Nurse Education in Practice 41 (2019) 102649

Contents lists available at ScienceDirect

Nurse Education in Practice

journal homepage: www.elsevier.com/locate/nepr

Original research

Clinical nurses's critical thinking level according to sociodemographic and professional variables (Phase II): A correlational study

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ARTICLE INFO

Keywords:
Critical thinking
Competence
Clinical practice
Patient safety

ABSTRACT

Critical thinking ability is one of the basic competencies of clinical nurse and is widely accepted as being associated with the provision of quality care, however, the few evidence-based data related to the relationship between level of critical thinking ability and nurses' sociodemographic and professional characteristics.

The aim of this study was to identify the level of critical thinking among nurses in clinical practice according to sociodemographic and professional variables.

Descriptive cross-sectional and correlational study was carried out in a sample of 339 nurses from medical, surgical and critical care units at a tertiary care hospital. This study is related to a previous publication that presents psychometric analysis. Data were compiled using the Nursing Critical Thinking in Clinical Practice Questionnaire and *ad hoc* form for the recording of sociodemographic and professional characteristics. The statistical analysis of the data was performed using frequency, Mann-Whitney *U* Test, Kruskal-Wallis Test, and Pearson's correlation coefficients.

Nurses reported moderate levels of critical thinking. Older nurses, with 11–15 years of experience in the actual unit, with continuous shift work, a permanent contract and master's degree indicated a higher level of critical thinking.

Critical thinking skills are related to certain socio-demographic and professional variables, particularly age, years of experience, shift work, type of contract and educational level.

What is already known about the topic?

- The processes of clinical decision-making and problem-solving require advanced critical thinking skills in nursing practice.
- The measurement of critical thinking is important to identify deficits and developments in nurses' cognitive capacities as well as demonstrate the effectiveness of strategies.

What this paper adds

- The critical thinking skills are related to certain socio-demographic and professional variables: age, years of experience in the present unit, shift work, type of contract and educational level.
- Gender, years of nursing working experience, work unit, years working in the present unit, type of contract and educational level are not considered related to critical thinking skills.

1. Introduction

Critical thinking is a cognitive process that includes a rational analysis of information to facilitate reasoning, judgment and decision-making. A review of the nursing literature shows that critical thinking is a major topic of interest, despite the terminological confusion and the lack of a broadly accepted conceptualization adapted to the clinical setting (Zuriguel-Pérez et al., 2015). Among the factors that may explain the interest in the subject over the past decade are the increase in

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https://doi.org/10.1016/j.nepr.2019.102649
Received 26 October 2018; Received in revised form 10 July 2019; Accepted 22 October 2019
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the complexity of patient care and the technological advances which have created challenging new scenarios for decision-making (Jacob et al., 2017; Yue et al., 2017). Other factors are the higher expectations of patients regarding their care and the need for critical thinking to respond to clinical problems. Previous studies have seen the ability of nurses to raise the quality of care as largely dependent on the development of critical thinking skills, especially in order to ensure accurate diagnosis (Bragadóttir et al., 2017; Cho et al., 2016; da Costa Carbogim et al., 2017). Critical thinking applied to clinical care can foster evidence-based professional practices and promote advanced professional skills (Edwards et al., 2015; Morténius et al., 2016; Taylor et al., 2016; Hong and Yu, 2017; Cui et al., 2018).

Nurses' ability to recognize and respond to patient's deterioration, reduces adverse events and promote patient safety (Purling and King, 2012). The focus of the nurse's clinical judgment should be on observation and reasoning skills. Clinical judgment, a concept that is critical for nursing can be complex, because the nurse needs to develop critical thinking skills to use observation skills, identify relevant information and identify relationships between elements given through reasoning and judgment.

Critical thinking skills are related to nursing competence (Chang et al., 2011) and Hamric et al. (2014) has summarised an integrated Advanced Practice Nursing (APN). Using expert clinical thinking, using reflective practice and using evidence as a guide to practice are considered as a 'core competence' in the conceptual definition of APN.

2. Background

Critical thinking ability is one of the basic competencies of clinical nurse and is widely accepted as being associated with the provision of quality and safety care, however, the construct of critical thinking poses considerable difficulties for researchers. The first difficulty is the absence of a conceptual description to use as a starting-point (Carter et al., 2015; Pitt et al., 2015, Von Colln-Appling and Giulano, 2017). Numerous studies have targeted topics in nursing education but studies in the area of nurse's critical thinking practice are rare (Zuriguel-Pérez et al., 2015, da Costa et al. 2017). In relation to clinical practice Alfaro-LeFevre (2016) put forward the idea of 4-Circle Critical Thinking, a theoretical model that offers a definition of critical thinking applied in this context. The 4-Circle CT Model describes the construct of critical thinking as the integration of four components: personal characteristic, intellectual and cognitive abilities, interpersonal abilities and self-management and technical abilities.

The second difficulty is the lack of instruments to assess critical-thinking that are designed as performance assessments and specific to nursing. (Paul, 2014). For example, the Watson-Glaser Critical-thinking Appraisal (WGCTA; Watson and Glaser, 1991) and the California Critical thinking Disposition Inventory (CCTDI; Facione et al., 1992) are instruments based on general critical-thinking ability isolated from the application of nursing knowledge. Zuriguel-Pérez (2016) reviewed nine tools for validity and feasibility, including these, and this author found that the tools with more validity included performance oriented assessment with detailed content, but there was not a single instrument that ranked high in both validity and feasibility in the clinic context.

The third difficulty is that not is there agreement regarding what variables influence critical thinking skills (Shoulders et al., 2014). Alfaro-LeFevre (2016) identifies age as one of the personal factors that influence critical thinking. More advanced ages may be related to higher levels of critical thinking skills, because, as people grow older they have more opportunities to apply their reasoning in different situations. The results of some studies have indicated a positive relationship between chronological age and critical thinking, though others in nursing students have suggested that age is not related to critical thinking ability. As regards gender, Hunter et al. (2014) found no differences between men and women in critical thinking skills; however, in the context of these investigations, it appears that the disproportion in the representation of men and women in the profession is a limitation for exploring critical thinking from the gender perspective. Experience in clinical practice can have a positive impact on critical thinking skills (Chao et al., 2013; Gloudemans et al., 2013; Zuriguel-Pérez et al., 2018) as nurses gain more knowledge about their profession and become more expert. At the same time, however, certain factors in the working environment may act as barriers to the promotion of critical thinking including hours working, estability laboral, limited time, understaffed units, fear of job loss, stress, technically focused care, automated, and increasing demands on nurses' time and energy (Cho et al., 2016; Raterink, 2011; Nantsupawat et al., 2017). Finally, higher academic levels are associated with higher critical thinking skills (Gloudemans et al., 2013; Pitt et al., 2015).

In summary, while several studies have analyzed the variables that influence critical thinking skills in students, the research in the healthcare field with samples of clinical nurses remains scarce and inconclusive. The lack of evidence on the levels of critical thinking in clinical nurses and associated variables represents a difficulty in promoting promotional measures that stimulate advanced clinical practice. To date, the link between level of critical thinking skills and sociodemographic and professional factors contributing to the nurse'critical thinking has not been examined closely in clinical practice. In this line, the research questions were: What are the critical thinking levels of nurses? How are the critical thinking levels of nurses distributed according to particular sociodemographic and professional variables?

This study aimed to identify the level of critical thinking skill in nurses according to sociodemographic and professional variables.

3. Methods

3.1. Design

A cross-sectional research design study Phase I/Phase II was used carried out between March and April 2015. Phase I explored psychometric properties of the questionnaire used in a sample of 339 nurses, selected using stratified sampling strategy according with proportional allocation by units, which main characteristics were published in a previous paper already (Zuriguel-Pérez et al., 2017).

In the context of Phase II we present the rest of the sociodemographic characteristics collected in Phase I and focused in the analysis of the variables correlation to follow the aim of the present study.

3.2. Data collection instruments

3.2.1. Nursing Critical Thinking in Clinical Practice Questionnaire

The Nursing Critical Thinking in Clinical Practice Questionnaire. (N-CT-4 Practice), develop by Zuriguel-Pérez (2016) is reported to be a useful instrument to which assess the level of nurses' critical thinking in clinical practice. The N-CT-4 Practice is based on Alfaro-LeFevre's 4-Circle Critical Thinking model and assesses the construct of critical thinking by integrating four components: (a) personal characteristics: patterns of intellectual behavior (attitudes, beliefs and values) that act as triggers of critical thinking skills; (b) intellectual and cognitive skills: knowledge and understanding of nursing and the decision-making process; (c) interpersonal and self-management skills that favor communication and the recording of relevant patient information; and (d) technical skills: knowhow and expertise in nursing procedures. Compared to other instruments critical thinking assessment instruments, the N-CT-4 Practice is the instrument with the best psychometric properties reported specific for clinical practice.

The N-CT-4 Practice questionnaire consists of 109 items, and the distribution into the four dimensions: D1-personal characteristics (39 items), D2-intellectual and cognitive skills (43 items), D3-interpersonal and self-management skills (21 items), and D4: technical skills (6 items). All items were classified using a 4-point Likert scale (ranging

from 1 = never or almost never to 4 = always or almost always). The overall score is the sum of the values recorded, which ranges from 109 to 436. Scores for each dimension are also obtained, the minimum and maximum values being: D1, 39–156; D2, 43–172; D3, 21–84; and D4, 6–24. As for its psychometric properties, the N-CT-4 Practice shows high reliability in terms of internal consistency (total Cronbach's α value was 0.96, it ranged from 0.78 for D4 to 0.94 for D2) and test-retest temporal stability (intraclass correlation coefficient of 0.77). The questionnaire obtained an overall content validity score of 0.85 under expert evaluation. Construct validity, analyzed by confirmatory factor analysis, showed the presence of the four dimensions proposed in Alfaro-LeFevre's theoretical model (Zuriguel-Pérez, 2016; Zuriguel-Pérez et al., 2017).

3.2.2. Demographic variables

A self-designed form was used based on a literature on this topic, with the aim to collect sociodemographic and professional information about the nurses in the study population. The form comprised 8 closed-answer questions on the following:

Gender, age, years of nursing working experience, working unit, years working in the present unit, shift work, type of contract and educational level.

3.3. Ethical considerations

The project was approved by the Clinical Research Ethics Committee of the Hospital Vall d'Hebron (Catalan Health Institute, PR (AG)188/2013), as well as by the nursing management team and the Commission of Bioethics at the University of Barcelona (IRB 00003099). Safeguards were put in place to ensure confidentiality of the participants. Potential participants received a self-administered questionnaire along with written information about the study, its significance and ethical issues. It was stressed that participation was voluntary. Informed consent was then obtained in writing. Participants received the questionnaires in unsealed envelopes. Once they had completed the questionnaires, they returned them in the same envelopes after sealing them. The duration of data collection was approximately 15 min per individual.

3.4. Data analysis

We obtained descriptive data with frequency and percentage distributions. The Kolmogorov-Smirnov test was applied to determine the goodness of fit of the distributions of the variable “critical thinking” (CT). Three levels of CT were defined: low (< 1 standard deviation *(SD)* below the mean), moderate (± 1 *SD* around the mean) and high (> 1 *SD* above the mean) (Falcó-Pegueroles et al., 2015). The age variable was categorized into intervals according to percentiles.

Relationships between the total CT scale and all dimensions and the independents variables, sociodemographic and professional variables, were analyzed using non-parametric test to establish significant relationships. The Mann-Whitney *U* test tested relationships between the independent variables with two categories, gender and educational level, and the CT scale and all dimensions. The Kuskal-Wallis H test tested the relationships between the independent variables with tree or more categories: age, years of nursing working experience, working unit, years working in the present unit, shift work, type of contract and the CT scale and all dimensions. In all tests, a confidence level of 95% was assumed. All analyses were performed using the statistical package R version 3.3.0.

4. Results

4.1. Characteristics of participants

As we present in previous paper in the context of Phase I (Zuriguel-Pérez et al., 2017), 339 questionnaires were correctly completed with an acceptable rate of 96.8%. The sociodemographic characteristics of the sample are shown in Table 1.

Table 1
Sociodemographic and professional characteristics of the nurses (n = 339). (Part of this data related with previous paper published with regard Phase I of the study (Zuriguel-Pérez et al., 2017)

Characteristics	n	%
Mean age (years)/range 43.8(SD 11.1)/21–65		
Gender		
Female	294	87.0
Male	44	13.0
Years working as nurse		
< 1	14	4.1
1-5	41	12.1
6-10	39	11.5
11-15	51	15.0
16-20	41	12.1
21 +	153	45.1
Working unit		
Medical unit	55	16.2
Surgical unit	34	10.0
Medical-surgical unit	146	43.1
Critical care	104	30.7
Years' experience in current unit		
< 1	51	15.0
1-5	98	28.9
6-10	54	15.9
11-15	38	11.2
16-20	28	8.2
21 +	70	20.6
Shift work		
Day (12 h)-Full time	182	53.7
Night (12 h)-Full time	80	23.6
7 h-Full time	52	15.3
Part-time	25	7.3
Type of contract		
Permanent	219	64.6
Temporary	120	35.4
Educational level		
Degree	136	40.1
Master-Degree	203	59.9

Degree qualifies for the exercise of the nursing profession.
SD, standard deviation.

4.2. Levels of critical thinking in nursing practice

Mean overall CT score was 362 ± 33.4 (range = 109–436). Scores of 328.6 or below were taken to indicate a low level of critical thinking, scores between 328.7 and 395.3 a moderate level, and scores of 395.4 a high level. The intellectual and cognitive dimension obtained higher mean (150 ± 15.00) than technical dimension (20.7 ± 2.45). According to this categorization, the sample had moderate levels in critical thinking skills.

4.3. Factors related to the nurse's critical thinking

The analysis showed statistically significant differences between total CT scores and the following variables: age (H = 8.218; $p = 0.042$) and shift work (H = 13.293; $p = 0.004$), Thus, nurses aged between 53 and 65 obtained the highest CT levels with a mean score of 360.6 ± 35.9. With regard to shift work, the highest CT levels were obtained by nurses on the 7-h full time with mean score 367.3 ± 31.5.

There were no significant differences between total CT scores according to gender, years of nursing working experience, work unit, years working in the present unit, type of contract and educational level ($p > 0.05$).

With regard to the four individual dimensions, mean scores were 125 ± 13.2 for the personal dimension, 150 ± 15 for the intellectual

Table 2
Critical thinking scores of the nurses (n = 339).

Nursing Critical Thinking in Clinical Practice Questionnaire (N-CT-4 Practice)		
Dimensions	Md [IQR]	Min-Max
Personal	123 [115; 134]	39–156
Intellectual and cognitive	152 [140; 164]	44–270
Interpersonal and self-management	63.4 [60.0; 72.2]	20–80
Technical	21.0 (19.0; 23.0]	6–24
Total Critical Thinking	367 [340; 390]	109–436

Md: median.
IQR: Interquartile range.

and cognitive dimension, 66.0 ± 8.01 for the interpersonal and self-management dimension and, 20.7 ± 2.45 for the technical dimension (Table 2).

As show in Table 3, the mean scores for total CT and dimensions scores according to sociodemographics and professional variables. With regard to age, there was a significant difference between the mean scores for the personal dimension (H = 5.945; $p = 0.114$) and intellectual and cognitive dimension (H = 10.712; $p = 0.013$). The mean scores for the personal and intellectual and cognitive dimension were higher in nurses aged between 53 and 65 than younger nurses.

Regarding years working in the present unit there was a significant difference between the mean scores for the intellectual and cognitive dimension (H = 13.296; $p = 0.021$), interpersonal and self management dimension (H = 11.808; $p = 0.038$), and technical dimension (H = 15.036; $p = 0.010$). The mean scores for these dimensions were higher in nurses with 11–15 years working in the present unit.

With regard to shift work, here was a significant difference between the mean scores for the four dimensions: personal dimension (H = 8.347; $p = 0.039$), intellectual and cognitive dimension (H = 11.538; $p = 0.009$), interpersonal and self management dimension (H = 15.425; $p = 0.001$) and technical dimension (H = 12.094; $p = 0.007$). The mean scores for these dimensions were higher in nurses worked in 7-h full time than nurses worked 12-h shifts (day or night) full time or part-time.

With regard to type of contract there was a significant difference between the mean scores for the intellectual and cognitive dimension (H = 8.026; $p = 0.018$), the mean score of nurses with permanent contract was higher than those with temporary contract.

Finally, with regard to educational level, here was a significant difference between the mean scores for the intellectual and cognitive dimension (H = 12565; $p = 0.047$) and technical dimension (H = 11679; $p = 0.003$). The mean scores for these dimensions were higher in nurses with a master's or higer degree.

5. Discussion

Using the conceptual model of critical thinking development by Alfaro–LeFevre of four dimensions, we found that most nurses in the sample presented moderate levels of critical thinking. This finding is consistent with results from other studies which have explored critical thinking skills in nurses using other instruments (Chang et al., 2011; Hunter et al., 2014; Ludin, 2018; Wu et al., 2017).

Regarding the correlations between the levels of critical thinking dimensions and the sample profile, the results indicate that critical thinking skills are sensitive to certain sociodemographic and professional characteristics such as age, years working in the present unit, shift work, type of contract and educational level.

Evidence suggest that age as a determinant of the level of critical thinking. The findings revealed that critical thinking level of nurses aged between 53 and 65 is higher than in younger nurses. The significant difference between critical thinking and age found in this study is consistent with previous studies of Chang et al. (2011) and Shinnick et al. (2012). Findings also differed from reports of Hunter et al. (2014) and Naber and Wyatt (2014), who found no relationship between levels of critical thinking and age. Factors not explored in this study may explain why age was a demographic factor that was correlated with critical thinking level, such as nursing competence instruments (Chang et al., 2011), emotional intelligence (Kahraman and Hiçdurmaz, 2016; Kaya et al., 2018) or decision-making abilities (Chen et al., 2016). According to Alfaro-LeFevre (2016), moral development usually comes with maturity and the most older nurses have had more opportunities to practice reasoning in various situations. This may be due to that older nurses had a higher level of attitudes, beliefs and values often seen in who are critical thinkers. According this author, then older nurses would be self-aware, genuine, curious, honest, confident, resilient, open and fair-minded, autonomous, flexible, proactive, persistent, creative or sensitive to diversity, a question that future research must focused. They also presented a high level of knowledge and intellectual skills necessary for safe and effective care, such as the nursing process and decision-making skills.

It could be expected that the years of work in the present unit are related to the level of critical thinking, as it is reasonable to assume that nurses that have worked longer in the same unit and consequently higher experience. Interestingly, in our study nurses with 11–15 years of work experience in the same unit had higher overall levels of critical thinking, corroborating the results of Hunter et al. (2014) and Gloudemans et al. (2013). However, from 15 years of experience onwards the level begins to fall. These findings corroborate those of Yang et al. (2013) who found that certain factors in the working environment appear to act as barriers to the promotion of critical thought, provoking dissatisfaction and demotivation, and increasing in effect over the course of a professional career. Alfaro-LeFevre (2016) states that critical thinking is dependent on the context and is not transferable to other situations; if so, experience in the same unit would encourage critical thinking, but we do not know what level of critical thinking of these same nurses would have if they transferred to other different care units. Another important professional characteristic in our study was that the participants were predominantly > 21 years in nursing (45.1%) with a fifth who worked in their current unit for > 21 years (20.6%). Fact that shows that, in our hospital, the voluntary nurse internal turnover or rotation between services is generalized and probably attributable a job dissatisfaction, as reported by the European study “Nurse Forecasting: Human Resources Planning in Nursing (RN4CAST)” where our hospital participates (Aiken et al. 2013). According to Jaturanonda et al. (2006), rotation is translated into the acquisition of new skills and the improvement of productivity, on the other hand, a high frequency of rotation of jobs may not be positive, and increases evidence of its negative effects on nurses, patients and health care organizations (Hayes et al., 2012).

Voldbjerg et al. (2016) argues that the ability to use to critical thinking is influenced not by educational level or experiential aspects but by environments that promote these skills. In agreement with Blondy (2011) we found that nurses with higher overall critical thinking scores work on continuous shifts and have permanent employment contracts. These results draw attention to the relationship between certain aspects of the working environment and critical thinking skills. According to Saksvik-Lehouillier et al. (2016) and Burke et al. (2013) nurses working part time have a less positive perception of the workplace and have less favorable attitudes to their work; what is more, working on night shifts may have a negative effect on professionals' participation and commitment. In this line Griffiths et al. (2014) conclude that shifts of 12 h were independently associated with nurses' reports of lower quality of care, poorer patient safety, and increasing rates of care left undone.

As for educational level, nurses with postgraduate qualifications presented higher overall levels of critical thinking, as previously reported by Gloudemans et al. (2013) and Pitt et al. (2015). It should be borne in mind that the professional training and accreditation systems in Spain differ from those in place in the US and in some other European

Table 3
Critical thinking total and dimensions scores of the nurses according to sociodemographic and professional characteristics (n = 339).

	Nursing Critical Thinking in Clinical Practice Questionnaire (N-CT-4 Practice)				
	Total Critical Thinking	Personal dimension	Intellectual and cognitive ddimension	Interpersonal and self-management dimension	Technical dimension
	Md [IQR]	Md [IQR]	Md [IQR]	Md [IQR]	Md [IQR]
Gender					
Female	362 [340; 385]	125 [115; 135]	152 [140; 162]	65.6 [60.0; 72.0]	21.0 [19.0; 22.0]
Male	369 [342; 390]	128 [118; 134]	154 [137; 164]	69.0 [61.8; 72.2]	22.0 [19.0; 23.0]
Statistical Analysis[a]	U = 5867.5	U = 6139.5	U = 6078.5	U = 5782	U = 5387
	p = 0321	p = 0.587	p = 0.519	p = 0.256	p = 0.071
Age (range years)					
21-35	361 [332; 380]	123 [116; 132]	149 [136; 157]	67.0 [60.0; 72.0]	21.0 [19.0; 23.0]
36-46	370 [343; 388]	126 [116; 136]	154 [143; 164]	66.0 [61.0; 73.8]	21.0 [19.0; 23.0]
47-52	353 [337; 382]	124 [115; 131]	150 [136; 162]	64.0 [60.0; 71.0]	20.0 [18.0; 22.0]
53-65	366 [346; 398]	127 [116; 138]	155 [143; 165]	67.0 [61.0; 74.0]	22.0 [19.0; 23.0]
Statistical Analysis**	H = 8.218	H = 5.945	H = 10.712	H = 3.904	H = 3.149
	p = 0.042	p = 0.114	p = 0.013	p = 0.272	p = 0.369
Years working as a nurse					
< 1	350 [340; 380]	125 [119; 132]	142 [135; 155]	65.5 [62.2; 69.8]	20.5 [19.0; 21.8]
1-5	357 [330; 379]	123 [113; 132]	151 [137; 159]	65.0 [60.0; 72.0]	21.0 [20.0; 23.0]
6-10	367 [340; 385]	125 [116; 134]	152 [141; 158]	67.0 [60.5; 72.0]	21.0 [19.0; 23.0]
11-15	373 [340; 388]	127 [116; 136]	155 [142; 164]	67.0 [60.0; 74.0]	21.0 [19.0; 23.0]
16-20	352 [337; 379]	124 [115; 131]	149 [136; 160]	65.0 [61.0; 71.0]	20.0 [19.0; 22.0]
21 +	362 [341; 390]	126 [115; 135]	153 [142; 163]	65.0 [61.0; 72.0]	21.0 [19.0; 22.0]
Statistical Analysis**	H = 3.129	H = 2.635	H = 5.936	H = 1.419	H = 2.026
	p = 0.680	p = 0.756	p = 0.313	p = 0.922	p = 0.846
Working unit					
Medical unit	357 [338; 380]	123 [116; 134]	151 [137; 159]	65.3 [61.0; 70.5]	20.0 [18.0; 22.0]
Surgical unit	359 [328; 378]	126 [114; 132]	145 [136; 155]	63.0 [59.2; 71.5]	20.0 [18.0; 22.0]
Medical-Surgical	362 [342; 390]	125 [114; 136]	153 [142; 163]	66.5 [60.0; 73.0]	21.0 [19.0; 23.0]
Critical care	366 [344; 387]	127 [118; 135]	153 [141; 163]	65.5 [60.8; 71.2]	21.0 [19.0; 23.0]
Statistical Analysis**	H = 2.964	H = 1.313	H = 5.947	H = 3.297	H = 5.41
	p = 0.564	p = 0.859	p = 0.203	p = 0.509	p = 0.248
Years' experience in current unit					
< 1	353 [332; 376]	124 [116; 132]	145 [136; 156]	64.0 [60.0; 69.5]	20.0 [18.5; 22.0]
1-5	366 [342; 386]	125 [116; 134]	153 [140; 163]	67.0 [62.0; 73.0]	21.0 [22.0; 23.0]
6-10	364 [336; 385]	126 [115; 134]	150 [140; 160]	66.0 [60.0; 71.0]	20.0 [18.0; 22.0]
11-15	376 [353; 397]	126 [119; 137]	160 [149; 166]	71.0 [64.2; 75.8]	21.0 [20.0; 23.8]
16-20	355 [337; 387]	122 [111; 131]	153 [138; 163]	64.5 [61.0; 71.0]	20.0 [18.0; 22.0]
21 +	360 [337; 392]	126 [115; 136]	153 [142; 162]	65.0 [59.0; 72.0]	22.0 [19.0; 23.0]
Statistical Analysis**	H = 7.729	H = 1.451	H = 13.296	H = 11.802	H = 15.036
	p = 0.168	p = 0.919	p = 0.021	p = 0.038	p = 0.010
Shitf work					
Day (12 h)	362 [337; 384]	125 [115; 135]	152 [139; 161]	65.0 [60.0; 71.4]	20.0 [18.0; 22.0]
Night (12 h)	362 [342; 385]	124 [115; 134]	152 [140; 162]	66.5 [60.0; 72.0]	21.0 [19.8; 23.0]
7 h-full time	378 [357; 397]	128 [121; 138]	156 [147; 166]	70.5 [64.8; 76.0]	21.5 [20.0; 24.0]
Part-time	351 [324; 373]	123 [112; 129]	142 [132; 154]	63.0 [56.0; 67.0]	21.0 [20.0; 22.0]
Statistical Analysis**	H = 13.293	H = 8.347	H = 11.538	H = 15.425	H = 12.094
	p = 0.004	p = 0.039	p = 0.009	p = 0.001	p = 0.007
Type of contract					
Permanent	366 [342; 389]	127 [116; 136]	153 [142; 163]	66.0 [61.0; 72.0]	21.0 [19.0; 23.0]
Temporary	359 [332; 386]	124 [115; 132]	152 [141; 162]	67.5 [60.0; 73.2]	21.0 [19.0; 23.0]
Statistical Analysis**	H = 5.001	H = 4.43	H = 8.026	H = 3.726	H = 0.751
	p = 0.082	p = 0.109	p = 0.018	p = 0.155	p = 0.687
Eductional level					
Degree	358 [334; 383]	125 [115; 135]	151 [136; 159]	65.0 [60.0; 72.0]	20.6 [18.0; 22.0]
Master Degree	366 [344; 388]	125 [117; 134]	153 [141; 163]	67.0 [61.0; 72.0]	21.6 [19.0; 23.0]
Statistical Analysis[a]	U = 12785	U = 13834	U = 12565	U = 13101.5	U = 11679
	p = 0.081	p = 0.560	p = 0.047	p = 0.163	p = 0.003

[a] Mann-Whitney *U* test; **Kruskal-Wallis H test: Md: median; IQR: Interquartile range.

countries where these studies were performed. In spite of these differences, it seems fair to conclude that nursing education programs contribute to the development of critical thinking skills and, therefore, that these skills can be learned.

In line with Ludin (2018), our nurses in critical care units had higher overall levels of critical thinking. It may well be the case that environments such as critical care units or emergency units, where the complexity of patients' conditions increases and nurses need to define priorities accurately and quickly, favor the development of critical thinking skill.

As regards gender, the data available are insufficient to be able to affirm that it is a decisive variable in the development of critical thinking skills. As with most studies of the nursing profession, the difference in the proportion of women and men makes it difficult to analyze the relationship (Liu et al., 2018; Shinnick and Woo, 2013; Hunter et al., 2014).

6. Limitations

Our study is not without limitations. First, the characteristics of our

sample mean that the results cannot be extrapolated to other populations. Second, the fact that the questionnaire was self-administered should be taken into account when interpreting these results. Third, the low percentage of men precludes any attempt to draw conclusions in relation to gender. While this study has provided information on the relationship between critical thinking levels and specific socio-demographic and professional variables, it would also be interesting to analyze other determinants such as job satisfaction, moral sensitivity, the degree of satisfaction with care expressed by patients or the occurrence of adverse effects or complications.

7. Conclusions and relevance to clinical practice

The results presented here show that critical thinking skills are related to certain socio-demographic and professional variables, particularly age, years of experience in the present unit, shift work, type of contract and educational level.

These findings are important in order to identify which groups of nurses present the highest critical thinking levels, which groups need to improve their critical thinking skills and which dimensions should be focused upon in order to increase these skills.

This study may help to design effective strategies for the development of critical thinking among clinical health staff. Nurses need to integrate a critical thinking focus by developing their clinical experience with a commitment to lifelong learning and evidence-based practice. These issues should also be considered by nursing care managers in order to create environments that facilitate critical thinking among professionals, such as the promotion of job security and the reduction of rotations in different hospital units. These results can be used to enhance nursing curriculum for the proper training and education of competent nurses.

The nurses' critical thinking is a process developed on the long term. It must be practiced, reinforced, and nurtured over time. Furthermore, even the nurses with experience need help to develop their critical thinking skills. The importance of demonstrating critical thinking in the clinical setting will likely produce nurses who are more self evaluative and comprehensive in their practice.

Contributions

Study design: Esperanza Zuriguel-Pérez, Maria Teresa Lluch-Canut, Anna Falcó-Pegueroles; Data collection: Sandra Agustino-Rodríguez, Maria del Carmen Gómez-Martín, Juan Roldan-Merino; Analysis: Esperanza Zuriguel-Pérez; Manuscript preparation: Esperanza Zuriguel-Pérez, Maria Teresa Lluch-Canut, Anna Falcó-Pegueroles. All of the authors critically reviewed the article and approved the final version.

Declaration of competing interest

No conflicts of interest has been declared by the authors.

Acknowledgements

The authors would like to thank the experts who participated in the panel and all the nurses who responded to the questionnaire. The support statistical analysis has been carried out in the Statistics and Bioinformatics Unit (UEB) of Vall d'Hebron Institute of Research (VHIR).

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.nepr.2019.102649.

Funding

This study was partially funded by the Nursing Foundation of Barcelona as part of the Grants for Research Projects (PR, 1820–14/2014).

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