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Attitudes towards patient safety culture among postgraduate nursing students in China: A cross-sectional study

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ABSTRACT

Patient safety is crucial to healthcare quality. It is important to assess the nursing students' safety attitudes to identify the weaknesses for developing education program and fostering students' engagement in patient safety practices. This study aimed to assess attitudes towards patient safety culture among postgraduate nursing students in China, and explore the factors that affect their safety attitudes and the relationships of safety attitudes and safety-related behaviors. This study used a cross-sectional survey design. A convenience sample of 231 postgraduate nursing students from ten medical universities in China completed the Chinese version of Safety Attitude Questionnaire, including six domains: teamwork climate, safety climate, perceptions of management, job satisfaction, working conditions and stress recognition. The mean scores of the six domains ranged from 65.22 to 70.75 on a 100-point scale. Percentages of positive responses for the six domains were below 55%, with the two lowest percentages for working conditions (35.9%) and safety climate (30.7%). Significantly lower domain scores were found in students with younger age, no work experience, higher workload and received safety education. There were positive correlations between the six domains and safety-related behaviors except for stress recognition. Nursing educators should focus more on the improvement of patient safety education and establishment of supportive work environment to enhance postgraduate nursing students' attitudes towards safety culture.

1. Introduction

Patient safety is defined as the avoidance and prevention of injuries or adverse events resulting from the processes of health care (Nieva and Sorra, 2003), and has been recognized as a central element of healthcare organizations. Nurses play an important role in ensuring patient safety due to the nature of their work (Kirwan et al., 2013). The Quality and Safety Education for Nurses (QSEN) emphasizes patient safety and quality in essential nursing competencies (Kim et al., 2018).

Nursing students constitute a distinct subgroup of healthcare providers in the complex healthcare system. Nursing students may lack the required skills and knowledge to improve patient safety and tend to make errors in the complex clinical settings, which may have negative effects on patient and students. Nursing education is faced with the challenge to equip the students with the essential knowledge, skills and attitudes to improve patient safety (Mansour, 2015). It is important to understand the patient safety attitudes among nursing students in order to assess the weakness and aspects that are needed improvement.

1.1. Background

The Institute of Medicine has emphasized the importance of creating patient safety culture in healthcare organizations to improve patient safety and quality of care (Lee et al., 2017). Patient safety culture is defined as the shared values, attitudes, competencies and patterns of behavior related to patient safety within an organization (Nieva and Sorra, 2003). Safety culture is a fundamental factor to seek quality in healthcare. Positive patient safety culture is related to higher safety-related performance. Accumulating reports have demonstrated that better safety culture in healthcare organizations contributes to lower incidence of adverse events and improved patient outcomes (Huang et al., 2010; Mardon et al., 2010; Wang et al., 2014). To maintain the

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positive safety culture requires regularly assessment of the healthcare providers' attitudes towards safety culture (Elsous et al., 2017). Assessing safety attitudes allows organizations to identify the strengths and weaknesses of patient safety and the aspects that are required improvement (El-Jardali et al., 2010).

Nurses are more likely to recognise, intercept, and correct errors that are life-threatening than any other healthcare providers (Rothschild et al., 2006). Healthcare providers with positive safety attitudes are more likely to engage into safe-related behaviors (Neal and Griffin, 2006). An increasing number of studies have focused on the nurses' attitudes towards patient safety culture to identify the areas that need to be improved, and found that age, gender, educational level and workload were related to nurses' safety attitudes (Elsous et al., 2017; Soh et al., 2018; Xiao et al., 2012).

Nursing students may have unique perspectives of patient safety culture for their transient role on medical teams. Their attitudes towards safety culture can highlight areas of strength and weakness in both educational and clinical settings. Several studies have explored the nursing students' knowledge, attitudes and competences of patient safety, and the findings can be used to identify areas for curricula development, such as error disclosure, communication skills to support error disclosure and reporting, and safe handoffs, or cultivate students to engage in patient safety practices (Bowman et al., 2013; Mansour, 2015; Stevanin et al., 2015; Usher et al., 2017).

Patient safety is particularly important in China for the occurrence of medical errors is one reason of increasing contradictions between healthcare providers and patients (Zhou et al., 2018). Managers are paying more attention on patient safety training, education and management with the purpose of improving patient safety and patient care. Master of nursing specialist (MNS) education was started in 2010 to cultivate advanced practice nurses in China. The curriculum design for MNS education has not been unified. The core courses include advanced health assessment, advanced nursing practice, clinical nursing practice and evidence-based nursing (Sun et al., 2015). Clinical practice is essential in the training of MNS students, and the duration of clinical practice ranges from 18 to 24 months (Luo et al., 2018). Nursing educators focus more on developing MNS students' clinical practice ability, however, patient safety education is less emphasized. There is still no special nursing curriculum on patient safety. Little is known about the attitudes towards patient safety culture among postgraduate nursing students in Chinese setting.

Therefore, the objectives of this study were as follows: (1) to assess the attitudes towards patient safety culture from the perspective of Chinese postgraduate nursing students to identify areas that need improvements, (2) to explore the factors that affect the students' safety attitudes, (3) and to identify the relationships of the students' safety attitudes and safety-related behaviors.

2. Methods

A cross-sectional survey was conducted to collect data from postgraduate nursing students in China.

2.1. Participants

Using a convenience sampling, 231 postgraduate nursing students were recruited from ten universities from Chongqing, Sichuan, Heilongjiang, Jilin, Liaoning, Guizhou, Guangdong and Hubei province. The eligibility criteria were: enrolled on a three-year MNS education, currently practicing in the clinical settings, and willing to participate in this study. Exclusion criteria was those with duration of clinical practice less than one month.

2.2. Measures

The self-report questionnaire consisted of three parts: demographic and clinical practice-related variables, the Chinese version of Safety Attitude Questionnaire (SAQ), and safety-related behaviors. The demographic and clinical practice-related variables included gender, age, employment experience, grade, workload and whether received relevant education about patient safety.

The SAQ was used to assess the students' attitudes towards patient safety culture. The SAQ was developed to measure healthcare providers' attitudes regarding patient safety (Sexton et al., 2006). The SAQ was one of the most recommended instruments measuring patient safety culture and was demonstrated a strong relation between obtained score and patient outcomes. The SAQ has been translated into Chinese and tested for psychometric properties (Guo and Zhou, 2010). The Chinese version of SAQ (C-SAQ) consists of 31 items with six domains: teamwork (six items), safety climate (seven items), perceptions of management (four items), job satisfaction (five items), working conditions (five items) and stress recognition (four items). The items were rated by a five-point Likert scale (1 = strongly disagree to 3 = Neutral to 5 = strongly agree). The C-SAQ has good reliability and validity and has been used in various settings (Guo and Zhou, 2010; Qian et al., 2018; Xiao et al., 2012). Higher scores indicate more positive safety attitudes.

Safety-related behaviors were assessed by five items derived from the Patient Safety Behaviour Scale for Medical Staff developed by Tang et al. (2016). It includes 21 items, such as collaboration, reporting adverse events, invasive procedure, aseptic technique and preventing complications. Five items from this scale were selected and modified to measure the nursing students' safety-related behaviors. Each item was rated using a five-point Likert scale (1 = never to 5 = always). An example item was: "I experience good collaboration with nurses during clinical practice".

2.3. Data collection

Data was collected using an online survey from July to November 2017. The questionnaire was put on a Free Questionnaire Platform. Then we contacted with the nursing teachers in the universities. The objectives of the survey, inclusion criteria of participants and submission deadline were informed to the students by nursing teachers in their own students' online management groups. If the eligible students agreed to participate in this survey, they were asked to response to the questions according to the instructions in the questionnaire. The teachers reminded the students to respond one week before submission deadline.

2.4. Ethical considerations

The study protocol was approved by the ethics committee of the first affiliated hospital of Chongqing Medical University. The survey was completely confidential and voluntary. The students were informed that submitting the completed questionnaire was considered implied consent.

2.5. Statistical analysis

Data analyses were performed using the SPSS 20.0 (IBM Corporation, Armonk, NY). The score of the C-SAQ was converted to a 0–100 point scale for analysis (1 = 0, 2 = 25, 3 = 50, 4 = 75 and 5 = 100) (Sexton et al., 2006). The negatively worded questions were reversed. A score $\geq$75 indicates a positive attitude towards patient safety culture. The percentage of positive scores ($\geq$75 out of 100) were calculated for each item and domain. Categorical data were calculated by frequencies and percentages, and the continuous data by means with standard deviations (SD). The mean score of each domain was compared with participants' demographic and clinical practice-related variables (gender, age, work experience, grade, workload and experience of patient safety education) by using *t*-test and ANOVA. Pearson's

Table 1
Sample characteristics and comparisons of C-SAQ domains (n = 231).

	N (%)	Teamwork climate	Safety climate	Perceptions of management	Job satisfaction	Working conditions	Stress recognition
Gender							
Male	16 (6.9)	70.05 ± 17.09	64.29 ± 17.20	69.53 ± 15.79	62.81 ± 17.89	63.44 ± 21.66	65.63 ± 20.16
Female	215 (93.1)	67.05 ± 16.86	66.30 ± 15.43	69.30 ± 16.64	66.49 ± 19.89	65.35 ± 17.57	71.13 ± 19.25
		P = 0.494	P = 0.618	P = 0.958	P = 0.474	P = 0.680	P = 0.272
		t = 0.686	t = −0.499	t = 0.053	t = −0.718	t = −0.413	t = −1.101
Age (years)							
< 25	81 (35.1)	64.04 ± 15.79	63.23 ± 14.86	65.82 ± 17.20	62.84 ± 20.00	63.27 ± 18.59	71.99 ± 18.86
25-29	115 (49.8)	67.94 ± 17.20	66.96 ± 15.38	70.05 ± 15.72	67.09 ± 18.38	66.39 ± 16.87	70.11 ± 20.22
≥30	35 (15.1)	72.50 ± 16.98	70.31 ± 16.68	75.00 ± 16.26	71.29 ± 22.50	65.86 ± 19.23	70.00 ± 17.66
		P = 0.038*	P = 0.058	P = 0.018*	P = 0.086	P = 0.472	P = 0.775
		F = 3.326	F = 2.890	F = 4.094	F = 2.483	F = 0.752	F = 0.255
Work experience							
Yes	57 (24.7)	76.24 ± 14.71	72.06 ± 14.74	76.32 ± 16.27	73.33 ± 19.74	68.33 ± 19.87	72.81 ± 19.50
No	174 (75.3)	64.32 ± 16.50	64.22 ± 15.33	67.03 ± 16.04	63.91 ± 19.23	64.20 ± 17.05	70.08 ± 19.27
		P < 0.001**	P = 0.001**	P < 0.001**	P = 0.002**	P = 0.129	P = 0.356
		t = 4.858	t = 3.379	t = 3.783	t = 3.190	t = 1.525	t = 0.925
Grade							
1	91 (39.4)	65.89 ± 17.01	65.39 ± 16.74	67.79 ± 17.87	64.73 ± 19.64	64.34 ± 18.74	69.30 ± 18.79
2	79 (34.2)	66.77 ± 15.52	65.55 ± 14.29	69.07 ± 14.94	64.56 ± 19.81	65.82 ± 15.33	74.53 ± 18.50
3	61 (26.4)	69.95 ± 18.20	68.09 ± 15.28	71.93 ± 16.44	70.66 ± 19.44	65.74 ± 19.62	68.03 ± 20.67
		P = 0.331	P = 0.526	P = 0.316	P = 0.125	P = 0.835	P = 0.093
		F = 1.110	F = 0.644	F = 1.157	F = 2.101	F = 0.180	F = 2.396
Workload							
< 16 h/w	49 (21.2)	68.79 ± 16.84	69.61 ± 13.91	71.43 ± 14.38	74.08 ± 16.26	71.53 ± 14.76	65.18 ± 20.05
16–32 h/w	43 (18.6)	69.86 ± 17.25	67.69 ± 14.91	69.91 ± 18.56	68.02 ± 17.56	67.44 ± 17.77	67.73 ± 17.04
33–48 h/w	98 (42.4)	67.60 ± 16.52	66.18 ± 16.31	70.28 ± 15.83	63.47 ± 22.27	61.22 ± 18.11	72.64 ± 19.15
> 48 h/w	41 (17.8)	61.89 ± 16.68	60.37 ± 14.98	63.87 ± 17.87	61.59 ± 16.64	61.22 ± 18.83	76.07 ± 19.61
		P = 0.130	P = 0.035*	P = 0.131	P = 0.006**	P = 0.012*	P = 0.026*
		F = 1.901	F = 2.918	F = 1.896	F = 4.273	F = 3.706	F = 3.140
Received patient safety education							
Yes	184 (79.7)	69.91 ± 16.45	67.49 ± 15.64	70.52 ± 16.58	68.64 ± 18.91	66.71 ± 17.64	70.65 ± 20.22
No	47 (20.3)	56.92 ± 14.34	60.94 ± 14.04	64.63 ± 15.76	56.81 ± 20.28	59.36 ± 17.56	71.14 ± 15.51
		P < 0.001**	P = 0.010*	P = 0.029*	P < 0.001*	P = 0.011*	P = 0.856
		t = 4.951	t = 2.612	t = 2.195	t = 3.772	t = 2.552	t = −0.181

*P < 0.05,**P < 0.01.

correlation analysis was used to examine the relationship between the two variables. Cronbach's α was used to evaluate the internal consistency of the C-SAQ. P < 0.05 (two-tailed) was considered statistical significance.

3. Results

3.1. Participants characteristics

The participants characteristics are presented in Table 1. The mean age of the 231 participants was 26.39 (SD = 3.51) years, with a range from 22 to 43 years old. The majority were female (93.1%). Before enrolling on the MNS education, 75.3% were never employed. Among them, 91 (39.4%) were in their first grade, 79 (34.2%) in their second grade, and 61 (26.4%) in their third grade. 184 (79.7%) students received patient safety education during clinical practice.

3.2. Participants' attitudes towards patient safety culture

The Cronbach's α of the C-SAQ was 0.93 in this study, and Cronbach's α for the six domains ranged from 0.75 to 0.89. The scores and percentages of positive response of the six domains of C-SAQ are listed in Table 2. The mean scores of the six domains ranged from 65.22 to 70.75 on a 100-point scale. The highest score was 70.75 ± 19.32 for stress recognition, and the lowest score was 65.22 ± 17.83 for working conditions. Percentages of positive response for the six domains were all below 55%. On average, 51.5% of students hold positive attitudes towards stress recognition, followed by perception of management (45.5%), job satisfaction (40.3%), teamwork climate (39%), working conditions (35.9%) and safety climate (30.7%). The scores and percentages of positive response of the items are shown in Table S1.

Table 2
The scores and percentages of positive responses of C-SAQ domains (n = 231).

	Mean (SD)	Positive response N (%)
Teamwork climate	67.26 (16.85)	90 (39.0)
Safety climate	66.16 (15.53)	71 (30.7)
Perceptions of management	69.32 (16.55)	105 (45.5)
Job satisfaction	66.23 (19.74)	93 (40.3)
Working conditions	65.22 (17.83)	83 (35.9)
Stress recognition	70.75 (19.32)	119 (51.5)

Related factors with six domains of C-SAQ are shown in Table 1. Older students had significantly higher scores for teamwork climate (P = 0.038) and perception of management (P = 0.018). The students with work experience had higher scores in teamwork climate (P < 0.001), safety climate (P = 0.001), perception of management (P < 0.001) and job satisfaction (P = 0.002). Students with lower workload scored significantly higher within the domain of safety climate (P = 0.035), job satisfaction (P = 0.006) and working conditions (P = 0.012), and scored lower within the domain of stress recognition (P = 0.026). Students who received patient safety education scored higher among all the six domains except for stress recognition. Gender and grade were not significantly associated with any domain of C-SAQ.

3.3. Relationship between C-SAQ domains and safety-related behaviors

Scores of students' safety-related behaviors showed low proportion of students performed better safety-related behaviors (Table 3). Pearson's correlation analysis showed the six domains of C-SAQ except for stress recognition were positively correlated with good collaboration with nurses and physicians, adhering to aseptic operating procedures,

Table 3
Scores of safety-related behaviours (n = 231).

Item	Mean (SD)	Never	Seldom	Sometimes	Often	Always
		N(%)	N(%)	N(%)	N(%)	N(%)
I experience good collaboration with nurses during clinical practice	3.12 (1.14)	18 (7.8)	53 (22.9)	73 (31.6)	56 (24.2)	31 (13.4)
I experience good collaboration with physicians during clinical practice	3.02 (1.15)	22 (9.5)	57 (24.7)	75 (32.5)	49 (21.2)	28(12.1)
I strictly adhere to aseptic operating procedures during clinical practice	3.28(0.99)	3 (1.3)	52 (22.5)	82 (35.5)	65 (28.1)	29 (12.6)
I have reported adverse events during clinical practice	2.69 (1.12)	39 (16.9)	60 (26.0)	81 (35.1)	36 (15.6)	15 (6.5)
I actively learn knowledge about patient safety during clinical practice	3.11 (1.03)	15 (6.5)	46 (19.9)	87 (37.7)	64 (27.7)	19 (8.2)

Table 4
Relationship between C-SAQ domains and safety-related behaviours (n = 231).

	Teamwork climate	Safety climate	Perceptions of management	Job satisfaction	Working conditions	Stress recognition
Collaboration with nurses	0.466**	0.293**	0.253**	0.240**	0.203*	0.055
Collaboration with doctors	0.422**	0.256**	0.224**	0.221**	0.149*	0.076
Strictly adhering to aseptic operating procedures	0.385**	0.227**	0.222**	0.194**	0.168*	0.033
Reporting adverse events	0.321**	0.210**	0.204**	0.208**	0.137*	0.059
Actively learning knowledge about patient safety	0.428**	0.319**	0.255**	0.266**	0.193**	0.088

*P < 0.05, **P < 0.01.

reporting adverse events and actively learning knowledge about patient safety (Table 4).

4. Discussion

4.1. Main findings

To our best knowledge, this is the first study to focus on attitudes towards patient safety culture among postgraduate nursing students. We used the C-SAQ to investigate the Chinese postgraduate nursing students' safety attitudes to identify the weaknesses for developing education program that is practical and relevant to the students' experience. The percentages of positive responses to safety domains reported by postgraduate nursing students were below the international standard (60%) (Lee et al., 2010). This indicated that postgraduate nursing students hold negative attitudes towards patient safety culture. Their safety attitudes were varied by age, work experience, workload and patient safety education. Our study also demonstrated that students' safety attitudes were associated with their safety-related behaviors.

The two domains of working conditions and safety climate presented the biggest weaknesses in the students' evaluations. Nursing working conditions were found to be related to patient safety outcomes and quality of care (Aiken et al., 2012). The low positive response to working conditions (35.9%) indicated that most students were not satisfied with the quality of work environment, logistics supports and training of new personnel. This may increase the risk of adverse events. Safety climate refers to the perception of a strong organizational commitment to safety. In this study, 42.4% of students considered it was difficult to speak up about nursing errors. Lee et al. (2018) also found that medical students had difficulty speaking up about medical errors. About 50% of students in our study reported they were encouraged by colleagues to report any patient safety concerns they may have, which was similar to Lee et al. (2018). Fear of speaking up is a common issue in medical students for their positions in the traditional medical system (Bowman et al., 2013). Nursing students usually weight their decisions when speaking up their concerns in order to be accepted in the nursing team (Levett-Jones and Lathlean, 2009). Organizational climate had a significant influence on nursing students' avoidance to challenge perceived unsafe practices (Andrew and Mansour, 2014).

Stress recognition was the most perceived safety factor in our study, which was inconsistent with the previous studies among nurses in department of emergency and cardiology and cardiovascular surgery (Ozer et al., 2015; Xiao et al., 2012). This suggested that students were able to recognize how stressors may have negative impact on patient safety. As previously described, nursing students were frequently exposed to high levels of stress during clinical practice, such as clinical incompetence, heavy work overloads and fear of making errors or mistakes (Blomberg et al., 2014). It may contribute to more aware of risk of error commitment when they feel fatigue (Elsous et al., 2016).

Perception of management measures healthcare providers approval of managerial action. Perception of management received the second highest scores, which was supported by previous studies among nurses (Elsous et al., 2017; Lee et al., 2010). Management actions to promote patient safety are essential to support and reinforce safe practices (Elsous et al., 2017). Our results suggested that students would have positive safety attitudes when more resources and supports were provided by management.

The importance of job satisfaction and teamwork climate cannot be ignored. Previous study showed that institutions where nurses were dissatisfied with their job were prone to make an increasing incurrence of adverse events and medication errors (Kunaviktikul et al., 2015). The negative attitudes towards job satisfaction domain indicated that students were not satisfied with their work experience during clinical practice, which may influence their work enthusiasm and acceptance future quality improvement measures. Teamwork has been demonstrated to be related to decreased avoidable errors, improved patient outcomes and better job satisfaction (Kalisch et al., 2010; Pettker et al., 2011). The percentage of positive response to teamwork climate in our study was 39%, which was lower than previous findings among nurses (Elsous et al., 2017; Ozer et al., 2015; Xiao et al., 2012).

Some of the factors examined in the present study contributed to the variance in the domain scores of C-SAQ. Lower scores were observed for teamwork climate and perception of management in the group of younger students, which supported the previous studies (Elsous et al., 2017; Xiao et al., 2012). Older students may be more professionally responsible and put more emphasis on patient safety than younger ones (Elsous et al., 2017). Students with employment experience had higher scores than those without work experience. A possible explanation could be that work experience made them more familiar with patient care, better teamwork ability and better safety attitudes. Workload was significantly associated with safety climate, job satisfaction, working conditions and stress recognition in this study. As indicated in the present study, 60.2% students worked more than 32 h per week. When workload increased, the stress among students would be more likely to be recognized and their job satisfactions were lower. Wu et al. (2013) also found that longer work hours were associated with lower patient safety grade.

In our study, nearly 80% of students received patient safety education during their clinical practice, and students who received safety education hold more positive attitudes towards safety culture. Though most medical universities have initiated to attach importance to patient safety education and establishment of safety environment, students reported low percentage (below 55%) of positive responses to safety factors in this study. This could be explained that universities usually provide theoretical or abstract patient safety education which students find difficult to use in practice, and inconsistencies exist between the educators' conceptualization and students' perception of patient safety (Lee et al., 2018; Lukewich et al., 2015; Mansour, 2012). In addition, differences have been found between what educators say and what they do when acting as role models for students (Liao et al., 2014).

Moreover, our findings showed students performed insufficient safety-related behaviors, and there was a significant association between safety attitudes and students' safety-related behaviors. In this study, students with positive safety attitudes expressed good communication and collaboration with their clinical colleagues, which was consistent with previous studies (Elsous et al., 2016; Lee et al., 2010).

4.2. Implications to nursing education

Our findings have important implications for nursing education. Students' experiences during clinical practice have an important influence on their future patient safety attitudes and behaviors (Liao et al., 2014). There is a need to pay more attention to patient safety by nurses, nursing students and educators. The interpretation of how to implement the teaching of patient safety is less clear in nursing curricula in China. It is necessary for educators to develop patient-safety-friendly nursing curricula, including the content, delivery, quality and evaluating criteria. Further, our findings provide information that enhances the educational environment for nursing students. Positive patient safety climate should be established to provide support to raise the students' awareness of patient safety and help them cope well with clinical environments (Kim et al., 2018). A supportive work environment should be provided in which students feel their concerns are being heard. In addition, staff's behaviors may have a significant impact on the students' safety attitudes and behaviors. Therefore, it is important to foster role-modelling behaviors in staff that guide and encourage nursing students to raise concerns about patient safety (Usher et al., 2017).

4.3. Limitations

This study was conducted in ten universities to acquire the data. In addition, an online survey was used to obtain complete filled questionnaire and minimize missing data. However, our study has some limitations. Firstly, our study was based on a convenience sample, which may have the possibility of selection bias and limit the generalizability of the findings. Secondly, it must be noted that we only explored the influence of demographic and clinical practice-related factors on the students' safety attitudes. There may be other factors that affected the nursing students' safety attitudes. Future studies are needed to explore these factors. Lastly, the scale used in our study was a self-report scale, which could involve recall bias.

5. Conclusion

This study provides evidence that postgraduate nursing students in China hold negative attitudes towards patient safety culture, and attitudes varied according to age, work experience, workload and safety education. We also found safety attitudes were related to their safety-related behaviors. Nursing educators should focus more on the improvement of patient safety education and establishment of supportive working environment to enhance safety attitudes among nursing students.

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Declarations of interest

None.

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Appendix A. Supplementary data

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