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PROTOCOL

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Impact of the implementation of best practice guidelines on nurse's evidence-based practice and on nurses' work environment: Research protocol

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Abstract

Aim: To determine the impact of the Best Practice Spotlight Organization® initiative on nurses' perception of their work environment and their attitudes to evidence-based practice.

Design: Quasi-experimental, multicentre study. The intervention is the participation in Best Prectice Spotilight Organizations to implement Best Practice Guidelines.

Methods: The study will include seven centres in the interventional group and 10 in the non-equivalent control group, all of them belonging to the Spanish national health system. The Practice Environment Scale of the Nursing Work Index, and the Health Sciences Evidence-Based Practice Questionnaire will be administered to a sample of 1,572 nurses at the beginning of the programme and at 1 year. This 3-year study started in April 2018 and will continue until December 2021. Statistical analyses will be carried out using the SPSS 25.0. This project was approved by the Drug Research Ethics Committee of the Parc de Salut Mar and registered in Clinical Trials.

Discussion: The study findings will show the current state of nurses' perception of their work environment and attitudes to evidence-based practice, and possible changes in these parameters due to the programme.

Impact: The findings could provide a strong argument for health policymakers to scale up the Best Practice Spotlight Organization® initiative in the Spanish national health system.

KEYWORDS
evidence-based practice, implementation, midwives, nurses, nursing, practice guidelines, quasi-experimental study, work environment

Why is this research or review needed?

- There are still barriers to excellence in health care, especially in the field of nursing care. This implies the existence of variability in nursing practice and, therefore, differences in health outcomes.
- The application of evidence through the Best Practice Spotlight Organization® is a new initiative in Spain. There is a need to identify the direct impact of this initiative on nurses' work environment and on their attitudes to evidence-based practice.

How should the findings be used to influence policy/practice/research/education?

- If the findings of this study reveal that the Best Practice Spotlight Organization® program improves nurses' perception of their working environment and/or leads to better attitudes to evidence-based practice, they would provide a strong argument for strengthening state policy in extending the initiative to all centres in Spain, and to other international settings that could apply the programme.

1 | INTRODUCTION

The term evidence-based medicine was coined in Canada by Sackett et al. (1996) in the mid-1990s and is defined as "the conscientious, explicit, judicious and reasonable use of modern, best evidence in making decisions about the care of individual patients". Since then, it has become an important paradigm in health care, as it provides a framework for the resolution of problems encountered in daily clinical practice. Although this paradigm originated in the field of medicine, the application of its basic principles has spread to allied professions, giving rise to the broader concept of evidence-based

practice (EBP) and, in the case of nursing, to that of evidence-based nursing (EBN).

The construct of EBP consists of a process of five steps or aptitudes initially delineated by Sackett et al. (1997) and consolidated in the Sicily Declaration (Dawes et al., 2005), which are routinely conducted in clinical practice (Johnson, 2008). This process involves the following: the formulation of answerable and clinically relevant clinical questions based on problems arising in clinical practice; the search for and retrieval of the best available evidence with which to answer these questions; critical appraisal of the evidence for validity and clinical relevance; application of the appraised evidence in clinical practice; integration of the evidence with clinical experience and patients' perspective; and, finally, assessment of the effects of the intervention on individuals. The conceptualization of the construct of EBP has evolved, including patient health status and the availability of resources in an organization, which are constantly changing and differ in each situation. Thus, the current concept of EBP encompasses the integration of individual clinical experience, patients' preferences and actions, their clinical circumstances, and the best available external evidence drawn from systematic reviews to guide clinical decision-making in the best possible way, with the aim of improving the effectiveness of healthcare delivery, and consequently, patient outcomes (Cullen et al., 2008; DiCenso et al., 2005).

The work environment is another element considered to be key for the quality of health interventions, and there is sufficient evidence to state that it influences patients' health outcomes. As long ago as the 1930s, it was stated that work satisfaction largely depended on group behaviour and the relationships of the individuals in the group, with greater emphasis placed on cooperation and the feeling of being of importance, than on physical conditions and financial incentives. Later, leadership style was linked to the organizational setting or climate, and the importance of the environment on staff behaviour. In the 1960s, it was believed that people's behaviour depended on both individual perception of their environment and individual components when adapting to it. Litwin and Stringer (1968) concluded that, by varying the leadership style, different organizational climates with stable characteristics could be rapidly created, which could have significant effects on motivation, performance and work satisfaction. Based on the conclusions of several authors who have developed the concept, the work climate or environment can be defined as the shared perceptions of an organization's members about organizational processes in the broadest sense, which encompass different aspects such as leadership styles, interpersonal relationships, remuneration, the organizations' policies or strategic lines and the mechanisms it uses to carry them out, etc., and which directly influence the people composing the organization.

1.1 | Background

Concerning the implementation of EBP in daily clinical practice, since the 1970s with the work of Archibald Cochrane, EBP was earmarked as a key element in the quality of health interventions to reduce variability in clinical practice. Several authors have stated that EBP can improve clinical practice and help health professionals stay up to date (Sackett et al., 1997), and that clinical practice should be based on the most current, reliable and valid evidence drawn from research (Trinder & Reynolds, 2008). Almost 20 years later, a meta-analysis confirmed that patients receiving EBN interventions had better outcomes than those receiving standard care (Heater et al., 1988). Thus, although it has been proven that EBP allows more individualized, effective, rational and dynamic care (Youngblut & Brooten, 2001), it has also been revealed that its implementation is complex and difficult because nursing practice has historically been based more on intuition and/or experience than on research (Brown et al., 2010), which has led to high variability in clinical practice. This was demonstrated in several studies performed in the 1990s showing that 20%–25% of nursing care was unnecessary or potentially harmful and that 30–40% of patients did not receive care based on the results of research (Schuster et al., 1998).

Several studies have described the elements believed to be barriers to the use of research in nursing practice: the quality of the available research, organizational characteristics, the difficulty of finding and reviewing evidence, lack of time and autonomy, the difficulty of understanding statistical concepts, and nurse-specific factors such as predisposition and skills (De Pedro-Gómez et al., 2012; Kajermo et al., 2010; Solomon & Spross, 2011; Squires et al., 2011). Thus, decades after the introduction of the concept of EBP, nurses are not putting into practice the evidence obtained from research or are only doing so in a partial or limited way (Kajermo et al., 2010). Therefore, there is generally a gap between the results of research and their application in practice.

Concerning the work environment in the case of nurses, Sleutel (2000) defined a set of factors that influence work satisfaction: autonomous practice in which nurses participate in decision-making and have control; the status and value of nursing throughout the institution assigned by administration and physicians; and supportive relationships with colleagues, physicians and administration, characterized by mutual respect and mutual concern for the quality of care. The American Association of Colleges of Nursing (2002) identified the dimensions that describe the characteristics of the practice environment and that best support professional nursing practice, allowing nurses to work at their maximum potential: a philosophy of clinical care that emphasizes quality, safety, interdisciplinary collaboration, continuity of care and professional responsibility, promotion of executive nurse leadership, and maintenance of clinical progress programmes based on education, certification and advanced training, among other factors. There is a demonstrated relationship between better nurse-perceived work environments and better health outcomes among patients (Cho et al., 2016), and with a more favourable perception of the quality of care received (Aiken et al., 2012). It has even been found that a reduction in the patient-nurse ratio is strongly associated with health outcomes only in adequate work environments (Aiken et al., 2011).

To overcome the above-mentioned difficulties, and given the current high variability in clinical practice, and the results of several patient health indicators, in the last few years there has been growing interest in applying healthcare quality policies based on the best available evidence and several institutions have been created to meet this aim. Currently, one of the maximum exponents is the Joanna Briggs Institute, which was joined by Spain in 2004 through the Spanish Centre for Evidence-based Health Care: a Joanna Briggs Institute Centre of Excellence. This Centre forms part of the Joanna Briggs International Collaboration and is situated in the Health Care Research Unit (Investén-isciii) of the Instituto de Salud Carlos III. Its mission is to promote and support the synthesis, transfer, and utilization of evidence through the identification of practices that are feasible, appropriate, understandable, and effective in improving health outcomes.

In 2010 the Health Care Research Unit (Investén-isciii), with the agreement of the Registered Nurses' Association of Ontario (RNAO), started the process of translating the RNAO Best Practice Guidelines to allow their use in the Spanish context and joined the Best Practice Spotlight Organisation® (BPSO®) initiative as the instigators and coordinators of its implementation in Spain. The RNAO Programme for the Implementation of Best Practice Guidelines in BPSO® (named Centres Committed to Excellence in Care in Spain), encourages, facilitates and supports the implementation, assessment and maintenance of scientific evidence in health care by supporting and mentoring the institutions involved, seeking improvements in patient, provider, organization, and health system outcomes.

To do this, the knowledge-to-action conceptual framework is used (Straus et al., 2009), which is based on six components: identification of the problem and selection of the evidence, adaptation to the context, assessment of barriers and facilitators, selection of the interventions to be implemented, monitoring and assessment, and sustainability, including an entire series of indicators to measure care process and patient health outcomes for each of the guidelines implemented. Thus, to achieve the implementation of recommendations, follow-up is continuous, as described in the literature (Ploeg et al., 2010). Centres participating in this programme commit to implementing, assessing and maintaining the implementation of at least three Best Practice Guidelines of the RNAO for an initial period of 3 years and to subsequently add to the number of guidelines, scaling them up to the entire institution and undergoing the process of gaining designation as a Best Practice Spotlight Organisation®, which signifies recognition by the Health Care Research Unit (Investén-isciii), the Spanish Centre for Evidence-based Health Care and RNAO that the institution is involved in the application, assessment and maintenance of Best Practice Guidelines.

The first cohort of participants was initiated in 2012, the second in 2015, and the third in 2018. To carry out the programme, a leader was selected in each institution, and the figure of champion, who are less directly involved in the program. This programme encourages both EBP and nurse participation, multidisciplinary work, and an institutional-level philosophy of care.

1.1.1 | International relevance

This study is the first on the topic and could be replicated in all settings applying for the Best Practice Spotlight Organization® Program around the world.

2 | THE STUDY

2.1 | Aim

To determine whether the Best Practice Spotlight Organisation® initiative in Spain has an impact on nurses' work environment and their attitude to EBP.

2.2 | Objectives

2.2.1 | General objective

To determine whether the implementation of the Best Practice Guidelines in the context of the initiative for the implementation of Registered Nurses' Association of Ontario in the Best Practice Spotlight Organisation® improves perception of the work environment in nurses in participating centres and attitudes and behaviour regarding EBP in nursing care.

2.2.2 | Specific objectives

1. To identify the socio-occupational and professional characteristics of nurses working in organizations participating in the study.
2. To describe the characteristics of the work environment and beliefs-attitudes and behavioural profile regarding the EBP of nurses working in organizations participating in the study.
3. To determine whether there are differences in the perception of the work environment and beliefs-attitudes and behavioural profile regarding EBP at 12 months post-implementation between the intervention group and the control group.
4. To assess whether there are differences between the baseline data obtained in the phase prior to the study and at 12 months after the implementation of the RNAO Best Practice Guidelines in the perception of the work environment, beliefs-attitudes and behavioural profile regarding EBP in the intervention group according to nurses' training profile and sociodemographic characteristics.
5. To determine whether there are differences between the baseline data obtained in the phase prior to the study and at 12 months after the implementation of the RNAO Best Practice Guidelines among nurses directly involved in the program (leaders, champions) and nurses in the intervention group not directly involved in the initiative.

2.3 | Hypotheses

2.3.1 | Main hypothesis 1

The implementation of Best Practice Guidelines in the context of the Registered Nurses' Association of Ontario Best Practice Spotlight Organisation® initiative will significantly improve attitudes and behaviour regarding EBP among nurses employed in participating institutions.

2.3.2 | Main hypothesis 2

The implementation of Best Practice Guidelines in the context of the Registered Nurses' Association of Ontario Best Practice Spotlight Organisation® initiative will significantly improve perception of the work environment among nurses employed in participating institutions.

2.3.3 | Secondary hypotheses

- The implementation of Best Practice Guidelines in the context of the RNAO BPSO® initiative will significantly improve attitudes and behaviour regarding EBP among nurses working in participating institutions.
- Nurses working in institutions involved in the RNAO BPSO® initiative will show, at 12 months post-implantation, a significantly greater improvement in their perception of the work environment than nurses working in institutions not involved in the initiative.
- There is an association between the training profile and the degree of involvement and the change generated after the implementation of the Best Practice Guidelines in the context of the RNAO BPSO® initiative.

2.4 | Design and methods

Multicentre quasi-experimental pre-post study with a non-equivalent control group, in the context of the third Spanish cohort of the BPSO® participating in the Best Practice Guidelines Implementation Program of the RNAO. Outcomes will be measured at two-time points: baseline and one year after the beginning of the intervention (Figure 1). This protocol will follow the SPIRIT 2013 Statement guidelines according to the design (Chan et al., 2013).

2.4.1 | Setting

Healthcare organizations in the intervention and in the control group belong to the Spanish National Health System. It is public and universal access, managed by regions.

Intervention group

Six healthcare organizations included in the third cohort of the BPSO® Program, located in five different regions. Three are teaching urban hospitals, having between 500 and 1,000 beds, 1 is a long-term conditions rehabilitation hospital, and 2 are integrated care organizations that involves teaching hospital and primary healthcare centres in urban and rural settings.

Control group

Seven healthcare organizations not included in the BPSO® Program, located also in five different regions, that include four teaching urban hospitals having between 500 and 900 beds, and three more (having between 40 and 400 beds) hospitals that attend both urban and rural zones.

2.4.2 | Study participants and recruitment

Inclusion criteria

Nurses who work in institutions participating in the study and who decide to participate voluntarily.

Exclusion criteria

Nurses who, at the time of data collection, are not occupationally active.

Recruitment will be carried out in person by the member of the research team in each centre. Individual nurses working in centres participating in the study will be recruited consecutively until achievement of the calculated sample size.

2.4.3 | Sample size

The sample size has been calculated for independent means of the measurements both for the control group and for the intervention group. Considering a bilateral contrast and accepting an alpha risk of 0.05 and a beta risk of 0.20 for both groups, and assuming a change in the EBP construct with a standardized effect size (Cohen's) of 0.2, a minimum of 786 participants will be required in each group to make up a total of 1,572 participants. The sample size of each centre has been calculated proportional to the size of the centre (number of beds), resulting in a mean of 112 nurses in each intervention centre and 78 in each control centre.

2.5 | The intervention

The main components of the intervention, implementation of Best Practice Guidelines in Best Practice Spotlight Organizations (González-María et al., 2020), is described in Table 1.

In the institutions composing the control group, there is no uniform method to implement the Best Practice Guidelines. In some centres, protocols have been designed by experts working in that centre. In others, healthcare management have decided which

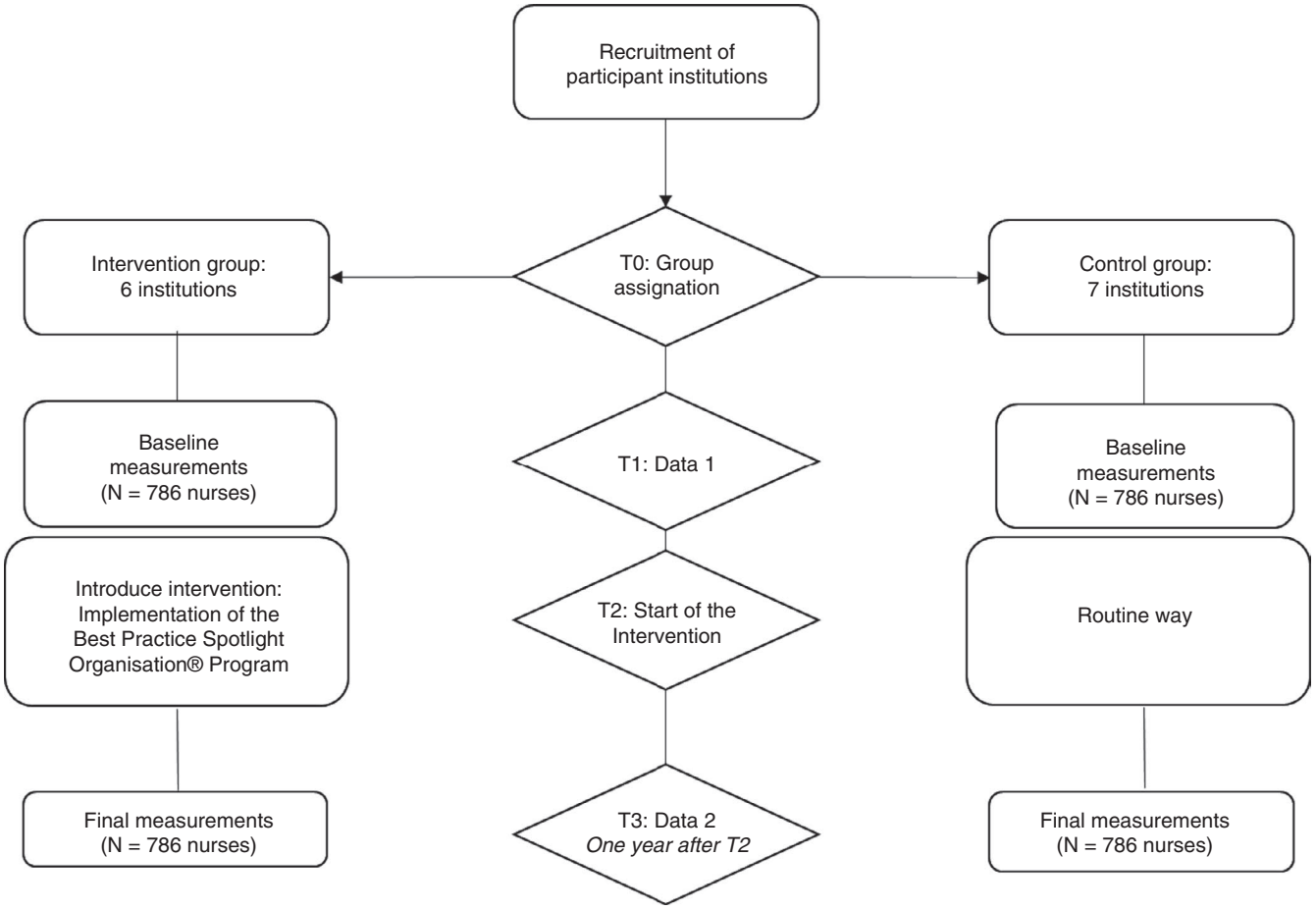

FIGURE 1 Study flow diagram

protocols will be implemented based on recommendations. However, a common element is that none of the control group centres will implement the strategy followed by the intervention group, based on the involvement and training of participating professionals, with a uniform method of registering indicators, with external monitoring and an accreditation system that should be updated every 5 years.

2.6 | Instruments and measures

2.6.1 | Sociodemographic and labour data

Participants' demographic information, including age, gender, marital status, educational level and employment status, will be collected through an ad hoc questionnaire. Additional data related to workplace, job satisfaction, experience with research and the institution's attitude to EBP and research perceived by nurses will be provided (Table 2).

2.6.2 | Nurses' work environment

The Practice Environment Scale-Nursing Work Index is the most useful instrument in terms of comprehension, validity, reliability, and applicability in distinct practice environments (Lake, 2007) and has acceptable metric properties: appropriateness (content validity), structure, good adjustment (construct validity), discriminatory ability for magnet hospitals (discriminatory ability), concurrent validity (association with patient health outcomes and with nurses´ self-esteem and mental health) (Bonneterre et al., 2008). This questionnaire has been validated in the Spanish context in the framework of the RN4CAST-España Project (Fuentelsaz-Gallego et al., 2013), and has 31 questions structured in five factors: staffing and resource adequacy (4 items), collegial nurse-physician relations (3 items), nurse manager ability, leadership and support of nurses (5 items), nursing foundations for quality care (10 items), and nurse participation in hospital affairs (9 items).

2.6.3 | Beliefs-attitudes and behaviour regarding the evidence-based practice questionnaire

The Health Sciences Evidence-Based Practice questionnaire, designed and validated in 2017 by Fernández-Domínguez et al. (2017), is the only currently available instrument in the Spanish setting that overcomes the limitations of the previous questionnaires. These questionnaires evaluate the construct of

TABLE 1 Components of the intervention "Implementation of Best Practice Guidelines in Best Practice Spotlight Organizations"

Component	Description
Theory and rationale	Best Practice Guidelines implementation is based on the conceptual framework *Knowledge to Action* (Straus et al., 2009), aiming to achieve a best-practice culture in healthcare organizations. Implementation involves a systematic change process in organizations as well as in professionals leaded by nurses. According to implementation science, this change has more possibilities to occur under an iterative cycle in which the specific context elements are considered for tailoring the interventions
Procedures and materials[a]	Organizations joining a new BPSO® cohort will set up an implementation committee and will assign a registered nurse as implementation leader. They will receive group in-person training on implementation methodology provided by the Spanish Program coordinators during a week, following the standardized international program themes, materials and procedures consisting of a workshop with open discussions and case studies based on the experience of previous cohorts. As the final workshop result, leaders will develop an implementation plan of Best Practice Guidelines selected in their organization
	Leaders will attract multiprofessional champions in their organization and will replicate afterwards the implementation training (Cascade training model) with the same method, materials, and support tools for all BPSO®, provided by Program coordinators. Champions will work in groups that meet in-person periodically for decision-making and development of the implementation activities according to the plan, scaling up the recruitment of new champions and involving them on activities
	Core activities across organizations will be the dissemination of the program and progression, continuous training, peers support, evaluation, and feedback, delivered in a combined way
Providers, modes, and frequency of delivery	Spanish program coordinators will be Train the Trainers for implementation and evaluation in the International Program. They will deliver the initial training to leaders and will supervise the process over time
	Involvement in BPSO® cohort, setting up committees and selection of the leader will be promoted by nurses and supported by the managerial board
	The leader and committees will be mostly registered nurses to be multiprofessional. They will deliver implementation training; involve, support, and coordinate the champions' group activities, monitor the program progress and report to Program coordinators. They will meet and review the implementation plan periodically
	Champions will be nurses and other health professionals, as physicians, physiotherapists, midwives, as well as other staff, depending on the Best Practice Guideline implemented. They will meet periodically by workgroups to review the gap between practice and Best Practices Guidelines, to analyse the context and stakeholders to plan actions for implementing the recommendations selected, including the update of protocols and procedures. They will deliver specific training related to Best Practices Guidelines implemented and will act as peer mentors supporting to promote best practices and adequate clinical records, usually by short meetings, clinical sessions, and boosters. They will give feedback to the leader and committees and contribute to the dissemination of the Program, (Ploeg et al., 2010)
	The time established to have the Best Practice Guidelines implemented is 3 years
Modifications	The components of the implementation will be cyclic. Thus, along the implementation they will be revised and updated, to adapt strategies to the progression that is reached in the organization, and to add cycles of quality improvement
	Onsite activities related to specific Best Practice Guidelines will have to be adapted at each organization's characteristics, expressed in protocols and procedures
Assessment of adherence	Program coordinators will monitor the process. Monthly online meetings with each organization team will be performed, to support and monitor the progress, as well as an annual onsite audit. At least once a year there will be a joint meeting with all the cohort to review procedures and fidelity
	Leaders and committees will monitor the process at their institution by meetings, reports, and evaluation, and will report to program coordinators quarterly
	For core activities, all BPSO® will use the same forms. Implementation will be evaluated with a common method, with a specific structure, process, and outcome indicators. Evaluation data will be collected monthly, through an online platform, to assess the impact on patients, professionals, and the organization. The information gathered will be used, among others, for proving frequent feedback

Note: Adapted from TIDieR checklist.

[a]Registered Nurses' Association of Ontario. (2012) Toolkit: Implementation of best practice guidelines (2nd ed.). Toronto, ON: Registered Nurses' Association of Ontario. Available at: https://rnao.ca/sites/rnao-ca/files/RNAO_ToolKit_2012_rev4_FA.pdf).

EBP focusing on assessing the components of the results of scientific research (McEvoy et al., 2010; Upton & Upton, 2006), (for example, in Fresno's test and its modified versions) (McCluskey & Bishop, 2009), and show weaknesses in psychometric validation and content validity or do not provide evidence of the measurement model or factorial structure (De Pedro Gómez et al., 2009;

TABLE 2 Study measurements

Independent variables	Collected data	Range
Demographic data	Gender	Male, female
	Age	Years
	Marital status	Single, couple, divorced/separated
	Number of children	
	Number of patients under care	
	Qualifications	Diploma, Bachelor's degree, Master´s degree, PhD
Labour data	Years working as a nurse	Years
	Type of workplace unit	Surgical units, medical units, critical care, emergency department, others
	Weekly work hours	<20, 21–35, full time
	Professional profile	Ward nurse, researcher, manager, teacher
Continuous training data	Type of training that is of interest	Continuing education linked to the institution, continuing education not linked to the institution, postgraduate, masters, doctorate, none
	Research courses taken	Yes/no
	Evidence-based practice courses taken	Yes/no
Research-related data	Congress attendance in the last 4 years	Number
	Congress participation	Number of posters, oral communication, presentation
	Reading of scientific journals	Number and journal name
Nurses' knowledge of institutional research-related resources	Research support figure	Yes/no/don't know
	Availability of hours within working hours	
	Training in research available	
	Encouragement of evidence- and research-based care	
Dependent variables		
Job satisfaction	Degree of satisfaction with current job	One Likert-type question rated from "very dissatisfied" to "very satisfied"
Nurses' perception of the work environment	Staffing and resource adequacy	Thirty-one Likert-type questions rated from "Strongly Disagree" to "Strongly Agree"
	Collegial nurse–doctor relations	
	Nurse manager ability, leadership and support	
	Nursing foundations for quality care	
	Nurse participation in hospital affairs	
Nurses' relationship with evidence-based practice	Beliefs-Attitudes	Sixty Likert-type questions rated from minimum agreement to maximum agreement
	Results of scientific research	
	Development of professional practice	
	Assessment of results	
	Barriers-Facilitators	

McEvoy et al., 2010; Upton & Upton, 2006). Other instruments have obtained unsatisfactory results in terms of their psychometric properties in some of their dimensions (De Pedro Gómez et al., 2009; Upton & Upton, 2006), and these limitations are mentioned in recent systematic reviews (Leung et al., 2014). Validation of the Health Sciences Evidence-Based Practice questionnaire includes evidence of reliability (internal consistency), apparent and content validity, validity based on internal structure (confirmatory models), convergent validity (with respect to the Evidence-Based Practice Questionnaire-19), decision validity (with respect to the participant's level of training on EBP), validity in relation to other constructs (attitudinal resistance to change, burnout, and quality of professional life) and validity based on response processes (ceiling-floor effect). The instrument has 60 items presented in enunciative-declarative forms and assessed on a Likert-like scale scored 1-10 according to the degree of agreement (the higher the score the greater the agreement). Responses are classified in five dimensions (Fernández-Domínguez et al., 2016): beliefs and attitudes (12 items); results of scientific research (14 items); development of professional practice (10 items); assessment of results (12 items), and barriers/facilitators (12 items).

TABLE 3 Study measure notes

	Outcomes (measures)	Baseline	After baseline	
			Up to 1 year from baseline	1 year after baseline
Inclusion criteria	Demographic and labour data	x		x
Primary outcomes	Nurses' relationship with evidence-based practice, HS-EBP	x		x
	Nurses' perception of the work environment, PES-NWI			
	Job satisfaction			
Secondary outcomes	Continuous training data	x		x
	Research-related data			
	Nurses' knowledge of institutional research-related resources			
Intervention: BPSO® program			x	

Abbreviations: HS-EBP, Health Science Evidence Based Practice Questionnaire; PES-NWI, Practice Environment Scale-Nursing Work Index.

2.7 | Data collection

Before data collection, an identification code will be assigned to each participating centre. In each of these centres there will be a member of the research team, who will know the code assigned to that centre and who will be responsible for explaining the study to nurses, distributing and collecting the data collection dossier (the Practice Environment Scale-Nursing Work Index, the Health Sciences Evidence-Based Practice questionnaire, and ad hoc questionnaires) and the informed consent form in a separate document. Each questionnaire will be identified with the code of the assigned centre and the unit where the nurse responding to the dossier works (Emergency department, Critical care; Surgical units, Medical units, Others), and the numerical order in which it has been distributed. The same code will appear in the document (of the informed consent) so that no personal identification data will appear in either the dossier or the informed consent. Thus, first the project will be explained, the dossier will be distributed and informed consent will be obtained, which will be sent to the principal investigator. Second, after approximately 1 week, the dossier will be collected and the information will be entered in the database. Each member of the research team will have access only to information from his or her centre. Only the principal investigator and the coordinating group will have access to the information from all the centres.

The information will be registered in a database specifically designed for the study. Quality control mechanisms will be developed both by participating centres and centrally to guarantee that, at all times, the information is gathered according to the stipulations of the study protocol and that the established norms are followed in all processes. To this end, all persons responsible for data collection will be duly informed by the coordinating group of the project about the procedure for codifying and collecting data before the start of the study. The principal investigator will carry out the follow-up, unification and cleaning of the database. Once the information has been introduced, the principal investigator will centralize and store all the original questionnaires, and the informed consent forms, as specified in the European Union data protection regulation of 27 April 2016. Only the coordinating team will have access to all the questionnaires and informed consent forms and with the sole aim of achieving objectives 4 and 5 of the study.

In all participating centres, baseline data collection will be conducted before implementation of the Best Practice Spotlight Organisation® Program. Post-intervention data collection will be performed 12 months after the start of the implementation in all participating centres and will be carried out by the member of the research team in charge of data collection in the first phase. Study measurement notes are showed in Table 3.

2.7.1 | Data analysis

A univariate descriptive analysis will be performed of all variables. Qualitative variables will be expressed as frequency and percentage and exploratory data analysis will be performed of quantitative variables, and tests of normality (Kolmogorov–Smirnov or Shapiro-Wilk depending on the sample size). We will attempt not to use any method of imputation of missing values and will apply pairwise data processing to maximize the information in the data matrix.

For comparison of the pre- and post-intervention phases in each study group with respect to EBP dimensions/construct factors and

the work environment, the Student *t*-test will be used for independent samples, or the Mann–Whitney *U*-test if the data follow non-normal distribution. The effect size will be estimated through Cohen's *d* and the 95% confidence interval of the pre-post difference of the means in the dimensions/factors of the Health Sciences Evidence-Based Practice questionnaire and the Practice Environment Scale-Nursing Work Index. The presence of differences in baseline values between the two study groups will be determined using parametric tests (Student *t*-test for independent samples) or non-parametric tests (Mann–Whitney *U*-test, depending on the results of the goodness-of-fit tests). We will perform a repeated measures ANOVA of two factors using time (pre- and post) and group (intervention group and control group) as variables. In variables showing statistically significant differences between groups in baseline measurements, pre-intervention values will be included as a potential covariable (ANCOVA) to adjust the effect. The effect size will be estimated through Cohen's *d* and the 95% confidence interval of the difference of the means in the dimensions/factors of the Health Sciences Evidence-Based Practice questionnaire and the Practice Environment Scale-Nursing Work Index. We will also conduct a differential analysis of profiles in the dimensions of the Health Sciences Evidence-Based Practice questionnaire, including sociodemographic, training and research variables, implementation time, type of involvement, and perception of the work environment. Inferential analyses will be conducted through statistical models for comparison of means, whether parametric (*t*-test, ANOVA) or non-parametric in the case of non-normally distributed variables (Mann–Whitney *U*-test, Kruskal–Wallis *H* test).

Last, we will also apply multivariate models, such as multiple regression, path analysis, or structural equations with latent variables to model the relationships of interdependence between the main study variables: EBP and perception of the nurse work environment. The multivariate analysis will be performed through the MPlus Program and we will use standard criteria established by the scientific community to assess the quality of model adjustment, and the most appropriate model for estimating the performance of the variance/covariance matrix and the nature of the variables involved. The data will be analysed and processed using the SPSS v.22 statistical package.

2.7.2 | Ethical considerations

The study has been approved by the Barcelona Drug Research Ethical Committee of the Parc de Salut Mar (CEIm-Parc de Salut Mar 2018/8087/I), although approval will also be sought from the ethics committees of participating centres if deemed appropriate. The dossier will be identified with a code without identifying personal data and will be collected in a closed envelope to ensure confidentiality.

Only members of the research team involved in data analysis will have access to individual tracing due to the codification of the data collection file and informed consent and no datum will be made public that could be linked to individuals. Tracing will only be performed to demonstrate possible individual changes, as described in objectives 4 and 5. The study will adhere to current legislation as expressed in Regulation 2016/679 of the European Parliament, 27 April 2016. This study protocol has been registered in Clinical Trials (ClinicalTrials.gov Identifier: NCT04199065).

2.8 | Validity and reliability

The Health Sciences Evidence-Based Practice questionnaire and the Practice Environment Scale-Nursing Work Index, will be the main study measurements. Both have adequate metric properties and have been validated in the Spanish context.

The progress of the intervention will be audited periodically. The quality control mechanisms will be applied by the participating centres and by the research coordinator to guarantee that the information is collected as stipulated in the study protocol. This monitoring will also ensure that the established standards are followed throughout the entire process.

This study will be carried out in clinical practice and under real conditions. Furthermore, the number and size of the institutions involved are high. These characteristics will provide external validity.

3 | DISCUSSION

Health professionals familiar with research have more open attitudes to EBP and knowledge of this approach (González-Torrente et al., 2012). In turn, better practice environments facilitate EBP (Lake, 2007). However, there is no published evidence on whether the inverse is true, that is: whether an institutional policy that applies evidence-based care improves attitudes and behaviour towards research and EBP and enhances perception of the work environment among nurses. If this were the case, the enhancement in the perception of work environment achieved by implementing Best Practice Guidelines could feed back into attitudes to EBP, generating a ripple effect and consequently improving health outcomes. Moreover, in environments that are difficult to change, the application of evidence-based care through the RNAO Program for the Implementation of Best Practice Guidelines in BPSO® is a strategy to generate changes and improvements in the perception of the work environment, and to achieve greater proactivity concerning research and the use of research results by nurses, that is: an improvement in nurses' behavioural profile regarding EBP. This means that the implementation of the RNAO Best Practice Guidelines through the BPSO® Program acts as a motor for change in the behaviour of nursing professionals, and could be considered a key element to generate better health outcomes, acting both directly on the patient and indirectly on nursing staff. This is in consonance with recently published results revealing that, in unfavourable economic contexts, Nursing Foundations for Quality Care and Nurse Participation in Hospital Affairs is associated with a better perception of the nursing work environment (Esteban-Sepúlveda et al., 2019).

3.1 | Bias control, limitations, and strengths

High nurse turnover in institutions prevents an exclusively longitudinal design that would allow comparison in the entire study population of the data from the same participants over time. Consequently, the study unit will not initially be nurses but rather institutions and the settings where the intervention has been performed. However, given that overall health outcomes are aggregate and not individual-level measures, it is also pertinent to determine whether there is a change in the variables studied among nurses, both overall and by work units, after an institutional-level intervention. Regardless, the total time that each nurse stays in the unit implementing each of the Best Practice Guideline will be collected, so that the analysis of the post-intervention results (in the intervention group) will only include the values of those professionals who have remained active in the unit for at least 3 months after the start of the implementation of the guideline.

Even so, we will also perform an analysis of the same characteristics as those mentioned for the subgroup of professionals in whom we were able to perform paired measurements through participant traceability (codification of informed consent and the data collection dossier), while respecting at all times participant anonymity so that no identifiable individual can be linked to the responses obtained. Data collection may be hampered by geographical dispersion, differences in participating institutions, and distinct rhythms of implementation. Consequently, it is envisaged that a person will be designated to fulfil this function in each of the participating institutions. A requisite for this role is to have knowledge of that institution and to be in direct communication with the director of that institution of the program for the implementation of RNAO Best Practice Guidelines in BPSO® This liaison with program leaders will, at the same time, facilitate access to participants. The fact that the person recruiting participants belongs to the same institution will facilitate a high response rate, which can be another limitation of survey-based studies. Even so, anonymity and data confidentiality will be guaranteed, which will also minimize informant bias (social acceptability, non-response).

4 | CONCLUSION

Although the factors involved on the nurses' work environment, and the barriers facing the evidence practice based by the nurses had been widely described, this is an innovative attempt to test a new initiative that could improve both topics. The BPSO® initiative is spreading internationally, so this protocol could be implemented in different countries to test it in other contexts. If the BPSO® initiative is effective to improve these topics, it will be a strong argument for health managers, and could be the beginning of a change in the way nurses work, and may improve patient health outcomes.

CURRENT STATE

At the moment, baseline data has been collected, the intervention is being done, the baseline data analysis is almost done and final measurements are in course.

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CONFLICT OF INTEREST

The principal investigator has no conflict of interest in relation to the study itself. Two of the authors are the coordinators of the Program for the Implementation of Best Practice Guidelines in Best Practice Spotlight Organisation® in Spain.

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