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Specialized Training for Nursing in the Surgical Area, a Question of Quality

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Abstract

This is an observational, descriptive and cross-sectional study that looks into nursing competencies within the surgical area and analyzes the influence of the variables age, years worked and employment relationship on the dependent variable nursing competencies. The Perceived Perioperative Competence Scale-Revised (PPCS-R) questionnaire was applied to nurses in the surgical area of the General University Hospital of Castellón. The variables were processed using ANOVA tests and Pearson's correlations. A sample of 50 female nurses with a mean age of 41 ± 7.931 years was evaluated. Age and number of years worked were positively related to 11 items of the questionnaire. Regarding the employment relationship, significant differences were found, with the "permanent" employment relationship obtaining the highest mean score [1.040 ($p = .018$)]. Education and clinical experience were found to contribute to the development of practice. Patient safety was an essential aspect in managing the associated risk in the operating room (OR).

Keywords: competence, clinical experience, specialized competence, specialized education, surgical area

1. Introduction

The nursing discipline has undergone constant development, both at a conceptual and at a theoretical and practical level. The minimum academic level to obtain the basic competencies is the University Degree in Nursing, which is based on the regulations of the European Higher Education Area (EHEA), which, in turn, provide a solid base in the sciences of behavior, life and care and open the possibility of creating ascending levels of academic recognition within the same discipline: degree, masters and doctorate [1].

Academic nursing degree programs certify the possession of foundational competencies. In some areas of nursing knowledge, there is the possibility of focusing training after obtaining the degree towards a more specialized field that allows the professional to perform better in situations of greater complexity [2].

In Spain, this specialized training has undergone a development parallel to that of the nursing discipline. The Law 44/2003, of the 21st of November, on the

organization of the health professions included, for the first time, the specific definition and catalog of nursing specialties [3]. The aforementioned catalog was modified by the Royal Decree 450/2005, finally leaving seven specialties: Obstetric-Gynecological Nursing, Mental Health Nursing, Geriatric Nursing, Occupational Health Nursing, Family and Community Nursing, Pediatric Nursing and Medical-Surgical Care Nursing [4]. All the specialties have their own legally supported training program regulated by a residency system (Resident Nursing Intern, *Enfermero Interno Residente-EIR* in Spanish), except for the Medical-Surgical Care specialty, which is paralyzed due to unknown reasons [5].

Postgraduate training implies the acquisition of competencies inherent to a specific context and nursing specialties guide the professional towards clinically relevant competencies [6, 7]. Consequently, they become a challenge for the profession, which involves combining patient care with highly technical aspects without affecting patient safety [8, 9].

The perioperative setting is dynamic in nature and depends on both knowledge, and clinical judgment and reasoning skills. Therefore, it is an environment that requires specific training, and this becomes a way to provide the highest quality of care, as well as being an essential element in the identification and prevention of errors [10]. Specialized training in surgical areas ensures patient safety and is the cornerstone of clinical practice [11]. A clear description and identification of nursing competencies in the surgical field would make it easier for nurses working in these areas to be specialists with a formally acquired education [6].

It is difficult to completely eliminate the risk associated with healthcare assistance, but awareness should be raised about the professionals' need to acquire specific skills for the prevention of errors and avoidable adverse events, in order to guarantee the safety of the patient and respect their rights. Regulated training, experience and professionalism are considered essential elements for risk management in surgical care [6, 8, 12].

The general objective of the present study is to observe the necessary nursing competencies within the surgical area. It is also intended to observe whether these competencies are modified according to age and sex, the number of years worked and the contractual relationship of the nurses.

2. Methods

This is an observational, descriptive and cross-sectional study, carried out in the Surgical Area of the General University Hospital of Castellón (HGUCS). The target population consisted of all the nurses working in the HGUCS surgical area. At the time of study, there were 87 nurses and 2 supervisors (N = 89). From this population, the study's sample was calculated, taking into account a confidence level of 95% and a margin of error of 3%, accepting a value of statistical significance $p \leq .05$. The studied sample consisted of 62 nurses. Only 50 nurses were interviewed because of the safety measures adopted to prevent the intra-hospital transmission of SARS-CoV-2.

The inclusion criteria were working in the surgical area and being in active service at the time of the study. The only exclusion criterion was the fact that the professional did not wish to participate in the study.

The dependent variables were those provided by the Perceived Perioperative Competence Scale-Revised (PPCS-R) questionnaire applied to assess nursing competencies.

The following were included as independent variables: sociodemographic variables (age and sex) and variables related to work (employment relationship,

defined as: permanent contract, indefinite contract and/or temporary contract) and years worked in a surgical area (less than one year, between 1 and 5 years, between 6 and 10 years, and more than 10 years).

The Perceived Perioperative Competence Scale-Revised (PPCS-R) was used, which quantifies both domains of general competence and domains of specific competence. It is a specific self-assessment tool, used to reflect on areas of strengths and limitations within the surgical context [2]. This questionnaire is based on a self-assessment applied through a Likert scale, ranging between 1 and 5, (1 never, 2 sometimes, 3 often, 4 very often, 5 always) with 40 closed-choice questions that address six domains. These domains are foundational knowledge and skills, leadership, collaboration, proficiency, empathy, and professional development. The calculated response time was 20 minutes. The data were collected between the 24th of February and the 13th of March 2020.

2.1 Statistical analyses

The data were processed using the Statistical Package for the Social Sciences (SPSS) v.23.0 statistical program, accepting a level of statistical significance of $p \leq 0.05$.

Regarding the analyses techniques, the description of the characteristics of the sample was carried out by calculating the mean and the standard deviation for the quantitative variables; qualitative variables were expressed in percentages and frequencies. To respond to the specific objectives, the Pearson correlation and the ANOVA test were applied, together with the Scheffé test.

2.2 Ethical considerations

The project was approved as of March 10, 2020 by the HGUCS Clinical Research Committee and the Nursing Directorate.

The participation of the nurses in the study was voluntary. The necessary measures were taken to preserve the confidentiality of personal data in compliance with the Organic Law 3/2018, of the 5th December, on the Protection of Personal Data and Guarantee of digital rights [13] and the declaration of Helsinki [14]. The participants were aware of their right to abandon said study at any given time.

Any personal data that could identify the professional was not used; hence the data collection notebooks were assigned a random number. The paper records were destroyed after being computerized. The study did not receive any public or private funding and the authors declare that they have no conflict of interest.

3. Results

A total of 50 questionnaires were collected ($n = 50$). The mean age of the participants was 41 ± 7.931 years, ranging between 27 and 59 years. The entire sample was composed of women.

Regarding the employment relationship, 22% (11) had a permanent contract, 56% (28) had indefinite contracts, and the remaining 22% (11) had temporary contracts. Regarding the number of years worked, 62% (31) had more than 10 years worked in the surgical area, 12% (6) had between 6 and 10 years, 20% (10) had between 1 and 5 years and 6% (3) had less than 1 year worked in the surgical area.

The descriptive results of the “Perceived Perioperative Competence Scale-Revised” (PPCS-R) questionnaire are presented structured in the six dimensions of the scale. These dimensions are divided into technical and non-technical

competencies. Technical competencies include the knowledge and skills dimension, as well as the proficiency dimension. In turn, non-technical competencies are composed of the remaining four dimensions: leadership, collaboration, empathy, and professional development.

Table 1 shows the results of both the “Foundational knowledge and skills” dimension and the “Proficiency” dimension. Regarding the “Foundational knowledge and skills” dimension, it should be noted that the lowest score was obtained by Item number 1 (3.21 ± 1.148), which referred to the variability of surgical instrumentation. Regarding the “Proficiency” dimension, the worst evaluated item was number 29 (3.58 ± 0.835), which dealt with the ability to anticipate the needs that may arise in an intervention. See **Table 1**.

Foundational knowledge and skills		Proficiency	
Items	Mean (SD)	Items	Mean (SD)
1. I am familiar with most of the instrumentation in different specialties	3.21 (1.148)	10. I have mastered the terminology and vocabulary of OR nursing	3.90 (.853)
2. I know where to find equipment and supplies in the OR	3.88 (.940)	11. I troubleshoot and take appropriate action in the event of machine/equipment failures	3.82 (.941)
3. My local knowledge of this department assists me to perform my OR role	4.02 (1.078)		
4. I understand and anticipate the surgical procedure	3.58 (.906)	12. Based on experience, I am able to identify actual or potential emergency situations and respond appropriately	4.12 (.799)
5. I am familiar with the technological equipment used in the OR	3.88 (.961)		
6. When I am allocated to an area of the OR that is unfamiliar, I draw on my skills and experience.	3.82 (1.014)	13. I apply specialist knowledge in providing care for OR patients	4.00 (.904)
7. I plan and coordinate the needs in the theater I am allocated	4.02 (.934)	14. I have the right amount of knowledge to practice in this specialty	3.61 (.975)
8. I know instinctively when surgery is not going well and am able to respond appropriately	3.76 (.969)		
9. Knowing the location of equipment in the OR assists me to perform my OR role	4.39 (.812)	15. I am able to anticipate the needs of the situation	3.58 (.835)

Mean: Value of the arithmetic mean. Standard deviation (SD).

Table 1.
Dimensions: Foundational knowledge and skills and proficiency.

In relation to the non-technical competencies, it should be noted that the items in the “Leadership” dimension, in general, have been those that have obtained the lowest ratings; highlighting the mean value ($2.64 \pm .987$) of the item that deals with the ability of a nurse to handle conflict situations among the staff of an operating room. However, nurses have shown interest in cooperating to train novel nurses.

Regarding the “Collaboration” dimension, it is observed that, in general, all the items have higher mean values with a trend approaching 5 as the highest score. In addition, Item 21 shows the respect that nurses have towards more experienced colleagues ($4.64 \pm .563$, see **Table 2**).

Table 3 shows the results of the non-technical competencies “Empathy” and “Professional Development”. All the items that are part of the “Empathy” dimension have obtained values close to 5. Perhaps the item that deals with the relationship with patients to make it easier for them to express feelings and concerns, scoring a ($4.02 \pm .750$), points out where training would be required. Regarding the “Professional development” dimension, it is worth highlighting that the lowest valued item (2.90 ± 1.026) is the one that deals with updating knowledge by reading articles, see **Table 3**.

To observe the correlation between age and perioperative competencies, 3 age ranges were established (25 to 40 years, 41 to 50 years and more than 50 years of age). The results of the Pearson correlation indicate the presence of a positive statistically significant correlation for 11 items of the questionnaire; these items were better evaluated with increasing age. See **Table 4**.

All participants were women; therefore, the sex variable was not processed as it was a constant. **Table 5** presents the results of the correlation between “Years

Leadership		Collaboration	
Items	Mean (SD)	Items	Mean (SD)
1. I take a leadership role to ensure the smooth running of the theater	2.90 (.984)	9. I use appropriate methods of communication according to the needs of the situation	3.78 (.815)
2. I make difficult decisions when necessary	3.13 (1.104)	10. I feel comfortable in seeking assistance from my colleagues when I am unsure	4.39 (.731)
3. I take an active role in preceptor-ing or mentoring lesser experi-enced nurses	3.47 (1.157)		
4. I manage clinical situations when there is conflict between staff	2.64 (.987)	11. I tailor my communication based on the mix of personalities in the team	3.86 (.783)
5. I provide clinical guidance to other staff members	2.90 (1.046)	12. I respect the level of expertise of other members of the team	4.64 (.563)
6. I encourage team members to use innovative solutions to solve traditional problems	2.90 (1.065)	13. I treat members as individuals who have different needs, abilities and aspirations	4.32 (.794)
7. I delegate aspects of care accord-ing to role, functions, capabilities and learning needs of other team members	3.06 (1.008)	14. When communicating with other team members, I use language that is appropriate to the situation	4.28 (.607)
8. I encourage active involvement in clinical decision-making processes	2.96 (0,978)		

Mean: Value of the arithmetic mean. Standard deviation (SD).

Table 2.
Dimensions: Leadership and collaboration.

Empathy		Professional development	
Items	Mean (SD)	Items	Mean (SD)
1. I provide reassurance for patients using verbal and non-verbal strategies	4.14 (.791)	35. I maintain current knowledge of, and incorporate relevant organizational policies into practice	3.57 (.866)
2. I use strategies to make the patient feel more comfortable	4.31 (.769)	36. I have detailed knowledge of anatomy and physiology	3.41 (.705)
3. I provide appropriate reassurance and explanation for OR patients	4.16 (.825)	37. I maintain knowledge of, and incorporate relevant standards into my practice	3.45 (.914)
4. I actively listen to the patient and significant others to obtain necessary information	4.35 (.597)	38. I read current journals and literature that relate to clinical practice	2.90 (1.026)
5. I establish rapport with patients that enhances their ability to express feelings and concerns	4.02 (.750)	39. I keep up with the technical changes in procedures and equipment	3.51 (.960)
		40. I use available resources to maintain current OR practice	4.00 (.935)

Mean: Value of the arithmetic mean. Standard deviation (SD).

Table 3.
Dimensions: Empathy and professional development.

Items	Pearson (r)	P-Value
1. I am familiar with most of the instrumentation in different specialties	.385	.012*
2. I know where to find equipment and supplies in the OR	.488	.001***
3. My local knowledge of this department assists me to perform my OR role	.455	.002**
4. I understand and anticipate the surgical procedure	.432	.003**
5. I am familiar with the technological equipment used in the OR	.317	.036*
8. I know instinctively when surgery is not going well and am able to respond appropriately	.322	.035*
9. Knowing the location of equipment in the OR assists me to perform my OR role	.374	.014*
10. I take a leadership role to ensure the smooth running of the theater	.366	.016*
24. I have mastered the terminology and vocabulary of OR nursing	.404	.006**
27. I apply specialist knowledge in providing care for OR patients	.370	.013*
36. I have detailed knowledge of anatomy and physiology	.464	.002**

r: Pearson's correlation coefficient. P-value: $p < .05^*$, $p < .01^{**}$, $p < .001^{***}$.

Table 4.
Relationship between the age of the participants and the score of the PPCS-R scale.

worked” and the scores of the (PPCS-R) scale. The “Years worked” were distributed into four groups (less than 1 year worked in the surgical area, between 1 and 5 years, between 6 and 10 years, and more than 10 years). The correlations were positive, indicating that the greater the number of years worked, the better the results obtained, see **Table 5**.

Items	Pearson (r)	P-value
1. I am familiar with most of the instrumentation in different specialties	.409	.005**
2. I know where to find equipment and supplies in the OR	.504	.001***
3. My local knowledge of this department assists me to perform my OR role	.464	.001***
4. I understand and anticipate the surgical procedure	.540	.001***
5. I am familiar with the technological equipment used in the OR	.336	.021*
7. I plan and coordinate the needs in the theater I am allocated	.367	.013*
8. I know instinctively when surgery is not going well and am able to respond appropriately	.440	.002**
9. Knowing the location of equipment in the OR assists me to perform my OR role	.376	.010**
11. I make difficult decisions when necessary	.352	.018*
12. I take an active role in preceptoring or mentoring lesser experienced nurses	.528	.001***
13. I manage clinical situations when there is conflict between staff	.567	.001***
14. I provide clinical guidance to other staff members	.428	.003**
15. I encourage team members to use innovative solutions to solve traditional problems	.470	.001***
16. I delegate aspects of care according to role, functions, capabilities and learning needs of other team members	.388	.008**
17. I encourage active involvement in clinical decision-making processes	.472	.001***
20. I tailor my communication based on the mix of personalities in the team	.330	.023*
24. I have mastered the terminology and vocabulary of OR nursing	.553	.001***
25. I troubleshoot and take appropriate action in the event of machine/ equipment failures	.471	.001***
27. I apply specialist knowledge in providing care for OR patients	.599	.001***
28. I have the right amount of knowledge to practice in this specialty	.553	.001***
29. I am able to anticipate the needs of the situation	.513	.001***
32. I provide appropriate reassurance and explanation for OR patients	.298	.045*
34. I establish rapport with patients that enhances their ability to express feelings and concerns	.219	.049*
36. I have detailed knowledge of anatomy and physiology	.540	.001***
39. I keep up with the technical changes in procedures and equipment	.435	.002**
40. I use available resources to maintain current OR practice	.540	.001***

r: Pearson's correlation coefficient. P-value: $p < .05^*$, $p < .01^{**}$, $p < .001^{***}$.

Table 5.
Relationship between the years worked and the results in the PPCS-R scale.

The significant results of the ANOVA test that observe whether the means of the scores obtained in the PPCS-R scale presented differences depending on the employment relationship are presented in **Table 6**. See **Table 6**.

Scheffé's test was applied to observe which employment relationship was the one that presented the differences found in the ANOVA test. As a more noteworthy general results, professionals with a permanent employment relationship presented higher mean values and better evaluations on the scale (PPCS-R). See **Table 7**.

Items	F-Value	p-value
2. I know where to find equipment and supplies in the OR	4.231	.021*
3. My local knowledge of this department assists me to perform my OR role	7.608	.001***
4. I understand and anticipate the surgical procedure	6.102	.005**
5. I am familiar with the technological equipment used in the OR	4.315	.020*
6. When I am allocated to an area of the OR that is unfamiliar, I draw on my skills and experience.	4.594	.016*
8. I know instinctively when surgery is not going well and am able to respond appropriately	4.138	.023*
9. Knowing the location of equipment in the OR assists me to perform my OR role	3.996	.026*
24. I have mastered the terminology and vocabulary of OR nursing	7.736	.001***
25. I troubleshoot and take appropriate action in the event of machine/ equipment failures	4.753	.014*
26. Based on experience, I am able to identify actual or potential emergency situations and respond appropriately	6.220	.004**
27. I apply specialist knowledge in providing care for OR patients	6.141	.005**
28. I have the right amount of knowledge to practice in this specialty	6.029	.005**
29. I am able to anticipate the needs of the situation	7.822	.001***
38. I read current journals and literature that relate to clinical practice	4.529	.017*

*F: Coefficient of the ANOVA test. p-value: p < .05 *, p < .01 **, p < .001 ***.*

Table 6.
Differences between employment relationship and the results in the PPCS-R scale.

Items	Employment relationship (I)	Employment relationship (J)	Mean difference (I-J)	p-value
2. I know where to find equipment and supplies in the OR	Permanent	Temporary contract	1.100	.023*
3. My local knowledge of this department assists me to perform my OR role	Permanent	Temporary contract	1.600	.002**
	Indefinite contract	Temporary contract	1.015	.021*
4. I understand and anticipate the surgical procedure	Permanent	Temporary contract	1.200	.005**
5. I am familiar with the technological equipment used in the OR	Permanent	Temporary contract	1.100	.006**
6. When I am allocated to an area of the OR that is unfamiliar, I draw on my skills and experience.	Permanent	Temporary contract	1.200	.025*
	Indefinite contract	Temporary contract	.923	.044*
8. I know instinctively when surgery is not going well and am able to respond appropriately	Indefinite contract	Temporary contract	1.000	.025*
9. Knowing the location of equipment in the OR assists me to perform my OR role	Permanent	Temporary contract	.911	.027*
24. I have mastered the terminology and vocabulary of OR nursing	Permanent	Temporary contract	1.300	.001***

Items	Employment relationship (I)	Employment relationship (J)	Mean difference (I-J)	p-value
25. I troubleshoot and take appropriate action in the event of machine/ equipment failures	Permanent	Temporary contract	1.200	.014*
26. Based on experience, I am able to identify actual or potential emergency situations and respond appropriately	Permanent	Temporary contract	1.000	.008**
	Indefinite contract	Temporary contract	.769	.016*
27. I apply specialist knowledge in providing care for OR patients	Permanent	Temporary contract	1.200	.006**
	Indefinite contract	Temporary contract	.777	.038*
28. I have the right amount of knowledge to practice in this specialty	Permanent	Temporary contract	1.411	.005**
29. I am able to anticipate the needs of the situation	Permanent	Indefinite contract	.700	.031*
	Permanent	Temporary contract	1.200	.001***
38. I read current journals and literature that relate to clinical practice	Permanent	Indefinite contract	1.040	.018*

The differences are presented with a positive sign. (I-J): Scheffé post hoc test. p-value: $p < .05^$, $p < .01^{**}$, $p < .001^{***}$.*

Table 7.
Group differences between employment relationship and results in the PPCS-R scale.

4. Discussion

Stobinski argued in 2008 that which determines what a professional is capable of doing can be expressed in measurable actions, so that assessment in a precise way becomes an essential practice implied in care [15]. We agree that, in a highly specialized clinical context, such as in surgical areas, identifying the nurses' competencies and measuring which variables modify them is necessary.

In our case and using the "Perceived Perioperative Competence Scale-Revised" (PPCS-R) questionnaire, perioperative competencies were evaluated across a total of 50 nurses from the surgical area of the HGUCS. The first dimension "Foundational knowledge and skills" obtained scores above the mean. Knowing the material and equipment, as well as having previous experience in the operating room were the items with the best scores; which reflects that both dimensions of a technical nature are basic and therefore are identified as prior essential theoretical instructions to obtain a clinically relevant competence [15].

The study carried out in Australia with a sample of 345 operating room nurses supports our results, as the authors also reported that experience was a critical factor in ensuring a good level of competence [9]; furthermore, a recently published review insists on the lack of specialized training for nurses in surgical areas and identifies this lack of training as a risk factor associated with certain adverse events; these include intraoperative infections, inappropriate drug administration, or incorrect execution of procedures [16].

Regarding the technical dimension of "Proficiency", the lowest mean value obtained was on the item that evaluates the sufficient amount of knowledge to offer

specialized care. The surgical environment is an excessively technocratic and changing context, and having situational awareness is an influential factor in minimizing the risk in adverse situations faced by professionals and favoring their ability to react [17].

The perioperative competence, in addition to including technical competencies, also includes cognitive, affective and psychomotor competencies, focused on comprehensive care based on communication and empathy, both with the patient and with the professional team [2]. These non-technical competencies include the dimension “Professional development”, where, specifically, the item “I read current journals and literature related to clinical practice”, obtained a low mean value (2.90 ± 1.026), a worrying result since it is the professional’s responsibility to have up-to-date knowledge. The same occurs with the dimensions “Leadership” and “Collaboration”, with results below those obtained in 2012 by Gillespie et al., [2]. However, the “Empathy” dimension obtained slightly better results and it should be noted here that empathy can be a strength to enhance emotional intelligence as a mechanism that stimulates knowledge and lays the foundations to build stronger teams, improve leadership, the environment and ultimately the quality of care [18, 19].

When we correlated age with the PPCS-R scale, we observe that as age increased, the results improved in the “Knowledge and skills” and “Professional development” dimensions. Both dimensions include the possession of specialized knowledge and its implementation. Regarding the relationship between years worked and the score on the PPCS-R scale, 61.7% had been practicing their profession in the surgical area for more than 10 years, and the results show the highest correlations in items that include possession of specialized knowledge and its application. These results can be based on clinical experience as an indispensable factor and a promoter of training [15, 20].

The trend found in this study relates a greater number of years worked, or in other words the work experience, with the contractual modality. Significant differences are observed between the different contractual models; being the “Permanent” contract model, the one that implies the greatest number of years worked, the one that presents the best results on the PPCS-R scale. In this sense, professionals with a permanent contract have a greater ability to anticipate the situations and needs of a surgical act; they also perceive that they have sufficient knowledge to identify situations of potential or real risk.

Finally, it should be noted that in the surgical field, not only the development of technological competencies should be prioritized, but also competencies related to care and specialized knowledge [21, 22]. The regulated acquisition of these competences, the experience and the continuous training within the clinical field [23, 24] are the tools the professional can count on to promote a culture of safety within the surgical field.

4.1 Limitations

The most important limitation of the present study was related to the appearance of the pandemic caused by SARS-CoV-2. This event made it impossible to continue with data collection, as most of the professionals in the surgical area were relocated to other areas of greater clinical need. Even so, this study can be a starting point to resume data collection and carry it out at a multicenter level. The authors are considering the option of distributing the questionnaire through the Spanish Association of Surgical Nursing (AEEQ).

5. Conclusions

Nurses in surgical areas need to have specific competencies that facilitate the performance of their work and promote quality of care.

The results obtained in the assessment of technical competencies show acceptable values, although these could be improved through training in specific competencies.

Non-technical competencies, such as empathy, are successful; however, the dimension that evaluated leadership scored poorly. A second and third level training would consolidate sufficient knowledge to develop leadership competencies.

Finally, it is observed that with increasing age and increasing number of years worked, the dimensions are better assessed. The same occurs with the type of contractual modality; the “permanent” contractual figure is the one with the best scores. This leads us to conclude that experience is essential to anticipate needs and prevent unwanted adverse events.

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Conflict of interest

The authors declare that they have no conflict of interest.

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