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RESEARCH ARTICLE

Describing Nurses' Competence in Primary Nursing Care Model: A Cross-sectional Study Conducted in an Italian Teaching Hospital

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Abstract:

Introduction:

Primary Nursing (PN) is a patient-focused nursing model that improves the quality of care. It has been defined over the years as a model to develop nurses' personal knowledge, but the relationship between different nursing care models and nurses' competence or experience still requires study.

Objectives:

The study aimed to describe nurses' perceptions of their competence in the primary nursing care model and to identify sociodemographic and organisational predictors of nurses' competence.

Methods:

A cross-sectional design was used to recruit nurses from wards using the PN care model and wards in which a team nursing care model was applied. A convenience sample of 142 nurses completed a self-administered questionnaire composed of a sociodemographic survey and the Nurse Competence Scale (NCS). Nurses' age, gender, education degree, years as a registered nurse, months as a registered nurse under the specific nursing model, and type of employment contract were tested as potential independent predictors of nurses' competence.

Results:

The PN nurses reported a better perception of their competence in all seven NCS categories. Independent predictors of a high level of competence in managing situations were an open-ended employment contract, greater work experience, working in a PN care model, and male gender. Predictors of a high level of competence in ensuring quality were greater work experience and working in a PN care model. Finally, an open-ended employment contract and working in a PN care model were both associated with a higher level of helping role, teaching–coaching, diagnostic functions, therapeutic interventions, and work role. The variables explained from 10% to 26% of the variance in all categories.

Conclusion:

PN model was found to be significantly positively correlated with nursing competence development. Advanced skills are involved in practising a personalized nursing care plan.

Keywords: Primary nursing, Nursing models, Professional competence, Nurses, Cross-sectional study, Nurse competence scale instrument.

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1. INTRODUCTION

Nursing care delivery models (NCDMs) offer assistance to patients in a constantly evolving system and outline the responsibilities and competence of the individual nurses involved in a patient's care [1]. NCDMs differ from each other in several aspects, including the decision-making process, communication, organisation of work, skill mix or qualification mix, staffing levels, nursing shifts, and management to improve the quality of care and the nursing work environment [2, 3]. In the literature, NCDMs have shown a significant impact on many aspects of delivering nursing care and nursing practice- [2, 4 - 6]. However, little research has examined how these models influence nurses' perceptions of their competence.

Primary nursing (PN) is considered a personalised model of care delivery based on continuity of care and the relation between the nurse and the patient [7 - 9], and it is the care delivery system that best supports professional nursing practice [10]. In PN, one nurse, named the primary nurse, is responsible

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for several patients 24 hours a day, seven days a week. The primary nurse assesses and prioritises each patient's needs, as well as plans and evaluates the patient's care. The registered nurse (RN) is responsible for planning, providing, coordinating, and evaluating the patient's care throughout their stay at the hospital [10]. PN focuses on the nurse-patient relationship, strengthens accountability for care, and facilitates patient and family involvement in the planning of care [10].

Several international studies have been conducted to evaluate PN-related outcomes. However, data from these studies have been found conflicting concerning the definition of primary care and the manner and time in which it was implemented [11, 12], but they were fairly consistent in identifying a positive correlation between PN and patients' outcomes, such as positive patient experiences [8, 13, 14].

Other studies have found a positive correlation between PN and staff-related outcomes, such as reduction of turnover, greater job experience, job autonomy experience, and independent decision-making [11, 15], along with work-related stress [2] or job satisfaction [16], but the evidence is highly limited [2, 11].

PN has been defined over the years as a model able to develop nurses' personal knowledge and to assess care planning more accurately [6, 14, 17], but the relationship between different nursing care models and nurses' competence or experience still requires study. One of the major difficulties is the definition of the term 'competence' or nurse competence. This concept has been defined in different ways by different people [18]. Benner defined nurse competence as the ability to perform a task with a desirable outcome under various conditions of the real world [19]. In the holistic vision, competency is defined as a cluster of elements, including knowledge, skills, attitudes, thinking ability, and values that are required in certain contexts [20]. Moreover, the development of nurse competence takes place while gaining work experience [21].

To our knowledge, nurse competence has recently been evaluated in a before–after study designed by Dal Molin *et al.* [14]. They observed that the addition of PN improved nursing skills, achieving outcomes related to the staff and the organisation. In this study, the nurses' competence was measured using the Nurse Competence Scale (NCS) [22], and they reported an overall increase in nurses' competence, although there was no statistical significance in some subscales (*teaching–coaching*, *therapeutic interventions*, and *work role*). The NCS was used to measure the nurses' self-assessment of nurse competence based on Benner's seven domains of nursing practice [23].

Other studies have investigated predictors of nurses' competence, and critical thinking ability, health care experience, and the department in which the nurses work have been found to be significant [21, 24]. No studies so far have explored whether the model of care delivery is independently related to a high level of nurse competence after adjusting for confounding factors, such as sociodemographic and professional variables.

This knowledge would improve the quality of PN interventions in the future. Thus,the objectives of this study were:

- To describe nurses' perceptions of their own competence in two different nursing care models;
- To identify sociodemographic and organisational predictors of nurse competence.

2. MATERIALS AND METHODS

2.1. Design

A quantitative cross-sectional research design was used for the purpose of the study following the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines [25].

2.2. Sample, Setting and Procedure

A convenience sample of 142 nurses was enrolled in this study. Nurses were recruited from an Italian university hospital in Rome (1,500 beds). Nurses who had been working as registered nurses (RN) for at least 1 year were included in the study. The intensive care units were excluded. In order to assess aspects of how representative the consenting population is of those approached, the sociodemographic and professional characteristics were collected on those who did and did not consent to participate. We analysed statistical power for the subject. A prior analysis was performed using G* power 3.1.9.4 for Windows. A significance level of 0.05 (two-sides), a power of 0.09, and an effect size (simple correlation coefficient) of 0.3 provided a sample size of 109 for correlation analysis. A power of 0.9 and an effect size of 0.15 provided a sample size of 123 for a multi-regression analysis entering six independent variables. Considering the likely response rate of the questionnaire as 70%, a self-administered and anonymous survey was sent to 176 nurses.

Data were collected from February 2020 to April 2020 in 16 different surgical and medical wards. 71 nurses were recruited from eight wards using a Team Nursing (TN) care model and 71 from eight wards using a PN care model.

TN is generally considered a traditional nursing model in this hospital [6]. It involves a group of nurses who work as a team for care delivery, but the nursing work is divided into different tasks. PN was introduced for the first time in November 2018 and involved more than half of the hospital wards. We considered the PN nursing model in a unit in which all patients admitted were assigned to a primary nurse within 24 hours of admissions; the primary nurse was involved in nursing documentation, and the nursing model was applied in the unit for at least 3 months.

2.3. Instrument

A structured questionnaire, developed by the researcher, was used to collect sociodemographic and professional characteristics (age, gender, marital status, education degree, years as RN, months as RN in the specific care model, and type of employment contract).

Nursing competence was analysed with the NCS [22, 26, 27], which is a 73-item scale distributed into seven categories: helping role (7 items), teaching–coaching (16 items), diagnostic functions (7 items), managing situations (8 items),

therapeutic interventions (10 items), ensuring quality (6 items) and work role (19 items). Each item is rated using a visual analogue scale (VAS) (0–100), with the ends labelled 0 for 'very low level' and 100 for 'very high level' of competence. The NCS was developed to assess nurses' competence in various work environments [23, 28], and it was validated in Italy in 2009 [26]. Based on the empirical evidence of data distribution [28], the VAS was divided into four parts for descriptive purposes, with scores ≤ 25 indicating a 'weak competence', scores >25–50 indicating a 'moderate competence'; scores >50–75 indicating a 'good competence', and scores > 75 indicating an 'excellent competence'. The NCS exhibited good reliability (average inter-item correlation coefficients from 0.353-0.442, item-total correlation coefficients from 0.322-0.731, and Cronbach's alpha from 0.79-0.91); the Italian version of NCS exhibited adequate internal consistency (>0.85) [27].

2.4. Statistical Analysis

Tests of normality were used to assess both the distribution of sociodemographic and professional characteristics and the seven NCS categories. When quantitative variables were normally distributed, results were expressed as mean values and standard deviations (SDs); otherwise, the median and the interquartile range (IQR) were reported. Qualitative variables were expressed as counts and percentages. The correlation between NCS categories and nurses' work experience (years as RN and months as RN in the specific nursing model) was assessed by Spearman's tests. Meanwhile, the correlation between NCS categories and different nursing care models was assessed using non-parametric tests (Mann–Whitney U test), as variables were not normally distributed.

To identify the sociodemographic and independent professional predictors of the *helping role*, *teaching–coaching*, *diagnostic functions*, *managing situations*, *therapeutic interventions*, *ensuring quality* and *work role*, stepwise regression analysis was conducted with entry and removal criteria for the independent variables to remain in the model, with a two-tailed alpha of 0.05 and 0.1, respectively. Nurses' age, gender, education degree, years as RN, months as RN in the specific nursing model, and type of employment contract were introduced as independent variables in seven stepwise multiple regression analyses. The data analysis was performed using SPSS (version 26, IBM, New York, NY, USA).

3. RESULTS

71 participants were recruited from eight wards using the PN care model and 71 from eight wards using the TN care model. The sociodemographic characteristics of the total sample are presented in Table **1**.

The median age was 33 (IQR 11) years. 75% were females, 53.5% of whom were married. 80% had been employed as an RN for 7 years with an open-ended contract (93%). The rate of questionnaire response was 89%. Nurses from the PN care model had a higher prevalence of female sex ($p = 0.05$), and t-test or chi-square demonstrated no statistical difference between the two groups for other sociodemographic and organisational characteristics.

Table 1. Sociodemographic and professional characteristics (N= 142).

-	**Total Sample N= 142**	**TN N=71**	**PN N=71**	***p****
Patient sample characteristics	-	-	-	-
Age, years; median (IQR)	33 (11)	30 (11)	30 (12)	0.866
Gender, N (%)	-	-	-	0.05
Male	35 (24.6)	23 (32.4)	12 (16.9)	-
Female	107 (75.4)	48 (67.6)	59 (83.1)	-
Marital status, N (%)	-	-	-	0.187
Married	76 (53.5)	35 (49.3)	27(38.0)	-
Single	62 (43.7)	33 (46.5)	43 (60.6)	-
Divorced	4 (2.8)	3 (4.2)	1(1.4)	-
Education degree, N (%)	-	-	-	0.222
RN	114 (80.3)	55 (77.5)	59 (83.1)	-
MSN	28 (19.7)	16 (22.5)	12 (16.9)	-
Professional characteristics	-	-	-	-
Years as RN, median (IQR)	7 (12)	5 (10)	5 (9)	0.736
Months as RN in a specific model, median (IQR)	14 (78)	8 (4)	8 (2)	0.694
Employment contract, N (%)	-	-	-	0.512
Fixed-term employment contract	10 (7.0)	6 (8.5)	4 (5.6)	-
Open-ended employment contract	132 (93.0)	65 (91.5)	67 (94.4)	-

Abbreviations: PN, primary nursing care model; TN, team nursing care model; RN, registered nurse; MSN, master on science nursing. * Comparison between groups was assessed through the Student's t-test and chi-square test, respectively.

Table 2. Level of competence in different nursing care models as median values (IQR) of the VAS scale of 0-100.

Competence Category	Total Sample N=142	TN N=71	PN N=71	*p*
Helping role	70.00 (16)	67.14 (14)	72.86 (16)	0.009
Teaching – coaching	71.88 (16)	70.00 (13)	74.38 (16)	0.032
Diagnostic functions	70.00 (16)	68.57 (10)	74.29 (17)	0.005
Managing situations	73.75 (14)	70.00 (14)	77.50 (14)	0.000
Therapeutic interventions	69.50 (15)	67.00 (14)	71.00 (16)	0.035
Ensuring quality	68.33 (17)	66.67 (12)	70.00 (18)	0.037
Work role	73.68 (14)	70.00 (12)	76.32 (15)	0.001
Overall competence	71.50 (12.16)	68.49 (11.23)	74.11 (14.66)	0.002

Abbreviations: PN: primary nursing care model; TN: team nursing care model.

Table 3. Bivariate correlation (Spearman's rank correlation).

Competence Category	Years as RN	Months as RN in the Specific Model
Helping role	.120	.293**
Teaching – coaching	.149	.213*
Diagnostic functions	.054	.169*
Managing situations	.152	.196*
Therapeutic interventions	.134	.168*
Ensuring quality	.046	.173*
Work role	.108	.157

Note: RN: registered nurse; **= correlation is significant at the 0.01 level (2-tailed); *=correlation is significant at the 0.05 level (2-tailed).

3.1. Nurses' Competence

Data regarding nurses' self-assessed level of competence are shown in Table **2**.

On average, nurses considered their levels of competence as 'good'. Median scores of the managing situations, helping role, diagnostic functions, work role, teaching–coaching, therapeutic interventions, and ensuring quality categories were all above 50.

The median VAS score ranged from 68.33 (ensuring quality) to 73.75 (managing situations). The percentage of nurses with a weak or moderate (VAS range 0–50) level of competence ranged from 3% (diagnostic functions) to 12% (ensuring quality). TN nurses' scores were significantly lower than PN nurses' scores in all seven NCS categories (Table **2**).

The sub-analysis of the helping role category items showed TN nurses' competence perceptions to be significantly worse than those of PN nurses in 'planning patient care according to individual needs' (p = 0.001), 'modifying the care plan according to individual needs' (p <0.001) and 'developing the treatment culture of my unit'(p = 0.022). No significant differences between the two groups were found in 'supporting patients', 'coping strategies', 'evaluating nursing philosophy critically', 'utilising nursing research findings in patient relationships' and 'decision-making guided by ethical values'.

In the teaching–coaching category, the TN nurses' competence perceptions were significantly worse than those of the PN nurses (70.00 *vs*. 74.38; p = 0.032), except for 'acting autonomously in guiding family members' and 'need for guidance'.

The TN nurses reported a decrease in their perceptions of competence in all items of diagnostic functions (68.57 *vs*. 74.29; p = 0.005), managing situations (70.00 *vs*. 77.50; p <0.001), and work role (70.00 *vs*. 76.32; p = 0.001), while in the therapeutic interventions category (67.00 *vs*. 71.00; p = 0.035), the items 'utilising research findings in nursing intervention' and 'evaluating patient care systematically' were not significant.

In the ensuring quality category, the items 'committed to my organisation's care philosophy', 'able to identify areas in patient care needing further development' and 'research and making proposals concerning further development and research' were not significant.

3.2. Correlation Between NSC Categories (or Level of Competence) and Work Experience

No significant correlations were found between the length of work experience and overall NCS categories (Table **3**). The longer work experience of the nurse in the primary nursing care model had a positive correlation with overall NCS categories except for the *work role category*.

3.3. Independent Predictors of Competence Level

To evaluate the contribution of sociodemographic and professional characteristics to determining a high competence level, seven separate stepwise multiple regression analyses were performed for each NCS category. Table **4** shows different variables to be associated with a high level of competence. Predictors of a high level of competence in managing situations were an open-ended employment contract, greater work experience, working in a PN care model, and male gender. Predictors of a high level of competence in

ensuring quality were greater work experience and working in a PN care model. Finally, an open-ended employment contract and working in a PN care model were both associated with a higher level of helping role, teaching–coaching, diagnostic functions, therapeutic interventions, and work role. The variables explained from 10% to 26% of the variance in all categories.

4. DISCUSSION

Our study aimed to compare the results of nurses' competence assessments in two different nursing models: PN and TN. Overall, the NCS category scores indicated a "good competence", with only 4% of nurses having a score under 50, and this is in agreement with published data from Italy and other countries [14, 22].

PN model nurses considered themselves more skilled in all categories: helping role, teaching–coaching, managing situations, therapeutic interventions, ensuring quality, and work role. This finding is not particularly surprising because through practising PN, the nurses' autonomy was increased, as was the responsibility of the primary nurse [6, 12]. A recent study demonstrated that the introduction of PN nursing model leads to improvements in nursing documentation accuracy, suggesting that primary nurses offer an accurate and tailored treatment plan for every patient under their care [6]. The PN model linked with the use of the nursing process allowed for a more individualised and problem-solving approach [6]. Moreover, in the TN care model, knowledge of patient needs is limited. In the TN model, nurses' work is divided into separate tasks, and a personalised care plan is not required [29, 30]. Similar results from previous studies have indicated PN to be better than TN model in care quality and cost [31].

Regarding the specific items of the helping role category, a significant difference was found between the TN and PN models in 'planning patient care according to individual needs' and 'modifying the care plan according to individual needs'. The PN model's organisation, with particular reference to the importance of the nurse-patient relationship, decision-making, and care planning responsibility, might be a possible explanation [9].

Other individual competencies in the teaching–coaching category were found not to be significant; these include 'need for guidance' and 'acting autonomously in guiding family members'. Although the PN model was developed recently, primary nurses' responses reflect their ability to deliver good education. As shown in previous studies, this perception may be due to the nurse-patient relationship, which is already built [32]. However, new studies are needed to explore this finding further.

The TN nurses reported a decrease in their perceptions of competencies in all items of diagnostic functions, managing situations, and work role. This might be due to more skills and knowledge among PN nurses thanks to their longer experience, as 'professional maturity affects practising nurse's ability' [21].

Table 4. Independent predictors of the level of competence.

Variables	Standardized β	R^2	F
Predictors of helping role	-	0.23	12.01*
Employment contract (0= Fixed-term employment contract, 1= Open-ended employment contract)	0.267*	-	-
Nursing care model (0= Team nursing care model, 1=Primary nursing care model)	0.155**	-	-
Predictors of teaching coaching	-	0.21	18.65*
Employment contract (0= Fixed-term employment contract, 1= Open-ended employment contract)	0.297*	-	-
Nursing care model (0= Team nursing care model, 1=Primary nursing care model)	0.277*	-	-
Predictors of diagnostic functions	-	0.14	23.74*
Employment contract (0= Fixed-term employment contract, 1= Open-ended employment contract)	0.361*	-	-
Nursing care model (0= Team nursing care model, 1=Primary nursing care model)	0.102***	-	-
Predictors of managing situations	-	0.26	13.93*
Employment contract (0= Fixed-term employment contract, 1= Open-ended employment contract)	0.343*	-	-
Years as RN	0.243**	-	-
Nursing care model (0= Team nursing care model, 1=Primary nursing care model)	0.214***	-	-
Gender (0=male, 1=female)	-0.153***	-	-
Predictors of therapeutic interventions	-	0.10	7.949**
Nursing care model (0= Team nursing care model, 1=Primary nursing care model)	0.202**	-	-
Employment contract (0= Fixed-term employment contract, 1= Open-ended employment contract)	0.198***	-	-
Predictors of ensuring quality	-	0.10	8.064*
Years as RN	0.230**	-	-
Nursing care model (0= Team nursing care model, 1=Primary nursing care model)	0.171***	-	-
Predictors of work role	-	0.22	14.377**
Nursing care model (0= Team nursing care model, 1=Primary nursing care model)	0.183*	-	-
Employment contract (0= Fixed-term employment contract, 1= Open-ended employment contract)	0.285*	-	-

Note: RN. registered nurse; *p<0.001 ** p<0.01 ***p<0.05

Finally, in the *therapeutic interventions* and *ensuring quality* categories, no significant difference was observed among 'utilising research findings in nursing intervention' and 'research and making proposals concerning further development and research', respectively. These were the most challenging categories in both groups because they reflect the barriers to research utilisation among nurses. Even if nurses have a positive attitude toward research utilisation in clinical practice, the transfer of research findings into delivery care models can be problematic [33]. Nurse research education quality and nurses' access to internet at work might be two main factors related to the specific NCS categories [34]. The low competence in research utilisation is widely proven by the published data [35, 36].

Regression analysis revealed that for each NCS category, working in the PN care model was a predictor of high competence levels. This finding is in agreement with other studies that showed PN to be better than TN in care quality, cost (Fernandez *et al*., 2012), in nursing documentation accuracy [6], in terms of satisfaction with care [2], and in nurses' skills improvement [14].

There are limitations to this study. The sample was convenient, and the study was cross-sectional in nature. This study involved only a limited number of ward nurses and bias may have occurred in the selection of the study participants and in data collection. Because PN was introduced only two years ago, a longer time will be needed to observe its long-term effect [14]. The results could be verified in the future by increasing sample size, research centres, and using a longitudinal study.

CONCLUSION

In summary, in this study, we found the PN model as significantly positively correlated with nursing competence development. Nursing theories and models contribute to the development of the nursing profession by supporting the independent roles of nurses during care delivery in accordance with the nursing process. The PN care delivery model requires a personalised nursing care plan, and advanced skills are involved. Nursing programs and courses are needed to develop and maintain adequate nurse competence. Evaluating nurse competence with respect to individualised nursing care may be important for developing the PN care model. Nursing administrators and nurses should collaborate in order to consider the use of adequate NCDM that best meets the patients' needs.

LIST OF ABBREVIATIONS

RN	=	Registered nurse
MSN	=	Master on science nursing
PN	=	Primary nursing
TN	=	Team nursing

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Before the study was conducted, approval was obtained from the Catholic University Ethics Committee (N.0006663/20), where the study was to be conducted. A written informed consent was sought *via* a cover letter explaining the purpose of the study and the voluntary nature of participation.

HUMAN AND ANIMAL RIGHTS

No animals/humans were used for studies that are the basis of this research. All the human experiments were performed in accordance with the Helsinki guidline.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The dataset used and analyzed during the current study is available from the corresponding author upon reasonable request. Confidentiality and security of data and materials were ensured through all stages of the study.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

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