Assessment of Knowledge, Attitude, and Practice of Standard Infection Control Precautions among Health-care Workers in Baghdad, Al-Rusafa, 2023

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Abstract

Background: Hospital stays, mortality, and expenditures rise with health-care-associated infections, especially in developing countries. Public health promotes infection control. **Aim:** The aim of this study was to assess health-care workers' (HCWs) infection control knowledge, attitude, and practice and determine how sociodemographic and job descriptive variables affect them. **Settings and Design:** A cross-sectional study at four Baghdad/Al-Rusafa government hospitals (Shaikh Zayed Hospital, Al-Shaheed Al-Sader Hospital, Ibn Al-Balady Children and Maternity Hospital, and Fatima Al-Zahraa Children and Maternity Hospital). **Subjects and Methods:** All resident doctors, nurses, and laboratory personnel who were present during data collection and agreed to participate were included in this study. **Statistical Analysis:** Data were entered using Excel 2019 and then analyzed using SPSS 26. Frequency and percentage analyzed quantitative data, while Chi-square test analyzed categorical data. $P < 0.05$ indicated statistical significance. **Results:** Knowledge level was higher among HCWs aged 30–39 years (79.4%), doctors (81.0%), individuals with more than 5 years of experience (75.0%), and those who received training (83.7%). Positive attitudes were most prevalent among HCWs aged 49 years and older (68.6%), laboratory workers (59.4%), individuals with more than 5 years of experience (55.5%), and those who received training (60.6%). A higher level of practice was observed in individuals aged 30–39 years (83.2%), laboratory personnel (80.4%), those with 5–14 years of experience (80.4%), and trainees (83.0%). **Conclusions:** Three-quarters of HCWs had good knowledge and practice regarding infection control precautions, and nearly half of them had a positive attitude. The knowledge, attitude, and practice of HCWs were increasing with progress in age, increasing work experience, and also with training.

Keywords: Attitude and practice, Baghdad, health-care workers, infection control, knowledge

Introduction

Health-care-associated infections (HCAIs) occur in patients receiving health-care services in a hospital or other medical facility but were absent at the time of admission. They also include occupational illnesses among medical personnel.[1]

HCAIs are a major cause of morbidity and mortality and the second most frequent cause of death worldwide.[2]

At least seven HCAIs will be identified in every 100 hospitalized patients, whereas ten are emerging ones. The risk of HCAIs is 2–3 times greater in developing nations than in industrial ones.[2]

Each day, HCAIs cause extended hospital stays, long-term disability, increasing antimicrobial resistance, significant additional expenses for health systems, significant financial burdens on patients and their families, and untimely deaths.[3]

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Predisposing factors of health-care-associated infections

The risk factors for these infections are determined by:

1. Environment: Inadequate sanitary conditions and waste disposal in health-care settings
2. Susceptibility: Immunosuppression in patients, extended stay in the critical care unit, and antibiotic usage[4]
3. Unawareness: Incorrect injection procedures, inadequate awareness of fundamental infection control measures, incorrect use of invasive devices (catheters), and a lack

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of control guidelines. These risk factors are related to poverty, a lack of financial assistance, understaffed health-care settings, and an insufficient equipment supply in low-income nations.[4]

Types of health-care-associated infections

Catheter-associated urinary tract infections

It is the most commonly preventable kind of HCAI. Therefore, every urologist and other health-care professionals must prioritize the proper prevention and management of them.[5]

Central line-associated bloodstream infections

They are lethal nosocomial infections, with a mortality rate of 12%–25%. Catheters are inserted into blood vessels to provide fluids and medications, but extended usage can result in severe bloodstream infections, compromising health and increasing care costs.[6]

Surgical site infections

Better operating room ventilation, sterilization, barriers, surgical technique, and antibiotic prophylaxis have improved infection control, but they still cause morbidity, extended hospitalization, and mortality. Surgical site infection accounts for 20% of HCAIs and increases mortality risk 2–11-fold.[7]

Ventilator-associated pneumonia

Within 48 h of intubation, intensive care patients may develop pneumonia. Ventilator-associated pneumonia prevention is mostly related to nursing interventions. Therefore, educating health workers, especially nurses, in infection control and increasing their knowledge is crucial.[8]

General measures of infection control standard precautions

Keep good hand hygiene

Hand hygiene has been regarded as the primary behavior modification that health-care workers (HCWs) may do to successfully control HCAIs. Thus, hand hygiene noncompliance is a global public health concern that demands more standardized policies, continuous monitoring, and surveillance.[2]

Environmental hygiene

Hospital surfaces that are infected and polluted serve as a crucial reservoir and ways of transmission for life-threatening pathogens. It aimed to eliminate contagious microorganisms on surfaces, minimizing the risk of cross infection by reducing the transfer of infectious germs from objects to people. To perform effective environmental hygiene by using sterilization, disinfection, and cleaning.[9]

Studies that explored the Knowledge, Attitude, and Practice on infection control among healthcare care workers in Iraq, such as a study done in Teaching Hospitals in Erbil City in 2021,[10] revealed that 57% of the participants had a moderate level of knowledge of infection control, 78.3% of participants had a medium attitude, and 69.2% had a good practice, also a study in Sulaymaniyah City,[11] regarding water pollution and infection control, showed that 42.5% had fair knowledge, 46.25% had a fair attitude, and 41.25% practiced fairly.

Another study conducted in Al-Kut City,[12] showed that (53.4%)of the participants had good knowledge regarding infection control and a study in Kirkuk City,[13] revealed that most of the nurses demonstrated a high level of knowledge and a positive attitude, while their practices in infection control were graded moderately.

The current study aimed to assess HCWs' infection control knowledge, attitude, and practice and determine how sociodemographic and job descriptive variables affect them.

Subjects and Methods

Study design and setting

A cross-sectional study with an analytical component was conducted at Al-Rusafa Health Department Governmental Hospitals. Four hospitals were randomly selected using the simple random sampling method.

The study population consisted of HCWs from Shaikh Zayed Hospital, Al-Shaheed Al-Sader Hospital, Abn Al-Balady Children and Maternity Hospital, and Fatima Al-Zahraa Hospital, which include all resident doctors, nurses, and laboratory personnel who were currently working in the study area and were available during the data collection period and agreed to participate.

Sample size calculation

The minimum sample size was estimated to be 385, but 550 would be desired to increase the power according to the formula: $\text{Sample size} = \frac{Z^2 p\,(1-p)}{d^2}$. [14]

Data collection tool

Data were collected from March 1, 2023, to July 1, 2023, on an average of 1 day per week and about 4 h per day using an adopted questionnaire developed based on the guidelines of the Centers for Disease Control and Prevention (CDC)[15] and the World Health Organization.[16]

The questionnaire is divided into four parts:

- Part A included nine questions on demographic and professional information of HCWs such as age, sex, job description, working experience (years), and training
- Part B included 20 knowledge-related statements with "yes," "I do not know," and "no" responses. They were scored as "yes (2)," "I do not know (1)," and "no (0)"
  - The maximum possible score was 40 points with a range from 0 to 40 points
  - The overall level of knowledge was classified according to the Bloom score as poor (<24 points, <60% score), fair (24–31 points, 60%–79% score), and good (32–40 points, 80%–100% score).[17]
- Part C included 14 attitude-related statements. Each statement was assessed on a five-point Likert-type scale (strongly disagree to strongly agree). The maximum possible score was 70 points with a range from 14 to 70 points
  - The answers were reversed in the attitude questions with numbers: 1, 3, 6, 7, 9, 10, and 14

- Attitudes were classified according to the Bloom score as negative (<42 points, <60% score), neutral (42–55 points, 60%–79% score), and positive (56–70 points, 80%–100% score).[17]

- Part D included 15 practice-related questions. They were given 1 point for each activity they always participated in and 0 points for not participating, the maximum possible score was 15 points with a range from 0 to 15 points
  - The overall level of practice was classified according to the Bloom score as poor (<9 points, <60% score), fair (9–11 points, 60%–79% score), and good (12–15 points, 80%–100% score).[17]

The Arabic version of the questionnaire was translated from the original version and approved after the review by the experts.

Participants would be asked to complete this Arabic version of the questionnaire after explaining the aim of the study, so it was a self-administered questionnaire, and the researcher was present to answer any questions.

Pilot study

Before data collection, a pilot study was conducted on ten participants who were from a hospital not included in the study to estimate the time needed to get the necessary data, ensure that the questions were clear to them, and determine whether any adjustments should be made.

Ethical approval

Official approvals were obtained from the Scientific Committee at the Department of Family and Community Medicine, University of Baghdad and Iraqi Board for Medical Specialization, Council of Family and Community Medicine, Baghdad Al-Rusafa Health Department, in addition to hospitals.

Verbal consent was obtained from HCWs, and data would be kept confidential and not be revealed except for study purposes.

Statistical analysis

Microsoft Excel version 2019 was used for data entry, and Statistical Package for Social Science (SPSS) Version 26.0 (IBM Corp, Chicago, IL, USA) was used for data analysis. Quantitative data were analyzed using frequency and percentage; Categorical data were analyzed using the Chi-square test. P <0.05 was considered statistically significant.

Results

Sociodemographic characteristics of participants

The entire study sample was 550 HCWs, and they were from four hospitals; most of them were from Al-Shahed Al-Sader Hospital (29.1%).

About 2/3 of HCWs were female, and < 30 years of age in a percent of 63.8% and 62.5% respectively.

Nearly half of HCWs had < 5 years of work experience, and had been trained in infection control procedures in a percentage of 56.7% and 53.5% respectively.

HCWs were mainly nurses (46.2%), followed by resident doctors (27.8%) and thirdly laboratory personnel (26%).

All the above findings are listed in Table 1.

Participants' level of knowledge toward infection control standard precautions

Regarding the distribution of HCWs according to the level of knowledge, Figure 1 shows that a good knowledge level constituted the largest 404 (73.45%).

The result in Table 2 shows that a better level of knowledge was observed among the 30–39-year age group (79.4%), followed by the more than 49-year age group (74.3%) with a statistically significant $P = 0.014$.

When it comes to the job description, the highest percentage of a good level of knowledge was found among doctors (81.0%), with a statistically significant P value of 0.013.

A higher level of knowledge was found among HCWs with 5–14 years of work experience (75.5%) and those with more than 14 years of work experience (75.0%), with a statistically significant $P = 0.023$.

The highest percentage of HCWs who have a good level of knowledge is found among those who have received training (83.7%).This finding was statistically significant with a p-value of .001.

Table 1: The distribution according to sociodemographic and other participant characteristics of health-care workers

Variables	n=550; 100, n (%)
Sex	
Male	199 (36.2)
Female	351 (63.8)
Age groups (years)	
<30	344 (62.5)
30–39	131 (23.8)
40–49	40 (7.3)
>49	35 (6.4)
Job description	
Nurses	245 (46.2)
Resident doctors	153 (27.8)
Laboratory personnel	143 (26.0)
Years of work experience	
<5	294 (53.5)
5–14	184 (33.5)
>14	72 (13.1)
Hospitals	
Abn Al-Balady	130 (23.6)
Al-Shahed Sader	160 (29.1)
Fatima Al-Zahra	130 (23.6)
Shaikh Zayed	130 (23.6)
Training	
Receive training	312 (56.7)
Not receive training	238 (43.3)

Table 2: The association of the knowledge level of the study group with sociodemographic and other participant characteristics

Variables	Knowledge level			Total (*n*)	*P*
	Poor, *n* (%)	Fair, *n* (%)	Good, *n* (%)		
Sex					
Male	18 (9.0)	34 (17.1)	147 (73.9)	199	0.967
Female	31 (8.9)	63 (17.9)	257 (73.2)	351	
Age groups (years)					
<30	24 (7.0)	75 (21.8)	245 (71.2)	344	0.014
30–39	13 (9.9)	14 (10.7)	104 (79.4)	131	
40–49	6 (15.0)	5 (12.5)	29 (72.5)	40	
>49	6 (17.1)	3 (8.6)	26 (74.3)	35	
Job description					
Resident doctor	6 (4.0)	23 (15.0)	124 (81.0)	153	0.013
Nurse	27 (10.6)	40 (15.8)	187 (73.6)	254	
Laboratory personnel	16 (11.2)	34 (23.8)	93 (65.0)	143	
Years of work experience					
<5	19 (6.4)	64 (21.8)	211 (71.8)	294	0.023
5–14	20 (10.9)	25 (13.6)	139 (75.5)	184	
>14	10 (13.9)	8 (11.1)	54 (75.0)	72	
Training					
Not receive	22 (9.2)	73 (30.7)	143 (60.1)	238	0.001
Receive	27 (8.7)	24 (7.6)	261 (83.7)	312	

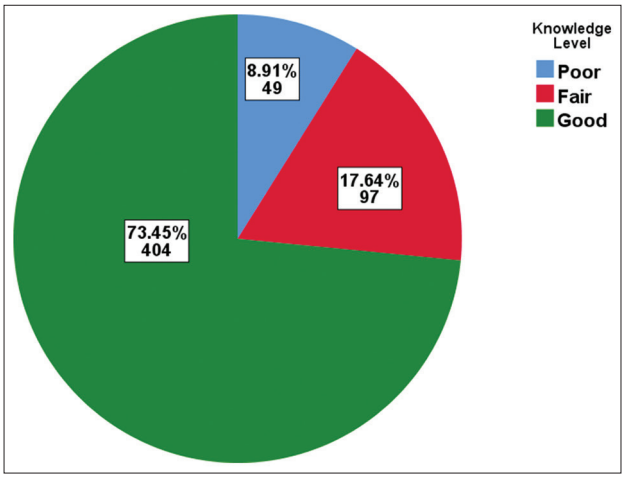

Figure 1: The distribution of health-care workers according to the level of knowledge

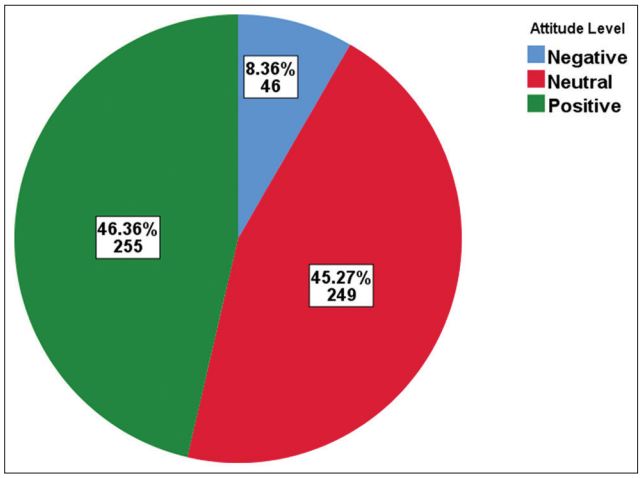

Figure 2: The distribution of health-care workers according to the level of attitude

There was no statistically significant association between knowledge level and sex, as indicated by $P = 0.967$.

Participants' level of attitude toward infection control standard precautions

Regarding the distribution of HCWs according to the level of attitude, Figure 2 shows that a positive attitude level constituted the largest 255 (46.36%), followed by a neutral attitude level which constituted 249 (45.27%).

Table 3 shows that a higher level of positive attitude was mainly observed among HCWs aged 49 years and above (68.6%). In contrast, a lower percentage of negative attitudes was found among those in the 30–39-year age group, with a statistically significant $P = 0.002$.

The laboratory workers had a high positive attitude (59.4%), whereas the doctors had the greatest negative attitude (11.1%) with a statistically significant $P = 0.001$.

HCWs with 5–14 years of work experience (55.5%) and those with more than 14 years of work experience (55.6%) demonstrated a higher level of positive attitude, as indicated by a statistically significant $P = 0.001$.

Among those who receive training, 60.6% indicate the most positive attitude. With $P = 0.001$, this finding was considered statistically significant.

There was no statistically significant association between attitude level and sex, as indicated by $P = 0.335$.

Table 3: The association of attitude level with sociodemographic and other participant characteristics

Variables	Attitude level			Total (*n*)	*P*
	Negative, *n* (%)	Neutral, *n* (%)	Positive, *n* (%)		
Sex					
Male	13 (6.5)	87 (43.6)	99 (49.7)	199	0.335
Female	33 (9.4)	162 (46.4)	156 (44.4)	351	
Age groups (years)					
<30	36 (10.5)	171 (49.7)	137 (39.8)	344	0.002
30–39	5 (3.8)	51 (38.9)	75 (57.3)	131	
40–49	3 (7.5)	18 (45.0)	19 (47.5)	40	
>49	2 (5.7)	9 (25.7)	24 (68.6)	35	
Job description					
Resident doctor	17 (11.1)	75 (49.0)	61 (39.9)	153	0.001
Nurse	16 (6.3)	129 (50.8)	109 (42.9)	254	
Laboratory personnel	13 (9.1)	45 (31.5)	85 (59.4)	143	
Years of work experience					
<5	32 (10.9)	149 (50.7)	113 (38.4)	294	0.001
5–14	8 (4.3)	74 (40.2)	102 (55.5)	184	
>14	6 (8.3)	26 (36.1)	40 (55.6)	72	
Training					
Not receive	34 (14.3)	138 (58.0)	66 (27.7)	238	0.001
Receive	12 (3.8)	111 (35.6)	189 (60.6)	312	

Participants' level of practice toward infection control standard precautions

Regarding the distribution of HCWs according to the level of practice, Figure 3 shows that a good practice level constituted the largest 395 (71.82%).

The result in Table 4 shows that a higher level of practice was observed among the 30–39-year age group (83.2%), followed by the more than 49-year age group (80.0%) with a statistically significant $P = 0.023$.

When it comes to the job description, the highest rate of a good level of practice was found among laboratory personnel (80.4%), with a statistically significant P value of 0.004.

A higher level of practice was found among HCWs with 5–14 years of work experience (80.4%), followed by those with more than 14 years of work experience (76.3%), with a statistically significant $P = 0.007$.

In terms of training, HCWs who received training had the highest rate of good level of practice (83.0%), which was statistically significant (p-value =.001).

There was no significant association between practice level and sex, as indicated by $P = 0.206$.

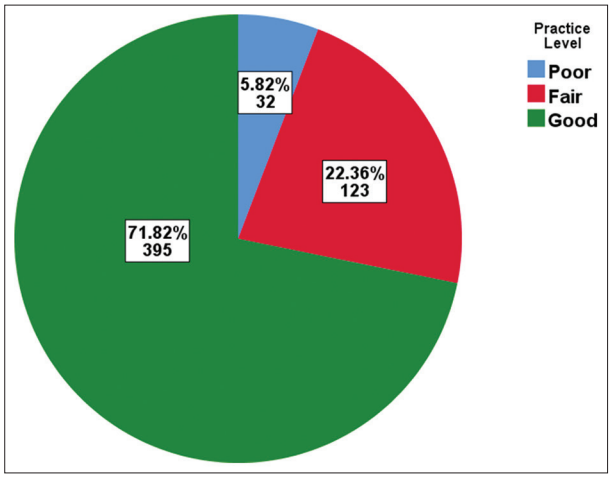

Figure 3: The distribution of health-care workers according to the level of practice

Discussion

Knowledge of participants in infection control precautions

The results showed that almost three-quarters of the participants had good knowledge in consonance with the findings of research in Al-Hillah city which found that 63% had good knowledge,[3] Saudi Arabian research in 2021 found that 67.6% had good knowledge,[18] and the Malaysian study demonstrated that 69.7% of the participants had good knowledge.[19]

These findings were greater than those of a study in Al-Kut city done by Khyoosh *et al*.,[12] and an Ethiopian study in 2019[20] indicated that 53.9% and 52.5% of the participants, respectively, exhibited good knowledge, but lower than those of researches conducted in Jordan in 2020 and in Ethiopia by Bayleyegn *et al*., which showed that 81.3% and 90% of the participants, respectively, had good knowledge.[21]

The time of the study may influence the knowledge of HCWs concerning to COVID-19 pandemic. Alterations to public health campaigns, educational programs, or health-care policies can influence their knowledge level.

Table 4: The association of practice level with sociodemographic and other participant characteristics

Variables	Practice level			Total (*n*)	*P*
	Poor, *n* (%)	Fair, *n* (%)	Good, *n* (%)		
Sex					
Male	8 (4.0)	40 (20.1)	151 (75.9)	199	0.206
Female	24 (6.8)	83 (23.6)	244 (69.6)	351	
Age groups (years)					
<30	24 (7.0)	91 (26.5)	229 (66.5)	344	0.023
30–39	4 (3.1)	18 (13.7)	109 (83.2)	131	
40–49	3 (7.5)	8 (20.0)	29 (72.5)	40	
>49	1 (2.9)	6 (7.1)	28 (80.0)	35	
Job description					
Resident doctor	9 (5.9)	41 (26.8)	103 (67.3)	153	0.004
Nurse	11 (4.3)	66 (26.0)	177 (69.7)	254	
Laboratory personnel	12 (8.4)	16 (11.2)	115 (80.4)	143	
Years of work experience					
<5	22 (7.5)	80 (27.2)	192 (65.3)	294	0.007
5–14	6 (3.3)	30 (16.3)	148 (80.4)	184	
>14	4 (5.6)	13 (18.1)	55 (76.3)	72	
Training					
Not receive	22 (9.2)	80 (33.6)	136 (57.2)	238	0.001
Receive	10 (3.2)	43 (13.8)	259 (83.0)	312	

Consistent with previous studies conducted in China,[22] Italy,[23] and Pakistan,[1] this study found a significant association between age and knowledge.

Nevertheless, it goes against the findings of studies conducted in Al-Kut city[12] and Sulaymaniyah city.[11] This association may be affected by how health care understanding evolves over time, which might explain why there is an association between the two.

This study accords with the Italian study,[23] in finding a significant association between knowledge and work experience, which contradicts prior research in Al-Kut city.[12] Increasing the work experience of HCWs in different workplaces may increase their awareness about infection control, so that their knowledge improves.

According to this study, there is a significant association between training and knowledge, which aligns with the findings of a study in Al-Kut city.[12] It suggests that the association between training and knowledge could remain stable across Iraqi governorates, which is encouraging.

Attitude of participants on infection control precautions

Regarding attitude, this study revealed that about half of HCWs had a positive attitude which is lower than the percentage that was recorded in Saudi Arabia (61.5%)[18] and Malaysia (70%).[19] Personal protective equipment, disinfectants, and proper waste disposal systems may be inadequate in some Iraqi hospitals. Hence, HCWs suffer from following infection control precautions due to shortages of resources.

The attitude was significantly associated with age that goes with a study in Sulaymaniyah city[11] but contradicts an Ethiopian study in 2019.[21] Attitudes may vary due to the education and experience of health-care personnel of different ages. Older Iraqi health-care staff may have more positive attitudes if they have more training and education about infection control.

This study disputes the findings of the Chinese study[22] and agrees with an Ethiopian study in 2019[21] that there is a significant association between attitude and years of working experience. A possible explanation is that the infection control protocols in China are already firmly established and strictly implemented. Exposure to something already considered essential may have a small effect on their attitudes.

This study found a significant association between training and attitude, which is consistent with the Chinese study.[22]

Practice of participants in infection control precautions

According to this study, about three-quarters of HCWs had good practices. This rate is more than what has been found in research done in Ethiopia in 2021 (48.6%)[20] and Northern Cyprus (30.9%),[24] but still lower than the percentage of HCWs in Saudi Arabia in 2021 (73.3%)[18] and nurses in Malaysia (77%).[19] Different training programs and supervision of their implementation of infection control standards might all contribute to the variations in the degree to which standard practices for infection control are applied across distinct nations.

This study found a significant association between age and practice, consistent with a study in Sulaymaniyah city[11] but contradicting the study in Palestine Hospital[25] and the Ethiopian study in 2021.[21] Health-care personnel of different ages may have distinct tasks and functions, which could explain why their infection control practices vary. The relationship

between age and infection control practices may differ in Iraq than in Palestine and Ethiopia due to differences in the kind of health-care jobs and duties assigned to people of different ages.

This study found a significant association between years of work experience and practice, consistent with the Ethiopian study in 2021[21] and a Nigerian study in 2020.[26]

This study found a significant association between training and practice, which is consistent with the Chinese study.[22]

Conclusions

The knowledge and attitude of HCWs were improving with progress in their age, and their practice was much better at the age of 30 years.

Knowledge, attitude, and practice of HCWs were increasing with increasing work experience.

Training improved the knowledge, attitude, and practice of HCWs.

Job description: Resident doctors were at a high level in their knowledge, but they were not in their attitude and practice. On the other hand, laboratory personnel were the best in their attitude and practice, but not in their knowledge.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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