

## 1 Introduction.

2 Organisation can be understood as the “process of associating or combining groups that  
3 must carry out specific envisaged actions, with the appropriate and necessary means, in  
4 order to work in a sensible, rational and coordinated manner that facilitates goal  
5 achievement” (Mompart García & Durán Escibano, 2009). Organisations present  
6 different “organisational climate” (Robbins & Judge, 2013). Thus, nursing care does not  
7 occur in an organisational vacuum, but is the product of interaction between  
8 professionals, patients, the public and the health service. One aspect of this interaction  
9 is the professional practice environment for nursing, which the International Council of  
10 Nurses (Baumann, 2007) has defined as “*those settings that facilitate excellence and  
11 conscientious work... to ensure the health, safety and well-being of staff, promote  
12 quality patient care and improve motivation, productivity and outcomes*”.

13 The study of nursing practice environments began with what is now considered a  
14 historic study on magnetism and health (McClure, Poulin, Sovie, & Wandelt, 1983), and  
15 since then, significant associations have been found between optimal professional  
16 nursing practice environments and quality of care and more positive outcomes for users  
17 or patients (Aiken, Clarke, Sloane, Lake, & Cheney, 2008). Excellent nursing  
18 environments yield specific benefits such as higher quality care (Kramer &  
19 Schmalenberg, 2008; Schmalenberg & Kramer, 2008; Trinkoff et al., 2010), lower rates  
20 of mortality, adverse events and work accidents (Aiken et al., 2014; Trinkoff et al.,  
21 2010), greater autonomy and professional development of clinical nurses (Kramer &  
22 Schmalenberg, 2008), lower rates of turnover, absenteeism and vacancies in the nursing  
23 team, greater staff loyalty to the organisation and greater professional satisfaction  
24 (McClure et al., 1983), significantly lower costs and reduced administrative expenditure  
25 (Smith, 2006).

**Commented [HP1]:** These references are somewhat dated. I suggest you include more recent justification for this study such as DOI: 10.1016/j.ijnurstu.2017.06.003

Several instruments have been developed to study and monitor nursing practice environments, including the Practice Environment Scale of the Nursing Work Index (PES-NWI) (A.1), developed by Lake in the USA (Lake, 2002). This measures the characteristics of professional environments, defined as “the organisational characteristics (organisational climate) that facilitate or constrain professional nursing practice”. The author assessed 7 instruments and 54 studies of multidimensional instruments, and concluded that the PES-NWI was the most useful instrument in this respect, although acknowledged that none of them were brief or rapid (12). It has also been suggested that the Practice (PES-NWI) presents greater methodological strength than the other tools available (Alzate, Bayer, & Squires, 2014; Gajewski, Boyle, Miller, Oberhelman, & Dunton, 2010) and is considered by most authors as the ideal instrument for assessing environments (Bonneterre, Liaudy, Chatellier, Lang, & de Gaudemaris, 2008). In short, this questionnaire has contributed to the development of safe work environments and quality, efficient nursing practice (Gu & Zhang, 2014), and has been validated in various cultural and geographical contexts (Liou & Cheng, 2009; Sermeus et al., 2011). In Spain, the questionnaire was initially validated and adapted for general nursing environments with registered nurses (31 items and 5 dimensions) (De Pedro Gómez et al., 2009) and later specifically for Primary Health Care (PHC) (De Pedro-Gómez et al., 2012). Recently, it was also assessed for content validity in 33 public hospitals in the Spanish national health system (Fuentelsaz-Gallego, Moreno-Casbas, & González-María, 2013). The studies conducted in Spain have mainly focused on appraising the quality of care environments in primary care. At the organizational level, primary and community care in Spain is arranged differently ~~from~~ hospital care. Nurses are much more independent, manage community health and practise within community health centres and patients’ own homes (Jarrín, Flynn, Lake, & Aiken,

2014). Previous studies have shown, however, that some of the organizational characteristics present in hospital care can be equally important in community care, influencing care excellence and clinical outcomes for patients (Flynn, 2007; Jarrín et al., 2014).

In relation to the elements measured in environment assessment questionnaires, the essential elements for professional practice have been defined as “*those which nurses themselves recognise as very important or significant for enhancing care in the pursuit of continuous improvement and excellence*” (Kramer & Schalenberg, 2004), and various elements may be more essential than others to improve care (Anzai, Douglas, & Bonner, 2014; Bjørk, Samdal, Hansen, Tørstad, & Hamilton, 2007; Gardner, Thomas-Hawkins, Fogg, & Latham, 2007; Van den Heede et al., 2013); even in a study on community-based settings (Jarrín et al., 2014; Mensik, 2006). The study by Mensik (Mensik, 2006) proposed that 10 elements were crucial for community care delivery, in agreement with other investigations conducted in hospitals (Kramer & Schalenberg, 2004). Finally, a recent experience in Spain pointed out that essential care elements could be identified by more than 40% of nurses (Gea-Caballero et al., 2017).

Despite the organisational benefits derived from the use of the tool, Lake (Lake, 2002) has identified the need for a short version of the PES-NWI as a priority (questionnaires evaluating environments have gradually reduced in size), together with collecting further evidence about the questionnaire and assessing its performance in different practice environments (Lake, 2007).

Therefore, our goal was to develop a short version of the instrument –facilitating and simplifying data collection whilst maintaining the quality of the information obtained– by identifying the essential elements of professional nursing practice environments in PHC (Gea Caballero & Martínez-Riera, 2015), i.e. those elements necessary to create

optimal conditions for the provision of excellent nursing care practice. A further goal was to assess the representativeness of essential items in relation to the full PES-NWI questionnaire.

## Materials & Methods.

Study design: ~~This o~~Observational, cross-sectional, multicentre and analytical study conducted in 2015, in PHC units in the Xàtiva-Ontinyent, Elx-Vinalopó and Torrevieja health districts (Valencia region, Spain), serving a population of 615000 citizens.

**Commented [HP2]:** This was not a complete sentence. The other parts of the M&M are complete sentences.

Population and sample: The study population ~~was~~ comprised ~~of~~ PHC nurses working in these health districts. Through random sampling we estimated sample size to achieve representativity was 198 participants (CI 95%, 5% error and a nursing population N=335).

**Commented [HP3]:** Was this done *a priori* or *post hoc*? I suggest you base your sample size discussion on specific literature concerning the number needed for factor analysis.

Inclusion and exclusion criteria: The inclusion criteria were: forming part of the health district's permanent PHC staff, with >3 months in post. Exclusion criteria were: not working as permanent staff and/or <3 months in post. Data were not collected during the summer months (July, August, September) to avoid the surge in nurses temporarily employed to cover for those in permanent positions.

Data collection tool: We used the 31-item version of the PES-NWI questionnaire (A.p. I) validated and adapted to PHC in Spain, with reliabilityCrombach's Alpha=0,913 (De Pedro-Gómez et al., 2012). The tool was self-completed by individuals online (Google Forms® via corporate mails) and in person (self administered). The PES-NWI has got 5 dimensions: Nurse participation in centre affairs, Nursing foundation for

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101 quality of care, Management and leadership of head nurse, Adequate human resources  
102 to ensure the quality of care, Nurse-Physician relationship. Data collection and analysis  
103 were carried out by different pairs of researchers to ensure impartiality. Researchers did  
104 not know the identity of participants. The database was refined on 2 occasions by 2  
105 researchers to minimise error.

**Commented [HP5]:** This step should be more completely described. What is meant by "refined"?

106  
107 Study variables: The sociodemographic variables collected were age, gender, level of  
108 education, professional experience (years), exercise (or not) of a  
109 management/leadership role, health district and place of work. Each item of the  
110 questionnaire was presented as a dichotomous qualitative study variable ('Yes, it is  
111 essential' / 'No, it is not essential'). The variables were grouped into the original  
112 dimensions of the PES-NWI questionnaire.

**Commented [HP6]:** Did participant not also respond to the 31 items on the survey using the original scoring scheme?

113  
114 Data analysis: Statistical analysis ( $\alpha=.05$ ) with SPSS v21. In terms of descriptive  
115 statistics (%), the global reliability of the survey tool as well as all the resulting sub-  
116 scales was measured using Cronbach's alpha. Construct validity was measured using  
117 exploratory factorial analysis with analytical validation of the degree of correlation  
118 between the variables (Kaiser-Meyer-Olkin, KMO) and Barlett's test of sphericity.  
119 Factor analysis measuring total variance explained by the essential elements ('Top  
120 Ten') obtained, using principal component analysis (Varimax-Kaiser rotation). The  
121 confirmatory analysis was carried out using multidimensional scaling (ALSCAL, with  
122 measure of S-stress and RSQ).

123  
124 Ethical aspects: Data were anonymised and protected according to relevant Spanish and  
125 European legislation. The Ethics committee approved the study and participants were

**Commented [HP7]:** I believe you mean were asked to indicate whether or not they consented to participant. This wording sounds as though all were required to consent.

provided with an information sheet and were required to sign a consent. The authors declare no conflict of interest or funding. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

## Results.

Descriptive results.

268 nurses completed the survey (response rate 80%). The majority of participants were 31-40 years (33.1%); only 16,7% of participants were younger than 30 years, and 51-60 years old were 30,1%. 64,7% were women. 75,5% had more than 5 years of experience in primary care, and 44,6% had more than 10 years of experience. In terms of educational achievement, 79,6% nurses were university educated. Only 10,4% were managers or charge nurses.

Participants were asked to select the 10 items they considered most important to help improve the care provided by nurses in primary health care.

The results are presented in *Figure 1*, which identifies the 10 most essential items according to the ratings provided by nurses sampled. The cut-off at 10 items was partly determined by the nurses' ratings, as there was a large gap between the preference for items 10 and 11; this figure perceived as crucial according to participants, receiving 7,3% more selections when compared to the following element (11). It was also partly because previous studies in Spain had also adopted a similar top-ten approach (29, 31).

## Figure 1.

Analysis results.

A factorial analysis of the results for the full questionnaire, exploring rotated components (Varimax-Kaiser rotation), reproduced the original structure of the full questionnaire in 5 dimensions.

A factor analysis of the 10 essential elements, which we call the 'Top Ten', explained 62,1% of the variance in 3 components (Accumulate Variance: Component 1: 24%; Component 2: 43,1%; Component 3: 62,1%).

To determine the construct validity an additional factorial exploratory analysis was carried out for the latent variables in the questionnaire, applying an analysis of principal components (APC). The result of the Kaiser-Meyer-Olkin (KMO) test was 0.77. Bartlett test of sphericity was statistically significant ( $p < 0.001$ ), chi-square = 1473.9. The results achieved in the non-parametric test to perform multidimensional scaling as alternative to the confirmatory factorial analysis obtains stress values = 0.184 and RSQ coefficient = 0.793. Varimax-Kaiser rotation of the 10 essential components indicated an internal structure of 3 dimensions (*Table 1*).

#### **Table 1**

Reliability was determined using Cronbach's alpha for the 5 questionnaire dimensions (D1 to D5), with all measurements obtaining  $> 0.8$  (D1=0.87; D2=0.85; D3=0.93; D4=0.84; D5=0.81). The reliability coefficient (Cronbach) for all of the Top Ten questionnaire items combined was 0.829. The Cronbach value for the dimensions of the short questionnaire were D1=.727; D2=0.705; D3=0.899. Below, we present the Top Ten essential elements for quality care grouped into 3 dimensions, and define the dimensions (*Table 2*).

**Table 2.**

We explored the predictive and explanatory power of the Top Ten in relation to the overall PES-NWI score in our sample (*Table 3*) using multiple linear regression. We found that the short scale closely predicted the overall scores obtained using the PES-NWI.

**Table 3**

In addition, the Top Ten accurately estimated 3 of the 5 dimensions of the PES-NWI (1, 2 and 4), but lost data for dimensions 3 and 5.

**Discussion.**

We aimed to synthesise and prioritise the essential elements for improving PHC, using the Spanish version of the PES-NWI questionnaire as a basis to construct a short nursing environment assessment tool. The Top Ten presents an internal structure centred around 3 dimensions, with Cronbach total=0.829, and dimensions D1=.727; D2=0.705; D3=0.899. In view of these results, the reliability –internal consistency– of the short questionnaire and its dimensions is confirmed according to Cronbach’s original criteria (above 0.7) for short questionnaires (Cronbach, 1951). The psychometric tests including Bartlett’s test of sphericity and Kaiser-Meyer (0.766) are within the intervals accepted in the literature to measure construct validity (Kaiser, 1974). When the multidimensional scaling technique was used as a non-parametric alternative to the confirmatory factorial analysis (Porcar Gómez & Escalante Gómez, 2009) we obtained stress values <.2 (0.184) with RSQ approaching 1 (0.793).. Overall, and based on these results, we propose a short, ‘Top Ten’ questionnaire based on the PES-NWI as a valid,

**Commented [HP8]:** Given the strong internal consistency of the original 31 items would you have expected otherwise? See Bland & Altman’s work on comparability of measures. [https://ncss-wpengine.netdna-ssl.com/wp-content/themes/ncss/pdf/Procedures/NCSS/Bland-Altman\\_Plot\\_and\\_Analysis.pdf](https://ncss-wpengine.netdna-ssl.com/wp-content/themes/ncss/pdf/Procedures/NCSS/Bland-Altman_Plot_and_Analysis.pdf)



flexible, rapid and brief alternative for the study and assessment of professional nursing working environments.

Our results are in the line with those obtained by Mensik (Mensik, 2006, 2007) for home-care environments in the United States. Thus, our essential elements coincided with at least 8 of the elements proposed by Mensik: support from managers/administrators, focus on collaborative practices and multidisciplinary roles, partnership with physicians, interprofessionalism, promotion of professional competence and control of contextual characteristics of the environment, which would include adequate allocation of human resources, nurse training and long-term allocation of patients to nurses (Aiken et al., 2008; Jarrín et al., 2014; Kieft, de Brouwer, Francke, & Delnoij, 2014). With respect to their applicability in different environments, Mensik (Lake, 2002) has stated that the essential elements are probably common to or very similar in settings as diverse as hospital, community or home-based care (Mensik, 2006). Consequently, we suggest that it would be relevant and appropriate to conduct a comparative study of research on different environments and cultures.

A study of hospital environments (Schmalenberg & Kramer, 2008) using the Essentials of Magnetism (EOM) tool has indicated the essential elements of magnetism: the authors found 10 essential elements, of which 8 accounted for most of the variance and were termed the essential 8. Our findings present a high degree of agreement with these results, on up to 7 items if the last item is analysed carefully, which includes both clinical competence and training support. A very recent study in Spain (Gea-Caballero et al., 2017) highlighted a number of essential elements that agree with the Top Ten proposed in the current manuscript (*Table 4*).

#### **Table 4.**

**Commented [HP9]:** Should this be nursing practice environments and cultures?

226

227 In our study, the most important factor for improving care was nursing leadership, a  
228 finding that coincides with most other studies (Jarrín et al., 2014; Mensik, 2006, 2007;  
229 Van den Heede et al., 2013); these studies have also stressed the importance of other  
230 factors in our Top Ten, e.g. provision of adequate resources and good relationships  
231 between nurses/physicians.

232 This high level of agreement indicates that such consensus is not likely to be attributed  
233 to chance. Rather, we believe it reflects a trend in the results of the studies carried out,  
234 suggesting that independently of the questionnaire employed or the environment  
235 studied, nurses tend to consider some elements of organisational environments as being  
236 particularly important to improve nursing care.

237 The information obtained by isolating these 10 items from the [original 31-item](#)  
238 questionnaire presented a high predictive power (90.7%) in relation to the overall score  
239 obtained with the full PES-NWI questionnaire, and explained 62.12% of total  
240 variance. Consequently, using our proposed *Top Ten* tool at operational levels (research  
241 and/or management) will yield a positive result because it provides a short, simple  
242 method to rapidly obtain reliable information on the general characteristics of a  
243 professional nursing environment. Future research is required to confirm and increase  
244 the evidence and to broaden it to the field of hospital care.

245 We are aware that our Top Ten is an unsuitable choice if the goal is to obtain exhaustive  
246 information on all 5 dimensions of the PES-NWI questionnaire, because it does not  
247 replicate the original structure (dimensions) and therefore does not have the capacity to  
248 explain the information in full. It yields equivalent information for dimensions 1, 2 and  
249 4, but loses data for dimensions 3 and 5. This represents a limitation of the study,  
250 particularly on D5 which is a short dimension; however, on D3 (leadership), we believe

251 that the element that we propose is fully representative of the dimension at large, which  
252 could compensate for the loss of information obtained: a good leader and team  
253 coordinator ought to support the staff, see mistakes as opportunities to improve, be  
254 understanding and praise quality work.

255 Therefore, we propose a short tool with 3 dimensions selected for their central role in  
256 the analysis of professional environments, and that include elements from all the  
257 dimensions in the PES-NWI; the first dimension includes items related to leadership  
258 and management of healthcare services; the second dimensions relates to fundamentals  
259 of nursing for the quality of care and relations with other professionals, an aspect related  
260 to independence for decision-making and self-management of nursing practice (Burton,  
261 2010); the third one refers to the availability of human resources. Additionally, the  
262 developer of the original PES-NWI questionnaire (Lake, 2002) considers that the item  
263 ‘relationship nurses/doctors’ can be confused with autonomous practice in nursing, an  
264 aspect identified by other authors (38). In our study, we defined ‘adequate’ relationship  
265 between nurses and doctors could refer to the autonomous practice and control over  
266 their sphere of practice (Kieft et al., 2014).

267 Construction of this short tool is line with the recommendation of the author of the PES-  
268 NWI questionnaire (Lake, 2007), who has stressed the importance of improving  
269 evidence on the scale and constructing short versions for evaluating environments (our  
270 Top Ten proposal is administered in <2 minutes), as well as implementing and testing it  
271 in different nursing practice environments (in our study, in Spanish PHC environments).  
272 We advocate its use in pilot evaluations of primary care environments, as well as once a  
273 complete picture of given environment is ready, and following organisational changes  
274 in order to evaluate their impact.

**Commented [HP10]:** This is a very strong statement in light of the fact that the 10 items explain 62% of total variance. I recommend some qualification of the word, “fully”.

We believe that short tools for assessing environments which simplify data collection will facilitate the evaluation and improvement of these. Consequently, the construction of a short tool based on a questionnaire such as the PES-NWI, which has been widely adapted, translated and used in many countries worldwide, is important to simplify the process of obtaining information about the most significant elements of nursing environments in order to facilitate the study and improvement of nursing work environments.

**Limitations:** This study is exploratory. Therefore, the additional studies of practice environments with the new simplified and revised PES-NWI tool could yield additional evidence concerning the validity of the Top Ten essential elements and contribute to improving the quality of care by modifying these environments in order to create better conditions that make it possible to continue optimising nursing care.

## Conclusions.

Our study identified ten key elements; those elements of the environment that are especially relevant to professional nursing practice in PHC. This has enabled the development of a rapid environment assessment tool consisting of 10 items (Top Ten), which has shown good predictive power regarding the full questionnaire. Since professional environments and nursing activity are variable organisational factors, use of this short tool will simplify data collection and facilitate decision-making for managers in relation to improving quality and outcomes in the population.

**Commented [HP11]:** These statements do not represent limitations of your study. Limitations might include the marginal levels of KMO and stress values, or the fact that the ability of the Top Ten items to predict overall scores of the original 31 item survey is not sufficient for concluding that the Top Ten are the essential elements of PHC nursing environments.

Comparing the sensitivity and specificity of both versions (31 and 10 items) for predicting an outcome of interest would be superior to deciding whether the 10 elements were sufficient for producing desired outcomes or if they are simply related to another survey.

**Acknowledgements.**

To Dr. Enrique Castro Sánchez for ~~their~~ his contribution, assistance and advice on writing and prioritising content; and for his contribution and guidance on the qualitative design of the study (Dr. Castro Sánchez is affiliated with the National Institute for Health Research (NIHR) Health Protection Research Unit (HPRU) in Healthcare Associated Infection and Antimicrobial Resistance at Imperial College London in partnership with Public Health England (PHE), and the NIHR Imperial Patient Safety Translational Research Centre.

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