Impact of Nurses' Post-graduate Education on Placement

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Research

Keywords: Education, Advanced practice/Advanced nursing practice, Nursing practice, Nursemidwifery, Evidence-based practice

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Abstract

Background

Epidemiological changes led to review health services organization and nursing education, in order to train practitioners capable of effectively dealing with new healthcare needs. Master of Science in Nursing (MSN) degree is a post-graduation training curriculum aimed at providing nurses a method to approach complex and unconventional problems. This survey aims to assess if the skills acquired through MSN degree were implemented in the workplace and were useful for professional advancements.

Methods

This survey involved 257 MSN graduates of Polytechnic University of Marche, 196 of them completed the survey (response rate 76.3%). Logistic regression models were developed to test independent correlation between variables.

Results

A positive relation between acquisition of skills and their implementation in the workplace has been demonstrated in all training areas: clinical (OR=25.2; $p<0.001$), management (OR=7.4; $p<0.001$), educational (OR=14.2; $p<0.001$), research (OR=18.8; $p<0.001$). Only implementation of management skills resulted associated to hierarchical position (nurse managers: OR=11.8; $p=0.006$; service director nurses: OR=14.6; $p=0.025$) and age class (≥50 years old: OR=7.3; $p=0.004$). Economical progressions resulted to be only related to formal hierarchical advancements (OR=27.9; $p<0.001$), but acquisition of skills allows MSN graduated to increase collaboration in research or educative projects (OR=3.3; $p=0.010$) and publication of scientific papers (OR=8.7; $p<0.001$).

Conclusions

Although application of managerial skills requires the achievement of a higher hierarchical position, implementation of these skills can be realized by all MSN graduates, regardless of their age and hierarchical position. This contribute to improve areas of research and develop new models of nursing care necessary to manage chronic and complex patients.

Keywords: Education, Advanced practice/Advanced nursing practice, Nursing practice, Nurse-midwifery, Evidence-based practice

Background

Advances in medicine improved life expectancy, resulting in demographic and epidemiological changes and increased prevalence of chronic diseases (OECD, 2011). On the other hand, economic crisis resulted in a reduction of hospital beds, leading to a new concept of "hospital health" (Pochini et al., 2013). For these reasons, health services were reorganized, developing new models that were based on intensity of care and outpatient clinics under nursing management.

This new scenario requires a consequent modification of nursing knowledge and skills, in order to obtain practitioners able to effectively face the changes in healthcare needs. Italian university nursing education consists of a basic three-year level with the possibility to continue studies, after graduation, on two distinct branches: a specialist two-year master's course, aimed to acquire specific complex skills in clinical or managerial fields (Dal Molin, Galletti & Marmo, 2014; Decree of the Italian Ministry of Education, University and Research, 2004), or a two-year Master of Science in Nursing (MSN) degree (Decree of the Italian Ministry of Education, University and Research, 2009) that is not aimed to provide specific knowledge of a given topic, but to develop critical thinking and to provide a method for complex and unconventional problems solving (Galletti et al., 2013; Gamberoni et al., 2008). MSN degree aims to train a nurse that is different from the expert nurse that has specific skills for common problem solving, but is not accustomed to face new and unexpected difficulties (Dal Molin et al., 2014). MSN degree gives nurses also the opportunity to perform doctoral studies (Brayer & Marcinowicz, 2018). European systems of higher nursing education are comparable to Italian ones (Lahtinen, Leino-Kilpi & Salminen, 2014), however, subtle differences can be identified between universities at national level, according to the importance that is given to different educational areas of training curricula (Rega, Gallo & Marmo, 2015).

Italian MSN degree training curricula include four main areas (Dal Molin et al., 2014): clinical, management, education and research.

The clinical area aims to provide skills concerning chronic disease prevention and management, giving graduates tools to implement several strategies, such as clinical pathways (Lodewijckx et al., 2012) and chronic care model (Wagner, 1998). The management area focuses to develop organizational and leadership skills to manage services, care needs and personnel. The education area gives MSN students training methods and competences in education design. The research area aims to develop critical thinking and at providing tools to implement evidence-based practice (EBP) (Watkins, 2011), even if it cannot be considered adequate to train researchers.

A great importance is given to internship that allows students to experience real world situations (Dal Molin et al., 2014; Furlog & Smith, 2005) and put in practice what they learned (Galletti et al., 2013). As concerning the working place, nurses can be employed in different roles, such as: basic nurses that take care of patients; nurse managers that have management responsibilities of a nursing unit; service director nurses that are responsible of a particular service within the hospital; top manager nurses that manage nurses of the whole hospital and expert nurses that have specific competences in a particular care field (Dal Molin et al., 2014; Saiani & Brugnolli, 2006).

The Italian legislation requires the MSN degree and to pass a competitive exam to gain top manager nurses' position, whereas MSN degree is a preferential but not mandatory criterion for other hierarchical advancements (Galletti et al., 2013). Skills acquired during the MSN degree can be useful in several areas. Research skills can be used to implement EBP in the working place; educational skills to teaching activities and clinical competences to provide primary care in nursing managed care systems. MSN graduates' occupational profile has been monitored only by mono or multicentric ad hoc surveys (Dante, Miniussi, Margetic & Palese, 2013; Massimi et al., 2017; Miconi et al., 2011;). There are no systematic surveys on MSN graduates' placement and no studies investigating if all MSN graduates have the same placement chance or if more experienced graduates with older age or hierarchical position have better working opportunities. This knowledge is very important nowadays

because the average age and working experience of new graduates is getting lower and lower and the MSN degree is often considered as the continuation of the studies cycle and not a subsequent deepening (Dal Molin et al., 2014).

This study aims to investigate usefulness of MSN degree for graduated nurses' placement. The main purpose is to assess the working application of knowledge and skills acquired during the degree course and to find out the factors associated to skills implementation. Secondary aim is to evaluate the correlation of MSN skills to professional advancements or if it depends on other factors.

Methods

Study Design

This study is Cross-sectional survey.

Participants

All the graduates (257) of the MSN of the Polytechnic University of Marche were considered eligible for the study, 196 of them completed the survey (response rate 76.3%). Eight not consecutive cohorts of graduates were involved in the survey, from the academic year 2006/2007 to 2017/2018. The list of graduates and their contacts were requested to the administrative office of the University after obtaining authorization from the Chancellor. Graduates who were not reachable by email or phone were excluded from the survey.

Data collection

An online questionnaire was sent to participants by email from June 2018 to February 2019. The email contained the survey internet link and a cover letter, explaining where study details and aims, questionnaire filling instructions and the informed consent. Three reminder emails were sent and a telephone call was made to each participant, in order to provide further details about the survey to maximize the response rate.

The questionnaire was based according to that developed by Massimi et al. (2017) and was slightly modified to better investigate other MSN features. The questionnaire contained 34 multiple-choice questions, in order to allow a quantitative analysis and an open-ended question to collect advices.

Items were related to seven different aspect: demographic and educational characteristics; occupational status; judgment on the quality, relevance and attractiveness of the course; judgment on the quality and relevance of practical experience during the course; acquisition of knowledge and skills during the course (concerning clinical, educational, managerial and research study areas); working implementation of acquired skills (concerning each study area) and career advancement after the course.

Data analysis

Descriptive analysis of data was performed, frequencies, percentage, mean values, standard deviation (SD) were computed and methods of statistical inference were applied.

The following questions were used as dependent variables in the study to analyze the second purpose of the survey:

"did you actually implement in your job clinical / educational / management / research skills acquired during the degree course?" to answer to the first aim of the study;

"did the degree allow you to obtain a hierarchical / economic advancement?",

"did the degree increase your opportunity to publish scientific papers?",

"did the degree increase your opportunity to collaborate in research or educative projects?",

"did the degree allow you to obtain an official recognition for your tasks?".

Continuous variables were analyzed through linear regression model. Categorical variables rated on a 4-point Likert scale were dichotomized (0 = No, if the selected option was "not at all" or "very little"; 1 = Yes, if the answer was "somewhat" or "to a large extent"). Bivariate analyses were performed to analyze the distribution of categorical variables in the sample using Fisher exact test. Logistic regression models were developed to adjust for confounding, and to evaluate which factors were independently associated with the dependent variables. The significance level for variables to enter the logistic regression model was set at <0.25. Statistical analyses were performed with STATA software, version 11. The level of significance was set at 0.05.

Validity, Reliability and Rigour

The modified version of the original questionnaire was tested through a pilot study conducted on a sample of 57 graduates (December 2017). Internal consistency of the modified instrument was tested by Cronbach's alpha test.

Results

Sample description

Eight academic years of MSN graduates in the Polytechnic University of Marche were involved in the study, accounting for a total of 257 master's graduates, 196 of them completed the survey (response rate 76.3%) and 83.2% were female, with a mean age of 38 (±11 SD). All of them were employed at the time of the survey (86.2% with a permanent contract), working place was mainly hospitals (72.5%) or teaching hospitals (11.7%). As concerning the hierarchical position, 70.9% of responders were employed as basic nurses, 7.14% as nurse managers and 6.63% as service director nurses; 15.3% of responders declared to be expert nurses; no responders belonged to the top manager category.

A decreasing trend was observed in the mean age of MSN students at the time of graduation (β=–0.49; $p<0.001$). The highest average age was 41.8 years (±6.5 SD) for graduates of the 2006/2007 academic year and the lowest was 28.7 years (±6.0 SD) for students that graduated ten years later (Table1).

Mean values, standard deviations, Cronbach α reliability estimates and correlations for the main variables in the study were shown in Table 2. All α levels were in an acceptable range above 0.89. The strongest correlations between items were those between the judgment of the degree course usefulness for the present job and acquisition of useful knowledge and skills ($r=0.71$; $p<0.001$) and between hierarchical and economical advancements ($r=0.72$; $p<0.001$).

Working implementation of knowledge and skills acquired during the degree course

Most of responders, 56.6% (n=111), declared that they improved their clinical skills thanks to the degree course. Educational, management and research skills were improved due to MSN course for 81.1% (n=159), 65.3% (n=128) and 73.0% (n=143) of responders respectively, whereas 48.0%,

64.3%, 50.0% and 47.5% of responders declared they implemented, respectively, clinical, educational, management and research skills acquired during the course in their working place, regardless of the judgment of satisfying or scarce amount of knowledge acquired. However, 12.8% of responders who applied the acquired clinical skills in the working place declared that they acquired an unsatisfactory amount of knowledge by the course. Similar consideration could be made for the implementation of educational (6.4%), management (17.4%) and research (5.4%) skills judged scarce by responders.

Acquisition of clinical skills during the degree course was a factor favoring their implementation in the working place (73,9%; OR=17.2; $p<0.001$). The same consideration was valid for practical implementation of acquired educational (74.2%; OR=10.4; $p<0.001$), management (63.3%; OR=5.2; $p<0.001$) and research skills (61.5%; OR=15.4; $p<0.001$).

Table 3 shows results of logistic regression models used to analyze the association between various factors and implementation of acquired skills. The opportunity to apply the acquired clinical skills in the working place was positively associated with a satisfactory level of clinical knowledge acquisition during the degree course (OR=25.2; $p<0.001$) and working position of expert nurse (OR=4.54; $p=0.027$). A negative association could be observed with age (age group 40-49: OR=0.18; $p=0.012$).

Implementation of management skills was associated with higher hierarchical position (nurse managers: OR=11.8; $p=0.006$; service director nurses: OR=14.6; $p=0.025$), age class (≥50 years old: OR=7.3; $p=0.004$) and acquisition of management skills through the course (OR=7.4; $p<0.001$). A correlation between implementation and acquisition of educational skills (OR=14.2; $p<0.001$) and research skills (OR=18.8; $p<0.001$) was statistically significant, whereas age class and hierarchical position were not correlated in both cases.

Professional advancements related to acquisition of skills during the degree course

The graduation in MSN was considered responsible for hierarchical advancement by the 25% (n=49) of responders and for economical progression by the 9.7% (n=19) of them. Whereas, 33.7% (n=66) of responders declared that the degree course improved their publication of scientific papers,

44.4% (n=87) of them stated that the degree increased their opportunity to collaborate in research or educative projects and 39.8% (n=78) of them indicated that the degree allowed them to obtain an official recognition for their tasks.

Results of logistic regression models were shown in Table 4. Implementation of acquired management skills (OR=3.9; p=0.031), the degree in the academic year 2007-2008 (OR=8.1; p=0.027), professional role of service director nurse (OR=25.8; p=0.002) and of expert nurse (OR=7.3; p=0.016) were associated with hierarchical advancement. The singular predictor of economical progression was demonstrated to be the achievement of hierarchical advancements (OR=27.9; p<0.001). Other typologies of opportunities provided by the course to graduates were the greater number of scientific papers publication that was correlated to the implementation of acquired research skills (OR=8.7; p<0.001); the chance to collaborate in research or educative projects that was associated with the implementation of acquired clinical skills (OR=3.3; p=0.010), and the opportunity to obtain an official recognition for their tasks that was positively associated with the work position of service director nurse (OR=6.5; p=0.044), the implementation of acquired educational (OR=4.0; p=0.007) and research skills (OR=3.2; p=0.011).

Discussion

This is the first study analyzing differences in the usability of acquired skills based on age and hierarchical position of MSN graduates. The large response rate (ranging from 64% of graduated in the academic year 2006/2007, to 85.2% of those of the year 2017/2018) is an indication of the great interest of graduates their qualification application in placement.

Skill acquisition during MSN course is associated with an increased implementation in the working place. Application of managerial skills is also associated with age and hierarchical position, suggesting that work experience and a specific hierarchical position are requested for the managerial field. This association is not observed in educational and research areas. The most acquired skills during the degree course are educational (81.1%) and research skills (73.0%), followed by managerial (65.3%) and clinical skills (56.6%). These results are different from those observed in a previous

multicentric study (Massimi et al., 2017), where educational and managerial skills are the most acquired skills in graduates of several Italian university (86.2% and 79.3%, respectively). Despite the didactic organization, the degree course in the Polytechnic University of Marche is comparable to that mostly represented in Italy, where managerial and educational domains are favored (Rega et al., 2015). The observed difference can be explained by the strong emphasis that was given in our University to the domain of research, in order to provide graduates with useful tools to implement EBP in their daily working life, as recommended by World Health Organization (WHO, 2016).

Implementation of acquired skills is the highest scored educative domains (64.3%); this reflects the existence of greater job opportunities in the pedagogical sector, which is shown to be accessible to all MSN graduates. Never the less disparities in the economic treatment is reported by younger graduates (Miconi et al., 2011). All the other acquired skills are implemented by ≤ 50% of responders, this is in agreement with reports of previous studies (Massimi et al., 2017).

It's important to highlight that some graduated nurses who acquired skills (38.5% research, 36.7% management, 26,1% clinical and 25.8% educational skills) during the degree course cannot implement them in the working place. This can cause frustration (Miconi et al., 2011) and loss of knowledge. Dale, indeed, hypothesized that retention of information is higher when learners do what they hear, read or observe (Dale, 1969) and lack of practical application of acquired skills can cause a rapid decline in competences. One of nurses' reasons to continue studies is the ambition to improve their working position; hence the lack of job opportunities to implement the acquired knowledge can lead to loss of professional practice and high-level competence (Callaghan, 2008; Miconi et al., 2011).

Twenty five percent of graduated nurses had a hierarchical advancement. This percentage is lower to that reported in previous studies 28.6%-40% (Miconi et al., 2017; Galletti et al., 213). Hierarchical advancements occurs mainly among nurses who graduated > 10 years. This may be due to the fact that promotions are not immediate, the n umber of service director nurse and top management positions are few. Economical improvements are reported by the 9.7% of responders, this is higher than the 3% reported by Miconi et al. (2011). However it was related only to hierarchical advancement

and not to an increased implementation of acquired skills. The lack of increase in remuneration of MSN graduated nurses can cause a decrease in nurses' job satisfaction (Brayer & Marcinowicz, 2018). This is particularly important because job satisfaction is associated to staff retention (Cowin, 2002; Al Sabei et al., 2019), better patient outcomes and quality of care (Asif, Jameel, Hussain, Hwang & Sahito, 2019). A major opportunity of collaboration in research and educative projects and of publication of scientific papers represent the most common progress for graduates that are related only with acquisition of skills during the degree course and can also lead to advantages in competitive exams. Awareness of applicants in the potential of research skills is demonstrated by the fact that most graduates suggest to increase the research contents in the training curriculum to improve the MSN course.

The main limitation of this study is the use of a self-reported questionnaire that is potentially inaccurate. In order to reduce the problem related to the social bias, anonymity is guaranteed to responders and social inappropriate behaviours are not inquired. Moreover, three reminder emails and a telephone call to participants are used to decrease the response rate bias. Finally, since the study is conducted on cohorts of graduates from different years, the possibility of recall bias must be considered.

Conclusions

Although the managerial and pedagogical professional placements are better known by MSN graduates, it is also important to underline the importance of acquired clinical and research skills. Implementation of these skills can be realized by all MSN graduates, regardless of their age and hierarchical position. This can also contribute to the improvement of clinical practice (through EBP application) and to the implementation of innovative models of nursing care that are increasingly necessary to manage chronic and complex patients. It is therefore important to improve areas of research and models of nursing care in the MSN courses' curricula and also to provide forms of merit compensation for those nurses who, thanks to acquired skills, apply EBP improving the service offered to patients and to the community.

Declarations

Ethics approval and consent to participate

Ethical approval for the study was obtained from the Studies' Courses Council and from the Chancellor of the Polytechnic University of Marche. Informed consent was provided to participants through a cover letter accompanying the questionnaire. Responders were guaranteed anonymity.

Consent for publication

Not applicable

Availability of data and materials

Not applicable

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

Pelusi G: substantial contributions to the conception and design of the work and the acquisition of data for the work; AND drafting the work and revising it critically for important intellectual content; AND final approval of the version to be published; AND agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

D'Alleva A: substantial contributions to the conception of the work and analysis and interpretation of data for the work; AND drafting the work and revising it critically for important intellectual content; AND final approval of the version to be published; AND agreement to be accountable for

all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Gatti C: substantial contributions to the conception of the work and the acquisition of data for the work; AND drafting the work and revising it critically for important intellectual content; AND final approval of the version to be published; AND agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Ciriachi N: the acquisition of data for the work and analysis of data for the work; AND drafting the work; AND final approval of the version to be published; AND agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Gasperini B: substantial contributions to the conception and design of the work; AND revising the work critically for important intellectual content; AND final approval of the version to be published; AND agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

*Prospero E: s*ubstantial contributions to the conception and design of the work and interpretation of data for the work; AND revising the work critically for important intellectual content; AND final approval of the version to be published; AND agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Table 1: Cohorts of MSN graduates participating in the survey: sample size, response rate, age and hierarchical position of respondents

Academic year of the MSN degree	Total number of MSN students	Responders at the survey: N (%)	Age of respondents on graduation: mean (sd)	Hierarchical position of respondents: N (%)			
				Basic nurses	Nurse managers	Service director nurses	Expert nurses
2006/2007	50	32 (64)	41.81 (6.54)	2 (6.25)	5 (15.63)	7 (21.88)	18 (56.25)
2007/2008	19	13 (68.4)	37,62 (6.43)	7 (53.85)	1 (7.69)	0 (0.00)	5 (38.46)
2012/2013	25	25 (100)	34.25 (9.51)	20 (80.00)	2 (8.00)	2 (8.00)	1 (4.00)
2013/2014	29	22 (75.9)	33.32 (9,09)	19 (86.36)	1 (4.55)	1 (4.55)	1 (4.55)
2014/2015	29	23 (79.3)	33.17 (8,91)	18 (78.26)	2 (8.70)	0 (0.00)	3 (13.04)
2015/2016	36	28 (77.8)	29.92 (7.30)	24 (85.71)	1 (3.57)	2 (7.14)	1 (3.57)
2016/2017	42	30 (71.4)	28.70 (6.02)	27 (90.00)	1 (3.33)	1 (3.33)	1 (3.33)
2017/2018	27	23 (85.2)	29.26 (6.44)	22 (95.65)	1 (4.35)	0 (0.00)	0 (0.00)
Total	257	196 (76.3)	33.41 (8.70)	139 (70.92)	14 (7.14)	13 (6.63)	30 (15.31)

Table 2: Mean values, SDs, Cronbach α reliability estimates and correlations for the main variables in the study

	Mean	SD	Cronbach α	Acquisition of useful knowledge/skills	Acquisition of clinical skills	Acquisition of educational skills	Acquisition of management skills	Acquisition of research skills	Implementation of acquired clinical skills	Implementation of acquired educational skills	Implementation of acquired management skills	Implementation of acquired research skills	Hierarchical advancement	Economical advancement	Increased professional recognition/responsability	Publication of scientific papers	Collaboration in research/educative projects
Acquisition of useful knowledge/skills	2,79	0,70	0,897	1													
Acquisition of clinical skills	2,56	0,84	0,901	0,60	1												
Acquisition of educational skills	3,01	0,69	0,903	0,40	0,36	1											
Acquisition of management skills	2,70	0,71	0,902	0,45	0,37	0,44	1										
Acquisition of research skills	2,86	0,73	0,903	0,36	0,31	0,28	0,42	1									
Implementation of acquired clinical skills	2,42	0,85	0,897	0,57	0,65	0,35	0,44	0,33	1								
Implementation of acquired educational skills	2,69	0,86	0,899	0,42	0,33	0,51	0,32	0,28	0,51	1							
Implementation of acquired management skills	2,47	0,91	0,897	0,56	0,32	0,30	0,55	0,39	0,51	0,60	1						
Implementation of acquired research skills	2,41	0,90	0,900	0,39	0,33	0,31	0,32	0,55	0,46	0,51	0,55	1					
Hierarchical advancement	1,78	0,99	0,901	0,37	0,27	0,15	0,23	0,22	0,37	0,39	0,46	0,39	1				
Economical advancement	1,38	0,73	0,903	0,30	0,21	0,10	0,22	0,18	0,29	0,30	0,42	0,35	0,72	1			
Increased professional recognition/responsability	2,15	1,08	0,900	0,38	0,26	0,27	0,18	0,23	0,36	0,51	0,44	0,35	0,50	0,46	1		
Publication of scientific papers	1,99	1,03	0,905	0,26	0,15	0,12	0,10	0,26	0,24	0,14	0,28	0,44	0,44	0,41	0,37	1	
Collaboration in research/educative projects	2,26	1,03	0,899	0,41	0,35	0,30	0,20	0,33	0,41	0,43	0,39	0,38	0,43	0,44	0,63	0,46	1

Table 3. Results of logistic regression models showing determinants of implementation of acquired skills

	OR	95%CI	p
IMPLEMENTATION OF ACQUIRED CLINICAL SKILLS			
Age at the time of the survey			
<30	1		
30-39	0.73	0.28-1.90	0.518
40-49	**0.18**	**0.05-0.69**	**0.012**
>49	1.14	0.30-4.29	0.850
Hierarchical position			
Basic nurse	1		
Nurse manager	2.27	0.52-9.89	0.276
Service director nurse	2.90	0.51-16.47	0.228
Expert nurse	**4.54**	**1.19-17.33**	**0.027**
Acquisition of clinical skills during MSN degree			
No	1		
Yes	**25.20**	**10.74-59.15**	**≤0.001**
IMPLEMENTATION OF ACQUIRED EDUCATIONAL SKILLS			
Age at the time of the survey			
<30	1		
30-39	1.66	0.74-3.74	0.218
40-49	3.42	0.92-12.62	0.066
>49	3.40	0.90-12.85	0.071
Hierarchical position			
Basic nurse	1		
Nurse manager	2.66	0.53-13.32	0.233
Service director nurse	2.46	0.36-16.66	0.357
Expert nurse	0.77	0.20-2.97	0.702
Acquisition of educational skills during MSN degree			
No	1		
Yes	**14.23**	**5.40-37.46**	**≤0.001**
IMPLEMENTATION OF ACQUIRED MANAGERIAL SKILLS			
Age at the time of the survey			
<30	1		
30-39	1.15	0.49-2.69	0.748
40-49	2.27	0.67-7.66	0.186
>49	**7.26**	**1.88-28.05**	**0.004**
Hierarchical position			
Basic nurse	1		
Nurse manager	**11.82**	**2.06-67.70**	**0.006**
Service director nurse	**14.59**	**1.40-152.07**	**0.025**
Expert nurse	4.29	0.98-18.74	0.053
Acquisition of managerial skills during MSN degree			
No	1		
Yes	**7.41**	**3.10-17.72**	**≤ 0.001**

		OR	95%CI	p
IMPLEMENTATION OF ACQUIRED RESEARCH SKILLS				
	Age at the time of the survey			
	<30	1		
	30-39	0.86	0.38-1.95	0.727
	40-49	1.09	0.32-3.67	0.893
	>49	0.75	0.24-2.41	0.632
	Hierarchical position			
	Basic nurse	1		
	Nurse manager	2.34	0.57-9.51	0.237
	Service director nurse	5.41	0.99-29.72	0.052
	Expert nurse	2.29	0.69-7.63	0.176
	Acquisition of research skills during MSN degree			
	No	1		
	Yes	**18.84**	**6.60-53.79**	**≤0.001**

Table 4. Results of logistic regression models showing determinants of professional advancements

	OR	95%CI	p
HIERARCHICAL ADVANCEMENT			
Academic year of the MSN degree			
2006/2007	1		
2007/2008	**8.14**	**1.27-52.23**	**0.027**
2012/2013	1.95	0.34-11.11	0.451
2013/2014	1.26	0.19-8.31	0.813
2014/2015	0.44	0.07-2.66	0.371
2015/2016	3.51	0.52-23.76	0.198
2016/2017	3.58	0.53-24.11	0.190
2017/2018	1.27	0.14-11.35	0.828
Age at the time of the survey			
<30	1		
30-39	1.44	0.39-5.33	0.589
40-49	0.75	0.13-4.43	0.754
>49	0.36	0.05-2.54	0.306
Hierarchical position			
Basic nurse	1		
Nurse manager	3.90	0.75-20.34	0.106
Service director nurse	**25.77**	**3.38-196.80**	**0.002**
Expert nurse	**7.31**	**1.46-36.60**	**0.016**
Acquisition of clinical skills during MSN degree			
No	1		
Yes	1.68	0.56-5.05	0.354
Acquisition of managerial skills during MSN degree			
No	1		
Yes	1.49	0.51-4.33	0.466
Acquisition of research skills during MSN degree			
No	1		
Yes	1.45	0.40-5.21	0.570
Implementation of acquired clinical skills			
No	1		
Yes	1.19	0.38-3.68	0.769
Implementation of acquired educational skills			
No	1		
Yes	2.49	0.79-7.82	0.119
Implementation of acquired managerial skills			
No	1		
Yes	**3.86**	**1.13-13.12**	**0.031**
Implementation of acquired research skills			
No	1		
Yes	2.38	0.82-6.92	0.110
ECONOMICAL ADVANCEMENTS			
Age at the time of the survey			

		OR	95%CI	p
	<30	1		
	30-39	0.13	0.01-2.08	0.150
	40-49	2.07	0.15-27.85	0.583
	>49	1.37	0.11-16.89	0.806
	*Hierarchical position**			
	Basic nurse	1		
	Service director nurse	2.80	0.27-29.04	0.389
	Expert nurse	1.65	0.22-12.49	0.626
	Acquisition of clinical skills during MSN degree			
	No	1		
	Yes	1.22	0.16-9.32	0.845
	Acquisition of managerial skills during MSN degree			
	No	1		
	Yes	3.75	0.28-49.53	0.316
	Implementation of acquired clinical skills			
	No	1		
	Yes	0.62	0.06-6.06	0.684
	Implementation of acquired educational skills			
	No	1		
	Yes	0.83	0.09-7.99	0.875
	Implementation of acquired managerial skills			
	No	1		
	Yes	3.23	0.22-48.36	0.395
	Implementation of acquired research skills			
	No	1		
	Yes	3.93	0.64-24.22	0.140
	Hierarchical advancement			
	No	1		
	Yes	**27.92**	**4.65-167.55**	**≤0.001**
GREATER PUBLICATION OF SCIENTIFIC PAPERS				
	Academic year of the MSN degree			
	2006/2007	1		
	2007/2008	1.03	0.19-5.46	0.971
	2012/2013	0.54	0.11-2.57	0.440
	2013/2014	0.95	0.19-4.70	0.950
	2014/2015	0.46	0.11-2.01	0.302
	2015/2016	1.40	0.31-6.30	0.664
	2016/2017	0.70	0.15-3.26	0.654
	2017/2018	2.73	0.54-13.77	0.224
	Hierarchical position			
	Basic nurse	1		
	Nurse manager	0.78	0.18-3.37	0.738
	Service director nurse	3.46	0.75-15.86	0.111
	Expert nurse	1.97	0.56-6.89	0.287
	Acquisition of educational skills during MSN degree			

		OR	95%CI	p
	No	1		
	Yes	1.63	0.55-4.85	0.382
	Acquisition of research skills during MSN degree			
	No	1		
	Yes	0.69	0.25-1.92	0.476
	Implementation of acquired clinical skills			
	No	1		
	Yes	1.61	0.72-3.62	0.245
	Implementation of acquired educational skills			
	No	1		
	Yes	0.47	0.17-1.28	0.138
	Implementation of acquired managerial skills			
	No	1		
	Yes	1.32	0.53-3.32	0.554
	Implementation of acquired research skills			
	No	1		
	Yes	**8.73**	**3.21-23.71**	**≤0.001**
GREATER POSSIBILITY TO COLLABORATE IN RESEARCH OR EDUCATIVE PROJECTS				
	Academic year of the MSN degree			
	2006/2007	1		
	2007/2008	1.87	0.34-10.18	0.467
	2012/2013	0.85	0.18-3.95	0.839
	2013/2014	2.57	0.49-13.57	0.267
	2014/2015	0.79	0.16-4.01	0.780
	2015/2016	4.72	0.91-24.58	0.065
	2016/2017	1.04	0.19-5.78	0.961
	2017/2018	1.51	0.25-9.28	0.655
	Age at the time of the survey			
	<30	1		
	30-39	1.73	0.66-4.56	0.266
	40-49	2.36	0.55-10.23	0.250
	>49	0.89	0.21-3.72	0.869
	Hierarchical position			
	Basic nurse	1		
	Nurse manager	1.58	0.35-7.19	0.554
	Service director nurse	2.90	0.54-15.61	0.214
	Expert nurse	3.62	0.92-14.20	0.065
	Acquisition of clinical skills during MSN degree			
	No	1		
	Yes	1.22	0.50-2.99	0.658
	Acquisition of educational skills during MSN degree			
	No	1		
	Yes	0.80	0.27-2.37	0.681
	Acquisition of managerial skills during MSN degree			

		OR	95%CI	p
	No	1		
	Yes	0.85	0.36-2.04	0.723
	Acquisition of research skills during MSN degree			
	No	1		
	Yes	2.00	0.77-5.19	0.153
	Implementation of acquired clinical skills			
	No	1		
	Yes	**3.31**	**1.33-8.23**	**0.010**
	Implementation of acquired educational skills			
	No	1		
	Yes	2.43	0.94-6.26	0.067
	Implementation of acquired managerial skills			
	No	1		
	Yes	1.61	0.59-4.37	0.354
	Implementation of acquired research skills			
	No	1		
	Yes	1.35	0.59-3.09	0.483
GREATER OPPORTUNITY TO OBTAIN OFFICIAL RECOGNITION				
	Academic year of the MSN degree			
	2006/2007	1		
	2007/2008	5.28	0.84-33.22	0.076
	2012/2013	1.92	0.39-9.41	0.420
	2013/2014	0.42	0.08-2.30	0.318
	2014/2015	0.51	0.10-2.51	0.409
	2015/2016	0.91	0.17-4.83	0.918
	2016/2017	1.25	0.22-6.95	0.799
	2017/2018	0.74	0.11-5.04	0.758
	Age at the time of the survey			
	<30	1		
	30-39	2.03	0.72-5.73	0.182
	40-49	2.50	0.55-11.25	0.234
	>49	1.50	0.32-7.10	0.611
	Hierarchical position			
	Basic nurse	1		
	Nurse manager	0.85	0.20-3.64	0.826
	Service director nurse	**6.54**	**1.06-40.53**	**0.044**
	Expert nurse	3.43	0.83-14.19	0.089
	Acquisition of clinical skills during MSN degree			
	No	1		
	Yes	1.40	0.55-3.54	0.489
	Acquisition of educational skills during MSN degree			
	No	1		
	Yes	0.77	0.26-2.28	0.631
	Acquisition of research skills during MSN degree			
	No	1		

		OR	95%CI	p
	Yes	1.20	0.44-3.31	0.724
	Implementation of acquired clinical skills			
	No	1		
	Yes	1.31	0.51-3.39	0.580
	Implementation of acquired educational skills			
	No	1		
	Yes	**3.96**	**1.46-10.74**	**0.007**
	Implementation of acquired managerial skills			
	No	1		
	Yes	0.86	0.34-2.18	0.755
	Implementation of acquired research skills			
	No	1		
	Yes	**3.20**	**1.31-7.85**	**0.011**

*Logistic regression model in this case was performed on 182 observation because the category "nurse manager" that obtained economical advancements thanks to the MSN degree was empty.