

Nurse Competence Scale: psychometric assessment in the Italian context

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Abstract

Introduction. The Nurse Competence Scale is a tool for evaluating nursing clinical competence. This tool has been used and psychometrically validated previously in different countries but never in Italy. Assessing the validity and reliability of the Nurse Competence Scale in the Italian context has been a strong necessity for many years.

Aim. To test the psychometric properties and evaluate the internal construct validity of the Italian version of the Nurse Competence Scale.

Methods. This study is a secondary analysis on a database of 698 bachelor nursing students who were trained in different clinical settings at two Italian universities. Internal consistency was examined with Cronbach's alpha coefficients and inter-item analysis, and construct validity was evaluated by Exploratory Factor Analysis with Oblimin rotation with Kaiser normalization, and eventually Confirmatory Factor Analysis.

Results. The results highlighted the necessity for refinements of the Nurse Competence Scale in the Italian Context. The original model of the Nurse Competence Scale (73 items) was not confirmed. The confirmatory factor analysis presented significant values of Chi-squared test = 10942.766, with degrees of freedom being 2.534 and a ratio of $\chi^2/df = 4.318$. The Comparative Fit Index value was significant 0.809 and the Normed Fit Index 0.765 was noteworthy too. The value of Root Mean Square Error of Approximation was significant 0.069. The Cronbach's α coefficient for the new scale was excellent (0.922). The exploratory factor analysis resulted in the Italian Nurse Competence Scale composed of 58 items divided into seven dimensions: using the research, professional awareness, ethical values, tutorial functions, professional leadership, educational interventions, and management of care processes.

Conclusions. The Italian version of the Nurse Competence Scale with 7 dimension and 58 items is an appropriate tool for describing and comparing self-assessed competencies by nurses. Such evaluations could constitute an important contribution to have better educational environments. Self-assessment of competencies can also raise a stronger awareness of individual educational needs.

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Introduction

Health systems have become increasingly complex and consequently quality nursing education has become crucial. Nowadays, developing, maintaining, and evaluating nurses' competencies are among the greatest challenges of the nursing profession. Thus, new research is needed to better define assessment's methods (1), given the contextual and dynamic feature of nursing competencies (2).

Nursing requires complex combinations of knowledge, skills, aptitudes, and performances.

Therefore, there is a strong need to have a better definition of nursing competencies in the Italian context that could be made operational. This could facilitate the development of standards of competence among nurses and, consequently, tools to evaluate these standards are essential (3). For nurses is indispensable to measure competencies in clinical environments.

For this reason, validity and reliability of instruments are important as they allow having appropriate measurements of concepts in different settings, cultures, and contexts. The aim of this study was to validate the nurse competence scale (NCS) in the Italian context. The results of this study can contribute to the improvement of university nursing education by redefining the training needs of nursing students according to their emerging and acquired competencies.

Background

Excellent nursing outcomes depend on the quality of nursing performances. The nursing performance, in turn, is determined by the capabilities and competencies possessed by nurses. This is in agreement with Bradshaw: 'Only the nurse is responsible for its own competence because only he/she is responsible for its activities' (4, 5).

Clinical competencies are a pivotal aspect of nursing that is yet to be fully clarified, and

perception of the same concept, by nursing professionals, is still controversial (6-8). Nurses can be defined as incompetent when fail to gain sufficient experience in managing clinical situations without having a holistic view of them, when they do not know how to deal with care situations, and/or when they do not know how to act effectively in their role (9).

Research on clinical competencies is a complex process and multiple factors are involved in the construction and acquisition of clinical skills. This happens because there are many associated factors that influence competencies. Hence, it is important to examine all these factors so that the most predictable variables that affect the development of nursing competencies could be detected (10). The assessment of nursing competencies is a fundamental prerequisite to ensure qualified care for patients and identify those areas where it is necessary to develop nursing practice further (11).

Clinical competence assessment is defined as an integrated form of assessment, which takes into account knowledge, understanding, problem solving, technical skills, attitudes, and ethics (12). This assessment is pivotal in the educational environment because it is a key component of nursing education programmes and it can be used to evaluate students in various clinical settings (13).

University education is crucial for ensuring and developing the competencies of health professionals as they work in complex systems where social and technological features are constantly changing and this represents a serious challenge (14). These dynamic educational needs require frequently updated competencies. In this sense, not only the ability and knowledge of nurses concur to define clinical competencies, but it is also the ability to apply them that is critical (3). These competencies, consequently, are not only objective (skills, knowledge, abilities, etc.), but also determined by meaningful and

subjective adaptation mechanisms that have to be investigated through tools which can explore the more personal sphere of clinical experience (15).

Despite the lack of a clear definition of clinical nursing competencies at the international level, there is an ongoing debate on tools for assessing competencies so as to improve educational programmes (16).

It does exist validated tools that aim to quantitatively identify and measure clinical competencies (16) and, in this sense, it is pivotal to develop effective instruments for evaluating clinical competencies to ensure that nurses can effectively provide quality care (16-18).

In this study, a psychometric evaluation of the NCS was carried out. This tool was initially developed by researchers in Finland (19). Then the tool was culturally and statistically validated, by Finotto and Cantarelli (20), in Italy, through the internal consistency, Cronbach's $\alpha = 0.78-0.96$ in the various sub-scales, and for the stability through the test-retest of Wilcoxon $p > 0.05$. For the validity of the instrument it was used the Intraclass Correlation Coefficient (ICC), that is, the description of the strenght of units that in the same group resemble each other with values > 0.8 .

Previous studies recommended the use of psychometric techniques to test the validity and reliability of the NCS (16). Muller (21) and Wangenstein et al. (22) sustained the need to explore the validity of this construct in other contexts and international languages. In fact, the use of these statistics can be useful in building more reliable evaluation tools for a more adequate definition of clinical nursing competencies.

Aim of the study

The aim of this study was to test the psychometric properties and evaluate the internal construct validity of the Italian version of the Nurse Competence Scale.

Method

Design and sample

The study design was cross-sectional and observational. The study was conducted on third year bachelor students belonging to five nursing schools included in two universities of two Italian Regions (Latium and Abruzzo). The participants were selected randomly (23). The scale was administered to the entire sample of the five nursing schools: 850 students. Of them, 698 (82.11%) returned it with at least 70% of the answers completed. Data were collected from April to July 2015.

In the present study, the researchers used the version of the NCS translated by Finotto and Cantarelli (20).

Instrument

The NCS is a self-assessment tool to assess nursing clinical competencies developed in Finland between 1997 and 2003 by Meretoja (19, 24). Other studies internationally used the NCS and these studies confirmed the reliability and validity of the scale with Cronbach's alpha values ranging from 0.78 to 0.91 (25), 0.76 to 0.85 (26), and 0.72 to 0.92 (27). In Italy, a cultural and statistical validation in 2009 was carried out (20).

The NCS is divided into seven factors (Table 1) derived from the theoretical framework regarding competencies defined by Benner (28). Each of these factors provides a set of specific skills for a total of 73 items. These dimensions have been classified into different domains: '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).

The NCS, at the competency level, is measured by a visual analogue scale (VAS), where 0 indicates a very low level and 100 indicates a high level of competency.

Table 1 - Factors of the original Nurse Competence Scale (Meretoja et al. 2004)

Factors of the original Nurse Competence Scale
Helping role (7 items)
Teaching-coaching (16 items)
Diagnostic functions (7 items)
Managing situations (8 items)
Therapeutic interventions (10 items)
Ensuring quality (6 items)
Work role (19 items)

Data analysis

Data analysis was performed using SPSS 19 (SPSS Inc., Chicago USA) software and the statistical application 'R'. A descriptive and multivariate analysis of the data was performed. A Confirmatory Factor Analysis (CFA) was executed to verify the factorial structure of the NCS and as a method of analysis to estimate the maximum likelihood.

The Chi-squared test (χ^2) was performed, given that its value expresses the goodness of fit of the model, even if, there is no agreement on the use of this measure in the literature (29). The χ^2 test is also susceptible to the sample size rejecting the model (29). Tabachnick and Fidell (30) have indicated that the acceptable fit of model adaptation is the ratio between χ^2 and the degrees of freedom of the model (χ^2/df). Although there is no consensus on this, the recommendations indicate a cut-off value ranging from a maximum of 5.0 (31) to a minimum of 2.0 (30).

Another index, the Comparative Fit Index (CFI), was used based on the comparison with a null model (32). The index aims to estimate the inadequacy of the model in the population. The cut-off values are close to 1, and still values >0.9 indicate a good fit to the data (33). The Normed Fit Index (NFI) was also calculated to evaluate the model's adaptation to empirical data, where cut-off values are equal to the CFI (33).

The Root Mean Square Error of Approximation (RMSEA) index represents

an estimate of the goodness of fit of the model in the population, where the values of cut-off between 0.08 and 0.10 provide a mediocre measure and those <0.08 show a good fit (34). Recently, other authors estimated that the cut-off values between 0.06 and 0.10 provided a mediocre measure and those <0.07 showed a good fit (34). Since the CFA did not confirm the original structure of the NCS, an Exploratory Factor Analysis (EFA) was performed.

There are two methods to examine the magnitude of the correlations between the variables to globally evaluate a correlation matrix. The first is the Barlett's sphericity test: if the test is significant (<0.05) and the sample is large enough, it can be calculated the factorial analysis (35). The second is the sampling adequacy that was calculated through the Kaiser-Meyer-Olkin (KMO) test to verify the partial correlation among the variables. In particular, values greater than 0.90 were considered excellent; values between 0.80 and 0.90 were good; values between 0.70 and 0.80 were acceptable; values between 0.60 and 0.70 were mediocre; and ultimately, values below 0.60 were considered poor/not acceptable (35).

With principal component analysis, three EFA were carried out. They were calculated with the extraction of the Eigen values >1 , resulting in the extraction of seven factors. For item saturation, a cut-off > 0.40 was entered, excluding those that did not reach that value (35). To render more interpretable, the factorial solution, an oblique rotation was

accomplished as the factors can be correlated with each other (35).

This method simplifies the matrix of factorial saturations so that the variables have saturations as close as possible to 0 for all factors, except one (35). It is always preferable to preliminarily perform an oblique solution, but if none of the correlations among the factors prove to be > 0.30 , it can be useful to run an orthogonal solution (35). Cronbach's alpha coefficients were used to measure the internal consistency of the factors.

Ethics

Each director of the nursing schools involved authorized the study. The data were treated as confidential and stored in a secure place by the principal investigator. The data were analysed in anonymous and aggregate form. The permission to test the Finnish version of the NCS was received by copyright holders.

Results

The age of participants was between 19 and 52 years (mean 22.82, SD 3.98). As many as 69.6% ($n = 486$) of them were women and 30.4% ($n = 212$) were male. 44% of respondents had a high secondary school education with scientific direction, while 1.7% of them affirmed to possess another degree, mostly in other health professions.

Nursing students, through the self-assessment of competencies with the NCS, scored an average total of 62.99%, demonstrating that they possessed a good level of competence.

Confirmatory factor analysis

The CFA presented values of $\chi^2 = 10942.766$, with degrees of freedom (df) being 2.534 and a ratio of $\chi^2/df = 4.318$. The CFI value was 0.809, while the NFI was 0.765. The value of RMSEA was 0.069.

The measurement values of the goodness of fit (ratio χ^2/df) and those of comparative indexes of fit, CFI, and NFI showed that it was a bad model fit. The results from the CFA indicated that the original structure of the NCS was not confirmed. Exploratory factor analysis was, therefore, considered appropriate for further analysis.

Exploratory factor analysis

Three EFA were performed, but preliminarily Bartlett's test of sphericity was conducted and was found to be significant ($\chi^2 44889,118$; df 2628; $p < 0.001$). The KMO test ($p = .981$) was found to be significant too.

The significance of these two tests paved the way to perform factorial analysis, which confirmed the seven factors of the original NCS. An oblique rotation reached the convergence criteria in 31 interactions.

The matrix of the model showed saturations of the items that did not reach the cut-off value of 0.40, effectively excluding $n=13$ items out of the original scale (17/19/22/24/27/29/30/32/35/40/44/65/68).

A second EFA was performed by removing the items that were not saturated; the sampling adequacy values were still significant, Bartlett's test of sphericity ($\chi^2 35497.389$; df 1770; $p < 0,001$; KMO $p=.978$). The seven factors were again confirmed.

An oblique rotation reached the convergence criteria in 19 interactions. Moreover, some items did not saturate well in the matrix model of the second EFA and thus other 2 items were eliminated (20 and 34). Lastly, the third EFA was performed, where Bartlett's sphericity test was always significant ($\chi^2 34082.269$; df 1653; $p < 0.001$) along with the KMO test ($p=.978$). The seven extracted factors explained 67.32% of the variance. Rotation reached the convergence criteria in 19 interactions. The items of the first 6 factors showed a satisfactory saturation, while the last factor showed unsatisfactory item saturation (Table 2).

Table 2 - Exploratory Factor Analysis – Nurse Competence Scale. Extraction method: Principal Component Analysis. Rotation method: Oblimin with Kaiser normalization. Rotation converged in 19 iterations. Factor weight ≥ 0.4 in bold.

Item	Component						
	1	2	3	4	5	6	7
54	.792	.018	.040	.075	-.029	.151	.158
53	.743	.175	-.039	.022	-.019	.043	-.046
45	.712	-.076	.148	.127	-.014	-.079	-.145
50	.685	-.009	.092	-.019	.160	.080	-.031
48	.671	-.019	.067	.048	.098	.039	-.103
49	.660	.048	-.003	-.111	.113	.119	-.111
51	.635	-.031	.096	.046	.143	.090	-.075
46	.526	.099	.150	.008	.014	.011	-.254
43	.499	.028	.080	.279	.024	-.096	-.157
47	.445	.263	.121	-.010	-.001	-.057	-.285
55	.431	.290	.003	.146	.054	.109	.001
52	.420	.378	.061	-.039	.046	.135	-.069
56	-.105	.829	-.030	.007	-.024	.072	-.045
57	.171	.826	.027	.012	-.044	-.048	.062
58	.032	.768	-.022	.057	.043	.025	-.072
59	.097	.552	-.015	.011	.127	.064	-.155
73	-.003	.500	.039	-.011	.358	.104	-.077
2	.055	-.029	.844	.002	.062	-.032	-.042
1	.011	-.007	.825	.023	.135	-.073	-.067
3	.031	-.034	.746	-.002	.058	.097	-.017
5	.300	.005	.586	.100	-.077	.042	.008
4	-.010	.133	.578	.127	-.055	.086	-.066
6	.133	-.090	.519	.117	.008	.219	-.038
7	.046	.107	.463	.025	-.109	.307	.023
16	-.041	.104	.097	.805	-.196	.093	-.054
15	-.107	.081	.201	.738	-.141	.094	-.094
60	-.006	.015	-.068	.709	.335	-.038	-.041
61	.121	-.086	-.079	.631	.364	-.010	.032
23	.230	-.073	.007	.560	.070	.077	-.044
64	.088	-.154	.059	.235	.542	.096	-.144
63	-.126	.158	.236	.045	.490	.121	-.114
70	.258	.079	.113	.045	.465	.157	-.036
67	.085	.420	.134	.010	.455	-.055	.030
66	.119	.150	.000	.133	.454	.087	-.201
62	.174	.082	.071	.355	.446	.008	.005
71	.231	.085	.009	.234	.439	.133	.055
69	.242	.182	.146	-.063	.429	.061	-.112
72	.337	.076	.126	.093	.411	.109	-.031
13	.072	.093	.080	.130	.012	.670	.062
26	.181	-.038	-.246	-.054	.082	.639	-.343
14	.189	-.018	.037	.217	-.012	.596	.117
11	.030	.089	.225	.047	.086	.595	.029
12	.058	.079	.218	.125	.101	.567	.005

9	-.085	.091	.328	-.036	.095	.538	-.060
10	-.052	.025	.368	.006	.149	.495	-.085
8	-.079	.157	.328	-.028	-.021	.470	-.153
25	.105	.034	-.053	.018	.043	.454	-.448
18	.198	.056	.156	.201	.007	.451	-.035
21	.065	.101	.123	.128	.078	.417	-.217
38	-.028	.315	.092	.120	-.023	.003	-.583
37	-.092	.416	.075	.069	-.044	.008	-.534
31	.138	-.086	.135	.204	.126	.037	-.525
41	.269	.123	.074	.064	.060	.032	-.493
42	.168	.188	.122	.033	.073	.029	-.492
33	.208	-.159	.111	.201	.157	.025	-.491
39	.117	.107	.175	.025	.101	.120	-.484
28	.101	.144	.009	.118	-.094	.270	-.456
36	.213	.070	.193	.033	.147	.020	-.433

Table 3 - Description of the items deleted to build the Italian version of the Nurse Competence Scale

Factor of the NCS	Item	Excluded based on	Reason for excluding
Teaching coaching	17	Evaluating patient education outcome together with patient	1° EFA Factor weight < 0.4
	19	Evaluating patient education outcome with care team	1° EFA Factor weight < 0.4
	20	Taking active steps to maintain and improve my professional skills	2° EFA Factor weight < 0.4
	22	Developing orientation programmes for new nurses in my unit	1° EFA Factor weight < 0.4
Diagnostic functions	24	Analyzing patient's well-being from many perspectives	1° EFA Factor weight < 0.4
	27	Arranging expert help for patients when needed	1° EFA Factor weight < 0.4
	29	Coaching other staff members in the use of diagnostic equipment	1° EFA Factor weight < 0.4
	30	Developing patient care documentation	1° EFA Factor weight < 0.4
Managing situations	32	Prioritizing my activities flexibly according to changing situations	1° EFA Factor weight < 0.4
	34	Arranging debriefing sessions for the care team when needed	2° EFA Factor weight < 0.4
	35	Coaching other team members in mastering rapidly changing situations	1° EFA Factor weight < 0.4
Therapeutic interventions	40	Making decisions concerning patient care taking the particular situation into account	1° EFA Factor weight < 0.4
	44	Providing consultation for the care team	1° EFA Factor weight < 0.4
Work role	65	Incorporating new knowledge to optimize patient care	1° EFA Factor weight < 0.4
	68	Utilizing information technology in my work	1° EFA Factor weight < 0.4

An overview of the items not included in the final version of the Italian Nurse Competence Scale (INCS) and the reason for their exclusion is shown in Table 3. The final model of the INCS consisted of 58 items divided into seven factors (Table 4).

The new factor dimensions of INCS were defined in: using the research (12 items),

professional awareness (5 items), ethical values (7 items), tutorial functions (5 items), professional leadership (9 items), educational interventions (11 items), and management of care processes (9 items). Regarding the internal consistency, Cronbach's alpha indexes were used and were satisfactory (Table 5).

Table 4 - Final model of the Italian version of the Nurse Competence Scale after EFA

Factor INCS	Items	Item NCS	Item content	Cronbach's alfa
FACTOR 1 12 Items (Using research)	1	54	Making proposals concerning further developments and research	.917
	2	53	Utilizing research findings in further developments of patient care	
	3	45	Utilizing research findings in nursing interventions	
	4	50	Able to identify areas in patient care needing further development and research	
	5	48	Contributing to further development of multidisciplinary clinical paths	
	6	49	Commitment to my organization's care philosophy	
	7	51	Critical evaluation of my unit's care philosophy	
	8	46	Evaluating systematically patient care outcomes	
	9	43	Updating written guidelines for care	
	10	47	Incorporating relevant knowledge to provide optimal care	
	11	55	Able to recognize colleagues' need for support and help	
	12	52	Evaluating systematically patients' care satisfaction	
FACTOR 2 5 Items (Professional awareness)	13	56	Aware of the limits of my own resources	.934
	14	57	Professional identity serves as resource in nursing	
	15	58	Acting responsibly in terms of limited financial resources	
	16	59	Familiar with my organization's policy concerning division of labour and co-ordination of duties	
	17	73	Developing work environment	
FACTOR 3 7 Items (Ethical values)	18	2	Supporting patients' coping strategies	.924
	19	1	Planning patient care according to individual needs	
	20	3	Evaluating critically own philosophy in nursing	
	21	5	Utilizing nursing research findings in relationships with patients	
	22	4	Modifying the care plan according to the individual needs	
	23	6	Developing the caring culture of my unit	
	24	7	Decision-making guided by ethical values	
FACTOR 4 5 items (Tutorial functions)	25	16	Supporting student nurses in attaining goals	.935
	26	15	Taking student nurse's level of skill acquisition into account in mentoring	
	27	60	Co-ordinating student nurse mentoring in the unit	
	28	61	Mentoring novices and advanced beginners	
	29	23	Coaching others in duties within my responsibility area	

FACTOR 5 9 Items (Professional leadership)	30	64	Guiding staff members to tasks corresponding to their level of skills	.914
	31	63	Acting autonomously	
	32	70	Orchestrating the whole situation when needed	
	33	67	Taking care of myself in terms of not depleting my mental and physical resources	
	34	66	Ensuring smooth flow of care in the unit by delegating tasks	
	35	62	Providing expertise for the care team	
	36	71	Giving feedback to colleagues in a constructive way	
	37	69	Co-ordinating patient's overall care	
	38	72	Developing patient care in multidisciplinary teams	
FACTOR 6 11 Items (Educational interventions)	39	13	Able to recognize family members' needs for guidance	.917
	40	26	Able to identify family members' need for emotional support	
	41	14	Acting autonomously in guiding family members	
	42	11	Providing individualized patient education	
	43	12	Co-ordinating patient education	
	44	9	Finding optimal timing for patient education	
	45	10	Mastering the content of patient education	
	46	8	Mapping out patient education needs carefully	
	47	25	Able to identify patient's need for emotional support	
	48	18	Evaluating patient education outcomes with family	
	49	21	Developing patient education in my unit	
FACTOR 7 9 Items (Management of care processes)	50	38	Promoting flexible team co-operation in rapidly changing situations	.915
	51	37	Keeping nursing care equipment in good condition	
	52	31	Able to recognize situations posing a threat to life early	
	53	41	Co-ordinating multidisciplinary team's nursing activities	
	54	42	Coaching the care team in performance of nursing interventions	
	55	33	Acting appropriately in life-threatening situations	
	56	39	Planning own activities flexibly according to clinical situation	
	57	28	Coaching other staff members in patient observation skills	
	58	36	Planning care consistently with resources available	

Table 5 - Reliability of the Italian version of the Nurse Competence Scale

Factors of the INCS	Scale Mean if Item is deleted	Scale Variance if Item is deleted	Corrected Item Total Correlation	Cronbach's Alpha if Item is Deleted
Using the research	381.07	7434.932	.844	.917
Professional awareness	368.44	8174.744	.644	.934
Ethical values	385.37	7664.991	.762	.924
Tutorial functions	384.48	7230.805	.700	.935
Professional leadership	380.43	7327.996	.868	.914
Educational interventions	380.54	7572.874	.848	.917
Management of care processes	376.10	7516.503	.871	.915
Total mean	379.49	7.560.406	.791	.922

Discussion

The purpose of this study was to test the psychometric properties and evaluate the internal construct validity of the Italian version of the Nurse Competence Scale. The original seven factors (73 items) that composed the original NCS were tested after a rigorous process of systematic analysis (19). The confirmative factorial analysis indicated that the original seven-factor structure of the NCS by Meretoja et al. (19) was confirmed

The Italian version of the Nurse Competence Scale possesses seven factors containing 58 items. As mentioned before, the INCS is composed of 58 items divided into seven dimensions: *research, professional awareness, ethical values, tutoring, professional leadership, educational interventions, and management of care processes*. Overall, the scale showed high levels of reliability

The variance explained by the third EFA was 67%, and it was higher than the value of variance described by Meretoja in the original development of the NCS (53%) (19).

The final structure of the INCS indicates that the final model includes various elements for evaluating nursing skills in the Italian context. In the final INCS model, 15 out of 73 items of the original NCS scale were excluded. The items eliminated were part of only four of the seven factors that made up the original NCS. The sections of the original NCS that included the erased items were teaching-coaching (four items), diagnostic functions (four items), managing situations (three items), therapeutic interventions (two items), and work role (two items).

The INCS consisted of the remaining 58 items, thus making the scale structure more practical and making compilation simpler with faster responses, as pointed out by some authors (21, 22). The INCS is, hence, a reliable tool for the self-assessment of nursing competencies.

However, there is no precise correspondence between the factors found by Meretoja and those of our study. The Italian version of the Nurse Competence Scale consists of 58 items, i.e. 15 items were deleted from the original Competence Scale (19). According to Meretoja (19), the NCS provides a measure of the level of competence of nurses in different clinical settings; in fact, other authors have used it to measure the competencies of nurses employed in different environments and also of graduating nurses' students (27, 36, 37).

Further developments to improve the INCS should be furthered by integrating aspects such as incompetence or errors produced in the clinical setting, as suggested by Wangensteen (22).

Limits and strengths of the study

The analysis accomplished in this study was performed on a sample containing only nursing students. As underlined by Wangensteen et al. (22), this raises questions whether the NCS is appropriate for measurement of nursing students' competencies, since they are considered "beginners", however, they may represent another population study (22).

In this study the NCS was used for the evaluation of student nurses engaged in different backdrops, thus attesting its validity (27, 36, 37). This investigation also follows the recommendations of Muller and Wangensteen et al. (21, 22) on the grounding of further researches on the NCS in other languages. Furthermore, the sample analysed was adequate in terms of size (interviewees/items = 9.5: 698 interviewees and 73 items) to accomplish a statistically significant factorial analysis (35).

Conclusions

After the linguistic and cultural validation process, the psychometric evaluation of an

instrument is important, as pointed out by many authors (21, 22).

The Italian version of the Nurse Competence Scale can be used for comparisons across various health care settings. It contributes to the definition of clinical competencies in the Italian nursing environments. At national educational level, the Italian version of the Nurse Competence Scale can contribute to the improvement of training programmes in different academic institutions. However, it is advisable to conduct further psychometric analysis to replicate the validity of the Italian version of the Nurse Competence Scale.

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The authors have declared no conflict of interest.

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Riassunto

Nurse Competence Scale: valutazione psicometrica nel contesto italiano

Introduzione. La Nurse Competence Scale è uno strumento per valutare la competenza clinica infermieristica. Questo strumento è stato utilizzato in diversi paesi. La validità e l'affidabilità della Nurse Competence Scale in Italia non è stata mai analizzata e la sua valutazione era limitata alla validazione linguistica e culturale.

Scopo. Lo scopo di questo studio è stato quello di verificare la validità e l'affidabilità della Nurse Competence Scale nel contesto italiano.

Metodo. Questo studio è un'analisi secondaria di un database di 698 studenti di infermieristica, che hanno svolto il loro tirocinio clinico in diversi ambiti sanitari. L'affidabilità della consistenza interna è stata esaminata con il coefficiente α di Cronbach e l'analisi inter-item, e la costruzione della validità è stata valutata con un'Analisi Fattoriale Esplorativa con rotazione Oblimin e normalizzazione Kaiser-Meyer-Olkin, infine è stata eseguita un'Analisi Fattoriale Confermativa.

Risultati. L'analisi del fattore di conferma ha mostrato valori significativi del test Chi-quadro = 10942.766, con Gradi di Libertà pari a 2.534 e un rapporto di $\chi^2/df = 4.318$. Il valore del Comparative Fit Index è stato

significativo 0.809 e il Normed Fit Index con valore di 0.765 è risultato nei range di normalità. Il valore del Root Mean Square Error of Approximation è stato significativo 0.069. Il coefficiente α di Cronbach per la nuova scala è stato eccellente (0.922). L'Analisi Fattoriale Esplorativa ha portato allo sviluppo della Italian Nurse Competence Scale composta da 58 items suddivisi in sette dimensioni: l'utilizzo della ricerca, la consapevolezza professionale, i valori etici, le funzioni di tutoraggio, la leadership professionale, gli interventi educativi e la gestione dei processi di cura.

Conclusioni. L'Italian Nurse Competence Scale con 7 dimensioni e 58 elementi è uno strumento appropriato per descrivere e confrontare le competenze auto-valutate dagli infermieri, tali valutazioni potrebbero costituire un importante elemento per migliorare gli ambienti clinici. L'autovalutazione delle competenze può anche aumentare la consapevolezza dei bisogni educativi.

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