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MSc Nursing Entrance Exams — admission to full-time and part-time programmes at medical university

Egzaminy wstępne na kierunek pielęgniarstwo studia II stopnia — rekrutacja na stacjonarne i niestacjonarne studia na uniwersytecie medycznym

ABSTRACT

Introduction. Reliable selection of candidates is a prerequisite for Master's degree graduates to achieve professional success on higher levels of nursing management in the future.

Aim of the study. Comparative analysis of candidates with reference to their scores on the admission test conducted at the Medical University of Warsaw (MUW) between 2009 and 2012 by the preferred mode of the Master's degree programme in Nursing.

Material and methods. A retrospective study involving a total of 1960 candidates for a Master's degree programme at the MUW, including 1157 candidates willing to take a full-time course (FT group) and 803 candidates for a part-time course (PT group).

Results. Reliability of admission tests was relatively low and α ranged between 0.429 and 0.558. It was demonstrated that the index of test difficulty was lower in all years in the case of the PT candidates compared to the FT candidates. The mean score on the entrance exam was also higher among the FT group compared to the PT group (ANOVA test, $p < 0.000001$). Significantly higher scores among the FT group compared to the PT group were observed in all years of the study (*post-hoc* RIR Tukey test, $p < 0.01$).

Conclusions. Candidates for a full-time programme were better prepared for a Master's degree course compared to those applying to a part-time programme. There is a need for a deep analysis (including also individual conditioning) of difficulties encountered by the PT candidates in sufficient mastering of clinical issues.

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Key words: school admission criteria; postgraduate nursing education; educational measurement

STRESZCZENIE

Wstęp. Warunkiem osiągnięcia w przyszłości przez absolwentów studiów II stopnia sukcesu zawodowego jest przeprowadzenie rzetelnej selekcji kandydatów na te studia.

Cel pracy. Analiza porównawcza kandydatów pod kątem uzyskanych wyników ze wstępnego testu egzaminacyjnego przeprowadzonego w Warszawskim Uniwersytecie Medycznym w latach 2009–2012, w zależności od preferowanej formy studiów II stopnia na kierunku pielęgniarstwo.

Materiał i metody. Retrospekcja obejmująca łącznie 1960 kandydatów na studia II stopnia w MUW, w tym 1157 deklarujących chęć podjęcia studiów w formie stacjonarnej (grupa FT) i 803 w formie niestacjonarnej (grupa PT).

Wyniki. Rzetelność testu egzaminacyjnego była stosunkowo niska i mieściła się w zakresie α od 0,429 do 0,558. Wykazano, że poziomo trudności testu, we wszystkich analizowanych rocznikach był niższy w przypadku kandydatów PT w porównaniu z FT. Ponadto, średnia suma punktów uzyskana na egzaminie wstępnym była wyższa w grupie kandydatów FT niż PT (test

ANOVA, p < 0,000001). Istotnie wyższe statystycznie wyniki FT niż PT zostały zaobserwowana dla wszystkich analizowanych roczników (test *post-hoc* RIR Tukeya, p < 0,01).

Wnioski. Kandydaci na studia w trybie FT są lepiej przygotowani do studiów II stopnia, niż osoby preferujące system PT. Trudności z dostatecznym opanowaniem zagadnień klinicznych w grupie kandydatów na studia PT, wymagają pogłębionej analizy, także z uwzględnieniem indywidualnych uwarunkowań. Konieczne jest dążenie do poprawy jakości testu wstępnego. Należy także ponownie rozważyć rolę studiów II stopnia w kształceniu kadry pielęgniarskiej i dopasować do tego strategię rekrutacyjną uczelni medycznej.

Introduction

Following the provisions of the Bologna Declaration and Directive 2005/36/EC of The European Parliament and of The Council of 7 September 2005 on the recognition of professional qualifications (Official Journal of the European Union L 255/41), in Poland there is a 3-tier education system for prospective nurses. Graduation from a Bachelor programme allows for the continuation of education in a Master programme, and then in a 4-year PhD programme [1, 2].

The Ministry of Health and Social Welfare decided to suspend admission to medical secondary schools in the school year 1992/1993 [3]. The closure of nursing schools at the secondary level in the '90s led to a rapid growth of the number of candidates willing to study at a higher education institution, because it has become the only way to be granted the right to practise as a nurse. Prospective nurses are trained on 3-year programmes at university-level schools where they can acquire knowledge and skills necessary to practise as a registered nurse. Those who would like to develop their skills and take better positions continue their education on a Master's degree programme to graduate with a Master's degree [4]. Therefore, a large number of BA graduates that have obtained the right to practice as a nurse is willing to improve their qualifications on the Master's programme. A numerous group of graduates from medical secondary schools and medical vocational schools who completed their education at a higher vocational school within bridge studies have also been willing to continue their education on a Master's degree programme [5, 6]. Because of such a considerable increase of interest in Nursing programmes, Bachelor's and Master's programmes, and later also PhD programmes, were introduced at all medical universities.

According to Drennan [7], obtaining a Master's degree is one of the most important stages in professional development of a nurse . This is also an essential stage of career development aiming to achieve better positions, particularly with reference to arrangement and management. Moreover, Master's degree graduates are natural candidates for team leaders [8]. Obviously, a Master's degree programme is not the only way available to nurses to improve their skills. Following the Regulation of the Minister of Health of October 29, 2003 (The Regulation of the Minister of Health of October 29, 2003 on the list of nursing areas and health protection areas for organising specializations and qualifying courses, as well as the specialization framework for nurses and midwives, Journal of Laws/Dz.U. 2003 No. 197 item 1922) and Act of July 15, 2011 (Nurses and Midwives Act of July 15, 2011, Journal of Laws/Dz.U. 2011 No. 174 item 1039), nurses may improve their education through participation in specialist, qualifying and skills improvement courses. In spite of this, graduation from a Master's degree course is perceived as a very attractive mode of education that allows for becoming familiar with interdisciplinary character of the profession and provides future nurses with a broader, in-depth insight into the issues of modern nursing, compared to a purely vocational training offered on a Bachelor's degree programme. A Master's degree course provides its graduates with the basics of conducting research in nursing, which has become an important and developing stream of research; this may be an important incentive for ambitious nurses that are willing to commence a PhD [8, 9]. Considering the above, the key question needs to be asked: to what extent are candidates for a Master's degree prepared to commence a programme that demands a wide scope of initial knowledge and skills?

In the academic year 2000/2001, the Medical University of Warsaw (MUW) (former Academy of Medicine), introduced a Bachelor's programme in Nursing for the first time in its history, and a Master's programme was introduced in 2003/2004. It was necessary to develop an admission policy that will ensure a fair system of selection of the best candidates for a Master's degree programme. In 2009 at the MUW a mini-interview was replaced by a 50-question exam as the key selection criterion. A uniform admission policy was introduced for both full-time and part-time programmes. Due to the fact that a Master programme is offered to a smaller number of students than a much more common Bachelor programme, sear-

Table 1. Characteristics of study group as divided into subgroups with respect to gender and mode of study

Tabela 1. Charakterystyka grupy badanej w podziale na podgrupy względem płci i wyboru formy studiów II stopnia

	Mean age (years)	2009		2010		2011		2012		Total	
		n	%	n	%	n	%	n	%	n	%
Total	27.7	541	–	581	–	492	–	346	–	1960	–
Women	27.8	520	96.1	558	96.0	465	94.5	331	95.7	1874	95.6
Men	25.9	21	3.9	23	4.0	27	5.5	15	4.3	86	4.4
Full-time programme	25.1	294	54.3	421	72.5	279	56.7	163	47.1	1157	59.0
Part-time programme	31.4	247	54.7	160	27.5	213	43.3	183	52.9	803	41.0

ching for an effective selection tool to find the best candidates who, more likely than not, shall achieve professional success on higher levels of nursing management seems to be justified [10].

Aim of the study

The present analysis aimed to compare candidates with reference to their scores on the entrance exam conducted at the Medical University of Warsaw between 2009 and 2012 by the preferred mode of the Master's degree programme in Nursing.

Material and methods

A 4-year retrospective study involved a total of 1960 candidates for a Master's degree programme at the MUW, including 1157 candidates willing to take a full-time course (FT group) and 803 candidates for a part-time course (PT group). Mean ages in both groups amounted to 25.1 SD ± 5.99 (FT) and 31.4 SD ± 9.30 (PT), respectively. Women constituted the vast majority of all candidates (95.6%). See table 1 for detailed data on the groups of candidates) Table 1.

Between 2009 and 2012, the entrance exam comprised 50 tasks in the format of multiple-choice questions (MCQs) with best answer from a list of possible answers. According to the test content outlines, four groups of questions were distinguished in each exam: basic science, health sciences, primary health care, and clinical nursing.

Raw data were pre-processed using TESTY version 7 (Testy komputerowe, Copyright© 1994–2014 by Sławomir Zalewski), which allowed for calculation of quality parameters of the test questions. Information was read in the database, processed in Microsoft Excel 2010 (Microsoft Corporation) and exported to Statistica version 10 (StatSoft, Inc.) for further analysis. The software was used in compliance with the MUW license.

Normal distribution parameters of particular exam results were assessed using the Shapiro-Wilk test. The assessment of the quality of the test exam was conducted with establishing the item easiness and discriminatory power of particular questions, and Cronbach's α-coefficient was estimated (the Kuder-Richardson Formula 20 for a test comprising dichotomous variables) to determine the reliability level of the test [11].

A non-parametric median comparison Mann-Whitney U test was used for comparative analyses of independent samples and the Wilcoxon matched pairs test was used for dependent samples. An analysis of variance ANOVA for a combination of factors and *post-hoc* RIR Tukey honestly significant difference test were used to analyse the significance of differences in the entrance exam scores in the subsequent years.

For all analyses, the a priori level of significance was 0.05.

Results

Both groups of candidates differed significantly with reference to age. Bachelor's degree graduates who wanted to commence a Master's degree programme directly after graduation constituted a majority of the FT group. The PT group was much more significantly diverse in terms of age; there were much more candidates over 31 years of age (Mann-Whitney U test for all years of the study, p < 0.00001).

The analysis of particular exam editions with regard to the nature of the distribution of this variable demonstrated a non-symmetric (skew) data diverging from the normal distribution in most cases (curtosis ≠ 0 and Shapiro-Wilk test, p < 0.05). Reliability of admission tests, measured with Cronbach's α-coefficient, was relatively low and ranged between 0.429 and 0.558. Due to narrow confidence intervals for the mean, it may be assumed that the analysis based on the above data is supposed to be precise.

Particular MCQ exams differed with respect to the scope of variability of the results, which was reflected in different values of coefficients of variation, the range of results, and the scope of scores. Moreover,

Table 2. Characteristics of particular editions of test exam

Tabel 2. Charakterystyka poszczególnych edycji egzaminu testowego

	2009		2010		2011		2012	
	FT	**PT**	**FT**	**PT**	**FT**	**PT**	**FT**	**PT**
Number of questions	50		50		50		50	
Number of options	4		4		5		4	
Number of varieties	3		3		3		3	
Mean (95% CI)	31.0 (30.5–31.5)	29.4 (28.9–29.9)	26.0 (25.6–26.5)	24.7 (24.0–25.4)	24.7 (24.2–25.2)	23.8 (23.3–24.3)	33.6 (33.0–34.2)	29.6 (29.0–30.2)
SD	4.40	4.08	4.57	4.53	4.39	3,80	3.92	4.01
Median	31.0	29.0	26.0	25.0	25.0	24,0	34.0	30.0
Q_1–Q_3	28.0–34.0	26.0–32.0	23.0–29.0	22.0–28.0	22.0–28.0	21,0–26,0	31.0–36.0	27.0–32.0
Range	26.0	23.0	25.0	27.0	24.0	23,0	25.0	26.0
Range of scores	16.0–42.0	18.0–41.0	15.0–40.0	11.0–38.0	13.0–37.0	14,0–37,0	20.0–45.0	15.0–41.0
CV	14.2%	13.89%	17.57%	18.35%	17.77%	15,97%	11.67%	13.56%
Skewness	–0.11	0.19	0.19	–0.10	–0.28	0,28	–0.36	0.05
Curtosis	0.54	–0.11	–0.36	0.77	–0.15	0,67	1.25	0.93
Normal distribution*	$p < 0.05$	$p < 0.05$	$p < 0.05$	$p > 0.05$	$p < 0.05$	$p < 0.05$	$p < 0.05$	$p < 0.05$
Index of test difficulty	0.62	0.59	0.52	0.49	0.49	0.48	0.67	0.59
Cronbach's alpha	0.558		0.546		0.429		0.446	
Number of questions with negative correlation	7		9		10		7	
Cronbach's a after optimization	0.587		0.604		0.523		0.534	

*Shapiro-Wilk test (for $p < 0.05$ distribution is not normal)

FT — full-time studies; PT — part-time studies; CI — confidence interval; SD — standard deviation; Q_1 — first quartile; Q_3 — third quartile; CV — coefficient of variation

a comparison of the FT and PT candidates demonstrated a similar scope of variability of test results within the same exam edition. On the other hand, it was demonstrated that the index of test difficulty was lower in all years in the case of the PT candidates compared to the FT candidates. See table 2 for a list of all results (Table 2).

Figure 1 shows that the mean score on the entrance exam was also higher among the FT group compared to the PT group (analysis of variance ANOVA for a combination of factors, $p < 0.000001$). Significantly higher scores among the FT group compared to the PT group were observed in all years of the study (*post-hoc* RIR Tukey honestly significant difference test, $p < 0.01$).

The analysis of item easiness for particular exam questions included in consecutive exam sets showed that the FT and PT groups differed the most in the case of tasks falling into categories "optimum", "easy", and "very easy". This was particularly well seen in the case of the 2012 exam. The comparison of item easiness of particular questions between the FT and PT groups showed that the exam tasks differed significantly in all years of the study (comparison of dependent samples, the Wilcoxon matched pairs test, $p < 0.01$).

The comparison of the scores obtained by the FT and PT candidates within the selected thematic areas demonstrated significant differences in the case of issues concerning clinical nursing, and lesser diffe-
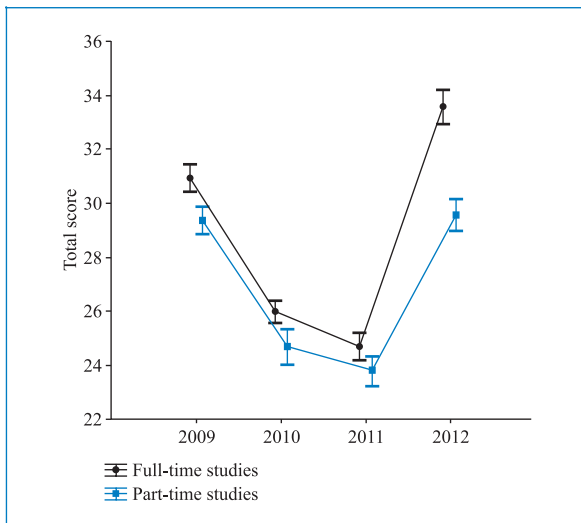
Figure 1. Comparison of total point score obtained by Nursing candidates by mode of study (vertical columns show 95% confidence intervals, factorial ANOVA — Analysing Multiple Factors, $p < 0.000001$)

Rycina 1. Porównanie sumarycznego wyniku punktowego uzyskanego przez kandydatów na studia pielęgniarskie w zależności od wybranej formy studiów (pionowe słupki oznaczają 95% przedziały ufności)

rences were found with reference to basic science. With the increase in the number of clinical questions in the whole pool of exam tasks (1/4 of the entire test in 2009 and as much as 2/3 of the total in 2012), the difference in the score between the FT and PT groups also increased.

Discussion

Following the provisions of the Bologna Declaration, the system of nursing education adopted in Poland comprises two main cycles: the first-degree (bachelor) and the second-degree (master). However, the value of the education level is still measured rather by obtaining a Master's degree than a Bachelor's degree, which is reflected in the small number of Bachelor's degree graduates not commencing a Master's degree programme. Therefore, there is a strong tendency to apply for a Master's programme regardless of a real professional need [12]. The analysis of admission data demonstrated that most candidates for a full-time programme of study decided on this straight after graduation from a BA programme. This was proved by the mean age of candidates in this group as well as a significantly lower standard deviation and the interquartile *range* compared with the candidates for a part-time programme. This confirmed a general tendency among the youth to enrol on a Master's programme just after obtaining a Bachelor's degree [12]. On the other hand, older

persons that constituted the majority among the candidates for a part-time fee-paying programme may have perceived this mode of study as more attractive because of their familial and occupational context. A large number of candidates for a Master programme were professionally active [13], thus, the choice of a particular mode of study might have resulted from a willingness to combine study and work. Graduates from bridge studies that are seeking promotion also might sign up for a part-time course since it is easier to reconcile this type of a course and work. Therefore, it is often a well-considered and reasonable decision to start a part-time course.

On the other hand, irrespective of the mode of study, Nursing graduates with a Master's degree should achieve the same outcomes of education. Determination of the minimum scope of initial knowledge and skills of candidates for a Master's degree programme is thus crucial. Competence of a future student can be assessed by various methods, with an aptitude test being the most popular and reliable [14–18]. It seems to be justified to ask to what extent part-time and full-time students are prepared to start a Master's degree course in Nursing.

Insufficient quality of a selection tool is one of the limitations of test verification of the level of suitability of a candidate to study at a higher education institution. Unfortunately, in the case of the present analysis, the annual entrance exam for a Master's degree course at the MUW is not reliable enough. Repeatability of results obtained under certain conditions is supposed to be an essential element of a good selection procedure. With reference to social research, Babbie [19] indicated prerequisites for reliability: objectivity of the measurement conditions and precision in scoring. The present analysis of reliability conducted with the use of Cronbach's α-coefficient demonstrated that the test exams used between 2009 and 2012 did not meet the assumed reliability criteria (α-coefficient was lower than 0.7). At the value of α of approximately 0.5, random errors constitute half of the variability of results and a measurement in such conditions might be used only for intergroup comparisons and not for individual differentiation [20].

Comparative analyses of the FT and PT groups demonstrated a similar scope of variability of scores obtained by candidates in both groups, which allowed us to assume that the selection tool maintained similar selection properties for both FT and PT groups. The assessment of the total easiness of the exam clearly showed that the FT candidates did better on the test compared with the PT candidates. Since this was observed in all years of the study, it can be assumed that this is a constant feature of the exam differentiating both groups of candidates. A detailed

analysis of particular exam questions demonstrated that the PT candidates had greater difficulties in completing those tasks that, for the FT candidates, were referred to as easy and very easy. This means that there was a certain scope of content of the exam not sufficiently mastered by PT candidates.

The above tendency was also found in a comparative analysis of the scores obtained by both groups with reference to clinical nursing. Despite a higher mean of age among the PT group, which allowed for an assumption that these candidates had longer experience in professional activity, the PT candidates dealt with clinical issues relatively worse. Furthermore, the larger amount of exam questions from this field of knowledge and skills, the more evident was the difference between the FT and PT groups. To some extent, this surprising result may be explained with the problem of "an excessive adjustment" of the exam tool, which is associated with the issue of content validity of the test. It is justified to pose a question whether the difference indeed resulted from the fact that the FT group comprised better candidates for a Master programme or whether they were excessively favoured by the selection criterion. It is problematic to judge whether the selection tool developed by MUW lecturers was not overfitting to the training offered in a Bachelor programme in Nursing. The problem of "an excessive adjustment" was described by Cronbach [21] who pointed to the fact that, if the test content reflects the subject matter covered e.g. in lectures rather than the assumed learning outcomes, then such a tool does not provide valid measurement results. It needs to be remembered that the entrance exam aims not to verify outcomes of education achieved on a Bachelor's degree programme, but to assess whether a candidate has sufficient initial competence necessary to commence a Master programme. Specificity of a particular assessment tool consists in its capacity to select those candidates who are not supposed to be admitted to the programme (negative selection). Criteria of significant specificity are most valuable for the selection of best candidates so that persons with insufficient level of initial competences are not admitted to the course.

If a large part of the discriminatory capacity of the exam test is dependent on the score obtained for clinical issues, it is necessary to critically analyse the purpose of this kind of directed differentiation in the admission test for a Master's degree. To what extent does this kind of test structure refer to actual competence that is important for effective studying on a Master programme? If, as it was stated in the introduction, a Master's degree programme is an essential stage of career development aiming to achieve better positions, particularly with reference

to arrangement and management [8], would it not be advisable to reconsider another admission system for this particular course? On the other hand, if candidates with years of experience encounter difficulties with proficiency in knowledge and skills of clinical issues, this may result from inefficient system of continuing education and improvement of professional competence.

Contemporary nursing is a vast and interdisciplinary field of knowledge that requires considering many different points of view. Perhaps we should, like it is in other countries, revise our postulates concerning the prevalence of higher education at a Master's degree, designating this level of education for more elite and exceptionally talented nurses. This could also contribute to the training of leaders and future mentors in nursing [8].

Conclusions

Considering the limitations associated with the quality of the exam tool, the following needs to be stated: (a) candidates for a full-time programme were better prepared for a Master's degree course compared to those applying to a part-time programme; (b) there is a need for a deep analysis of difficulties encountered by the PT candidates in sufficient mastering of the issues related to clinical nursing, that would also include individual conditioning; (c) there is a need for a broad discussion on the role of a Master programme in educating nursing staff, and clear setting out a development path for this education cycle, particularly with reference to a growing interest in a doctoral programme among nurses with a Master's degree.

Acknowledgments

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