.229
Being married	2.53	1.74, 3.67	1.37	0.86, 2.16	0.185
Not having stress-related diseases	1.55	1.07, 2.24	1.26	0.85, 1.87	0.253

Table 6. Duty hour limitations & average working hours for physicians in different countries

Country/organization	Duty hours limitation (hr/wk)	Average working hours (hr/wk)
ILO[12]	48	NA
US[10,21]	80	51
Japan[21]	40	53.2
European Union[11,21]	48	46.3
New Zealand[21]	72	50 to 70
Thailand		
Labour Protection Act (No. 2)[13]	48	94 hr[4]; >80 hr 80 to 90%[5];
Guideline for Thai Physician's Work Time Regulation[14]	80	>80 hr 35%[9];
Residency training program in Emergency Medicine[29]	60	>80 hr 42.7% (this study)

years of work such that the trends were similar. Despite the fact that stress happens to everyone, those diagnosed with stress-related diseases had a significantly lower quality of life[26].

In order to determine the optimal maximum working hours per week, a multiple logistic regression with stratified analysis and a backward Stepwise method was used. The adjusted odds ratios in Table 3 shows that all cut-off hours were associated, but the cut-off with the strongest odds ratio was 50 hours per week (AOR 3.11, 95% CI 1.98, 4.88, $p<0.001$). Since HWI is a dimension of QoWL directly associated with working hours, a bivariate and multivariate logistic regression analyses of the maximum working hours per week and HWI was done. The cut-off of 50 hours per week had the strongest adjusted odds ratio (AOR 4.17, 95% CI 2.66, 6.54, $p<0.001$) (Table 4).

Focusing on a cut-off of 50 hours per week, the odds ratio was adjusted using multiple logistic regression with stratified analysis and backward Stepwise method for age group, marital status, history of stress-related diseases, type of hospital (university or MoPH hospital), leadership position, having a specialty, shiftwork, and financial status (Table 5). The strongest associated factor for good QoWL was working hours (AOR 3.11, 95% CI 1.98, 4.88, $p<0.001$). According to Somsila et al (2015)[9], residents who worked ≤80 hours per week trended to have good QoWL-2.3 times greater than working >80 hours per week.

Being a leader might also contribute to good QoWL (AOR 2.85, 95% CI: 1.61, 5.06, $p<0.001$) because of being in control at work (CAW). CAW is one dimension of QoWL that is involved with (a) being able to voice opinions and influence changes in the area of work, (b) involving in decisions that affect ones in their own area of work, (c) involving in decisions that directly affect members of the public, and (d) having sufficient opportunities to question ones' leaders about change at work[27]. The strongest adjusted odds ratio of being a leader was in CAW (AOR 4.51, 95% CI: 2.53, 8.03, $p<0.001$).

The association of working in a university hospital and QoWL was not mentioned in any other studies. In the current research, it was found that doctors working in a university hospital trended to have a good QoWL; 1.82 times greater than doctors working in a MoPH hospital (AOR 1.82, 95% CI: 1.20, 2.74, $p = 0.005$). An analyses of the dimensions of QoWL was done, and the strongest adjusted odds ratio for working in a university hospital was in job and career satisfaction (JCS) (AOR 3.01, 95% CI: 1.99, 4.54, $p<0.001$). JCS was involved with (a) a clear set of goals and aims to do the job, (b) the opportunity to use ones' abilities at work, (c) being acknowledged when for a job well done, (d) being encouraged to develop new skills, (e) career opportunities, and (f) receiving training suitable for applying to the current job[27]. Working in a university hospital may offer these things aspects accounting for its positive effect on QoWL.

Having shift work of not more than 100 hours per month was associated to good QoWL. A similar finding was reported by Somsila et al (2015)[9]. Having savings was related to good QoWL (AOR 2.29, 95% CI: 1.55, 3.38, $p<0.001$). It was reported that residents whose financial status was negative would have a higher burnout score[28]. Likewise, having savings was related to a higher proportion of doctors who had a good result of stress at work dimension (SAW) (AOR 2.25, 95% CI: 1.24, 4.07, $p = 0.007$).

Duty hour limitations for physicians exist in some countries (Table 6). Thai physicians, however, work longer hours than other countries in contrast to the Guideline for Thai Physician's Work Time Regulation, and the limitation imposed by The Labour Protection Act (No. 2) BE 2551. If the Labour Protection Act were applied to Thai physicians, which it is not, there might be a marked improvement in QoWL and HWI.

Conclusion

The maximum working hour per week that influenced the most on QoWL among the doctors in Health Area 7 public hospitals was 50. Other factors significantly related to good QoWL are: working in a university hospital, being a leader, doing shiftwork not more than 100 hour per month, and having savings. In order to improve the QoWL among the doctors, the number of working hours might be limited to 50.

What is already known on this topic?

The Thai WRQLS-2 is a tool for measuring QoWL as applied to Thai health workers, including doctors[9,15]. Thai doctors working in public hospital have inordinately high working hours[4,5], and working hours might play a key role in contributing to good QoWL[13]. A study on working hours related to QoWL among Thai doctors in public hospital has not yet been conducted.

What this study adds?

This study confirmed that working hours plays an important role in contributing to good QoWL. The results of this research can be generalized to Thai doctors working in public hospitals. The maximum working hours per week with the strongest association to good QoWL was 50. In addition, the optimal working hours was the most important factors for improving QoWL.

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Potential conflict of interest

The authors declare no conflicts of interest.

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