PUBLIKASI JOURNAL OF NURSING REGULATION

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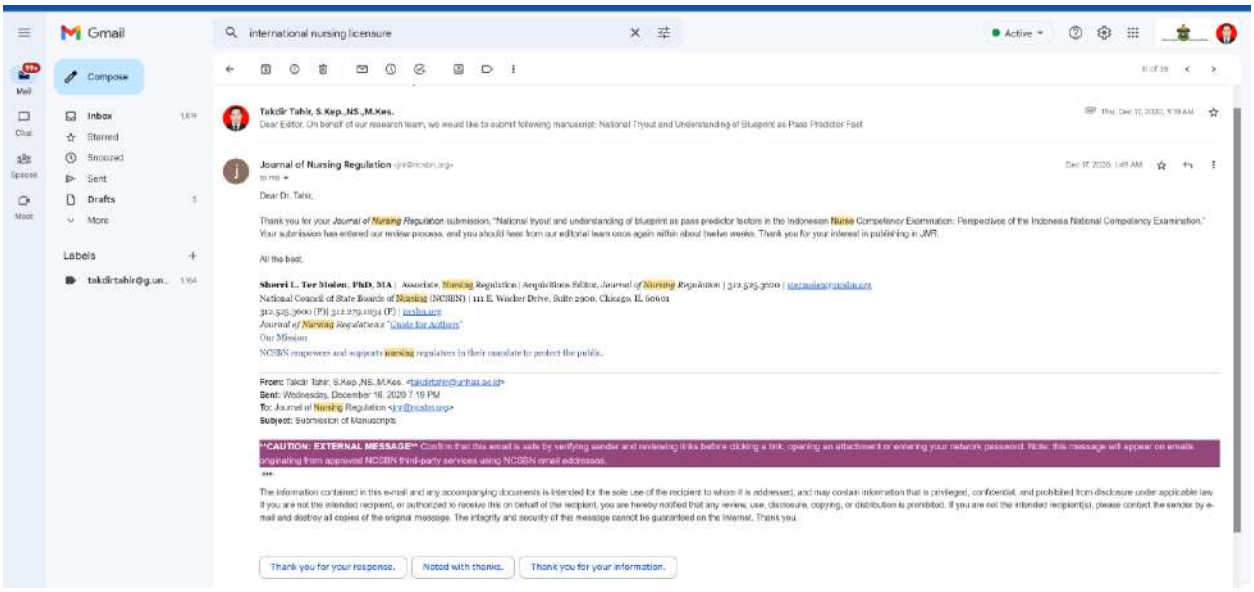

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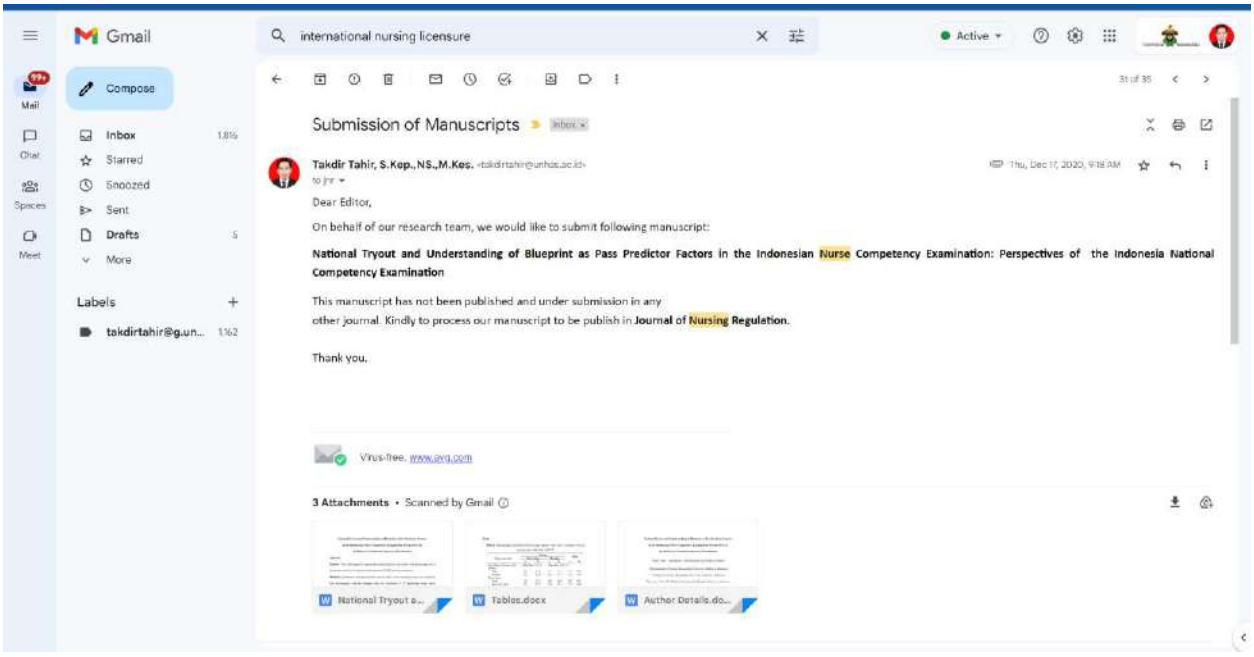

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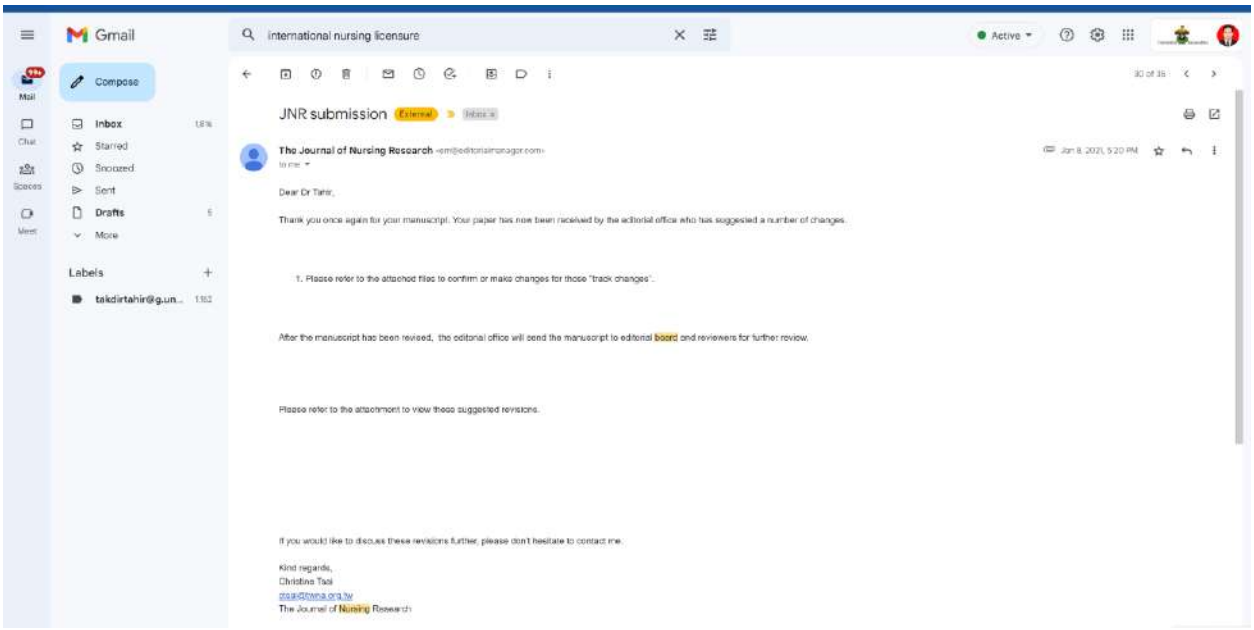

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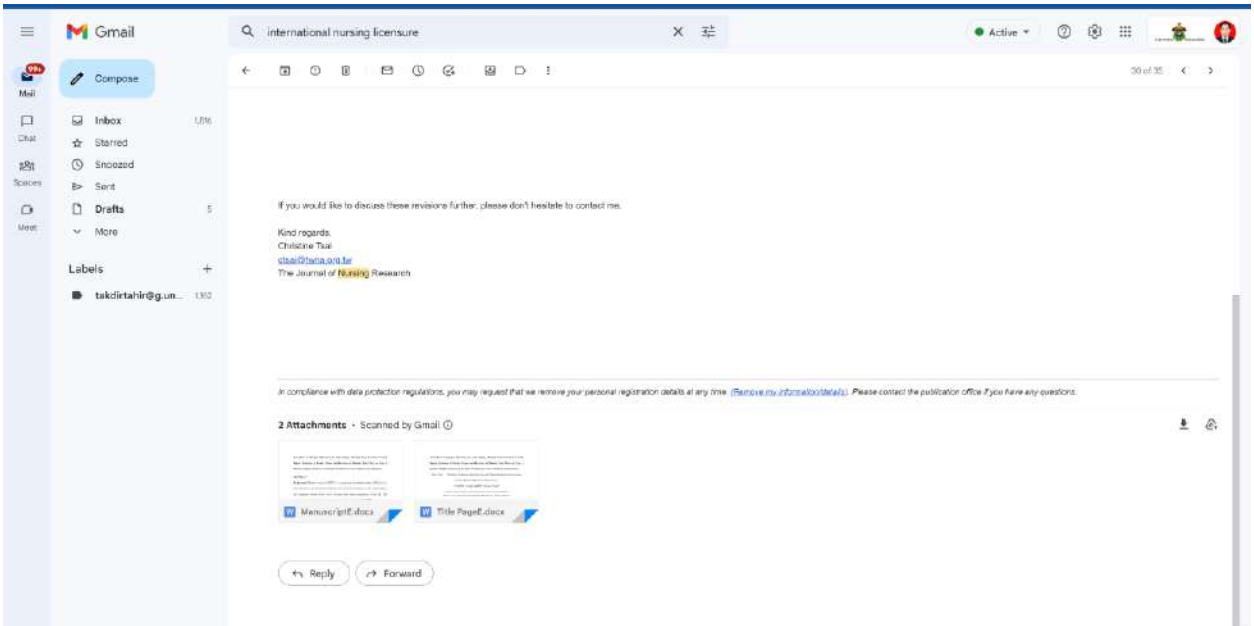

5. 08 Januari 2021 (Lampiran 1: “ManuscriptE.docx”)

The Effect of Buerger Allen Exercise and Channa Albumin Oral Provision towards Repair Perfusion of Perifer Tissue and Recovery of Diabetic Foot Ulcer on Type 2 Diabetes Mellitus Patients in the Rizky Wound Care Center Of Palu City Indonesia

ABSTRACT

Background: Diabetic foot ulcer (DFU) is a complication of diabetes mellitus (DM) such as infection, ulcers, and destruction of deepest skin tissue in the leg due to nerve abnormalities and peripheral arterial blood vessel disorders that require amputation of the leg. The intervention needs to reduce the incidence of amputation in patients with DFU.

Purpose: This study was designed to determine the effect of buerger allen exercise (BAE), channa albumin oral (CAO), and BAE-CAO combination on peripheral tissue perfusion and to identify the recovery of DFU after BAE and CAO intervention on DFU type 2 diabetes mellitus (T2DM).

Methods: Simple random approach was used with 31 DFU T2DM samples. The measurement of ABPI, GDS, albumin on day 0 and posted on day 6 and 14 after BAE and CAO intervention. The wound healing process was measured using the diabetic foot ulcer assessment scale (DFUAS).

Results: The BAE-CAO combination significantly improves peripheral extremity tissue perfusion, the ankle-brachial pressure index (ABPI) score on day 14 P=<0.001. DFU healing, BAE-CAO combination was considerably more reliable on day 14 p-value = <0.001.

Conclusion: The BAE-CAO combination increases peripheral tissue perfusion and heals DFU in T2DM.

Keywords: Buerger Allen exercise, channa albumin oral, peripheral tissue perfusion.

Introduction

Diabetes Mellitus (DM) is a global problem. International Diabetes Federation (IDF) predicts that in 2045 the case of DM will increase to 693 million (Cho et al., 2018). In Indonesia, DM has increased every year especially in Central Sulawesi is 3.7% (Kemenkes RI, 2014). DFU is a complication of DM such as infection, ulcers, and destruction of deepest skin tissue in the leg due to nerve abnormalities and peripheral arterial blood vessel disorders (Chang et al., 2016). DFU problems in diabetic patients impact foot amputation, and that a significant case around 85% (Walsh et al., 2016). DFU begins with impaired peripheral blood perfusion, then foot condition worsens, resulting in patients at high risk of lower extremity amputations and if it happens the mortality rate is high (Kawasaki et al., 2013).

A previous study has shown that DFU occurs every 20 seconds in the world, amputation and 85% faster mortality (Bajwa et al., 2014). one of the nursing interventions for patients with DFU is Buerger Allen Exercise (BAE). An excellent and regular BAE can increase blood vessel vascularization and repair perfusion of the perifer tissue (Huang et al., 2018). Albumin therapy can reduce edema and increase local vascular perfusion (Park et al., 2017).

Methods

This study was used as a probability sampling technique with a simple random sampling approach. Respondent in this research was 31 DFU T2DM respondents at the Rizky Wound Care Center of Palu city Indonesia.

BAE Procedure

The patient in the supine sleeping position and the legs are lifted 45° using a pillow for 5 minutes. The pillow is lowered to hang the side of the bed or sit in a chair for 5 minutes. Then, returning with the supine sleeping position, the legs are covered with a blanket for 5 minutes.

BAE and CAO Combination

BAE was carried out for 20 minutes, 2 times a day for 14 days, CAO administration two times 500mg in the morning and evening for 14 days, peripheral perfusion measurements were taken on day 0 before the intervention, on days 6 and 14 after the intervention.

Data Analysis

Item analysis was performed using SPSS 23.0 (IBM, Inc., Armonk, NY, USA). Pearson Chi-Square Test and One Way Anova was used. DFUAS was performed on day 0 (pre), day 6, and day 14 (post). ABPI measurements used dopler and tensimeter ultrasound.

Ethical Approval

The study was approved by the Medical Faculty of Hasanuddin University (Makassar, Indonesia) Number 957/UN4.6.4.5.31./PP36/2019. All of the participants provided written informed consent.

Results

The study shows different characteristics. The mean of age 59.58 ± 7.05, male (n=22.6%), female (n=77.4%) physical activity (p=1.0000), gender (p=0.182), ethnicity (p=0.499), marital status (p=0.069), education (p=0.395) and occupation (p=0.175) (Table 1).

The result of one way ANOVA analysis shows that there is no difference in blood pressure systole (p=0.402), blood pressure diastole (p=0.124), BMI (p=0.609), duration of DM (p=0.381), insulin therapy (p=0.189), and smoking history (p=0.457). The result of the Pearson Chi-Square analysis shows that blood pressure, BMI, Length of DM, insulin therapy and smoking history are not confounding variables that can influence the results of the study (Table 2).

The mean perfusion of peripheral tissue was measurement using ABPI and it shows there is no difference in wound duration (p=0.219) and causes of ulcer (p=0.22) between the groups. It means the length of wound and purpose of the injury do not become a confounding variable that affects the results of these study (Table 3) and (Table 4).

The results of One Way ANOVA Post Hoc Tambane analysis show that there is a difference in changes DFUAS as an indicator of wound healing, Control group and BAE on day 6 (p=0.030) and day 14 (p: 0.001). There is a difference between the Control and BAE group. CAO combination on day 6 (p=0.035) and day 14 (p<0.001), so that means BAE and CAO effect on wound healing. combination of DFUAS reduction on day 6 and 14 (Table 5).

Discussion

ABPI value pre-test <0.9 is one of the inclusion criteria in this study. Normal ABPI value is ABPI >0.9-1.3 (Chang et al., 2016). The results of this study indicate a change or decrease in ABPI scores after day 6 in control group (0.01 ± 0.30 mg/dl), increase in ABPI scores in BAE group (0.19 ± 0.10 mg/dl), increase in the CAO group (0.07 ± 0.02). In BAE-CAO group increase (0.18 ± 0.10). Likewise on day 14, increase in ABPI in control group (0.02 ± 0.02 mg/dl), BAE group (0.22 ± 0.32 mg/dl), CAO group (0.22 ± 0.32 mg/dl) and the combination BAE-CAO increase in ABPI value (0.32 ± 0.11 mg/dl).

The exciting findings in this study are as follows:

1. The effect of BAE on peripheral perfusion based on ABPI scores between groups found differences in changes in ABPI between the BAE group on day 6 (p=0.003) and day 14 (p=0.026), so that means BAE effects on increase ABPI values.
2. The effect of CAO administration to assess tissue perfusion in this study shows that differences in ABPI changes between the control group and CAO group on day 6 (p=0.034) and day 14 (p=0.043). so that means CAO effect on changes in peripheral tissue perfusion by ABI results.
3. The combined impact of BAE-CAO on peripheral tissue perfusion found increased ABPI on day 6 (-0.18 ± 0.10) and day 14 (-0.32 ± 0.11). Judging from differences in peripheral tissue perfusion by ABPI between groups, there is a significant increase in ABPI on days 6 and 14 (p<0.001).

The effect of BAE in DFU healing based on DFUAS was found to decrease on day 6 with DFUAS value (7.38 ± 1.36), and day 14 (17.50 ± 1.92). A significant influence on peripheral tissue perfusion in macro changes wound healing process based on observation days and healing of diabetic foot injuries in the group.

Conclusion

Based on results of the effect BAE and provision CAO to improve peripheral tissue perfusion and DFU healing, concluded that:

1. BAE improves peripheral extremity tissue perfusion under DFU patients with ABI indicators, BAE increase changes in ABI values in DFS patients.
2. CAO improves peripheral perfusion extremity under DFS patients with ABI indicators, CAO is proven to enhance tissue perfusion with an indicator of increasing ABI values
3. BAE effects on the healing of extremity wounds under DFU patients with DFUAS indicators. That is proven BAE can reduce DFUAS scores.
4. The provision of a single CAO to wound healing of extremities under DFU patients with DFUAS indicators reduces DFUAS scores.
5. BAE-CAO combination on the healing of extremity ulcers under DFU patients with DFUAS indicators can reduce DFUAS scores.

References

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6. 08 Januari 2021 (Lampiran 2: “Title PageE.docx”)

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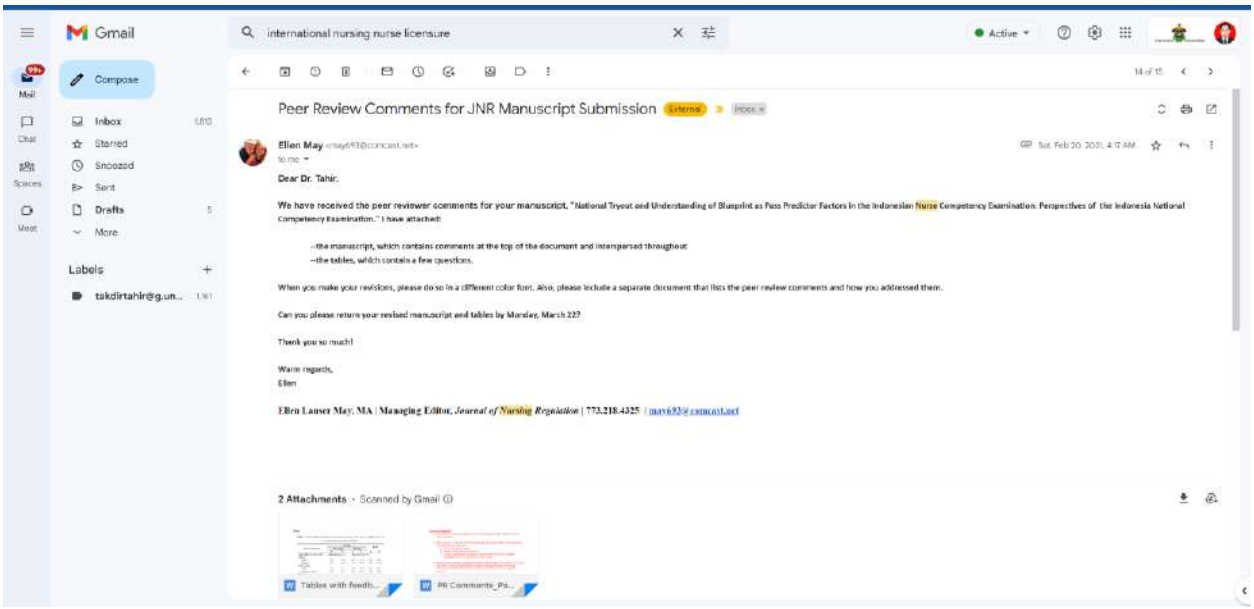
7. 20 Februari 2021



8. 20 Februari 2021 (Lampiran 1: “PR Comments_Pass Predictor Factors with Feedback”)

Pass Predictor Factors in the Indonesian Nurse Competency Examination: Perspectives on the Indonesia National Competency Examination

Abstract:

Purpose: The Indonesian Nurse Competency Examination (INCE) has been designed as a legally defensible, psychometrically sound examination to measure readiness for entry-to-practice. This study aimed to explore the predictor factors associated with the passing rate in the INCE nursing institutions.

Methods: Quantitative nonexperimental research with a cross-sectional design was conducted. The questionnaire with the Guttman scale was distributed to 727 graduating from various nursing institutions in Indonesia between the year of graduation nurse 2012 and 2019 using cluster sampling. Pearson correlation statistical test showed a significant level at p-value = 0.05.

Results: There was a correlation between national predictor exam ($p = 0.002$), understanding of blueprint ($p = 0.001$), nursing professional practice system ($p = 0.001$), institution roles ($p = 0.009$), and nurse academic achievement grade point average (GPA) ($p = 0.000$) with the INCE passing rate.

Conclusion: The success of the INCE is determined by factors of the national predictor exam, understanding of the blueprint, nursing professional practice system, and nurse academic achievement. However, it is necessary to conduct future research related to other factors that can determine the passing rate of the competency examination.

Keywords: Competence examination, National predictor exam, Understanding of blueprint, Nursing professional practice system, Nurse academic achievement.

Introduction

The nursing profession is a component of a professional health service provider that competently fulfills the standards in carrying out professional duties, and must prove competency through competency test evaluation (Valizadeh et al., 2019). The Association of Indonesian Nurse Education Center (AINEC) through the national committee of INCE is charged with the maintenance of minimum practice standards for nurses entering the workforce. The INCE develops psychometrically sound standardized licensure examinations, INCE consistent with the current practice of an entry-level competent nurse is one part of that maintenance. (Haryanti et al., 2016). INCE is dedicated to developing psychometrically sound and legally defensible nurse licensure and certification examinations consistent with current practice (Liu & Aungsuroch, 2018; Kariasa et al., 2019). The purpose of conducting a competency examination is to achieve graduate competency standards as evidenced by a registration certificate, which in this case is the competence of nurse generalists according to the regulation of the minister of health of the Republic of Indonesia number 83 of 2019.

INCE pass rates are likely the most accepted outcome metric for nursing education, as graduates must be licensed for practice. Indonesia is not the only state that implements a competency examination system for health workers to obtain licensed professional practice. Other countries are also conducting competency examinations including China established the National Nursing Licensure Examination (NNLE), the United States of America's National Council Licensure Examination for Registered Nurses (NCLEX -RN), and the Korean Nursing Licensing Examination (Hou et al., 2019). Similar to Indonesia, these states also make competency examination and accreditation status as parameters to determine the quality-

nursing program (Sears et al., 2015).

Besides, the passing score set by the national committee of INCE is 48.33% as a benchmark with a total of 180 questions within 180 minutes using computer-based exams and INCE will be held three times a year (Kariasa et al., 2019). Different states have different regulations related to pass rates. As a result, nursing programs are generally judged on their first-time INCE pass rate. According to data from the secretariat of the INCE committee the average of participants who did not pass the INCE for three periods each year from 2017 was 18,403 out of 58,791 participants, in 2018 it was 19,699 out of 61,834 participants, and in 2019 there were 20,691 out of 59,796 participants. Several factors may be impact of increase failure rate in the INCE, including the absence of an exit exam so that the institution does not feel responsible for passing the student competency test after passing ners. Also, several institutions have not implemented competency test-based questions during lectures so that students are not used to answering competency test questions from an early. Previously published studies showed that until 2018, the low overall competency examination passing rate of under 60% was still a problem (Masfuri, 2018).

Faculty are in the best position to set the competency score. Given the cost of higher education, it seems wise and ethical to provide every resource available to students to assist them with passing competency exams (Smith et al., 2019). The majority of students and faculty are concerned about student performance on the INCE. High failure rates can damage a nursing program's reputation and can cause a possible loss of new students. The low national pass rate influenced by several factors are related to the passing rate of competency examinations in Indonesia including exam readiness, national predictor exam, academic achievement, and institution roles (Hartina et al., 2018). In the United States, several attempts were made before

the implementation of the NCLEX-RN, including clinical nursing courses (a combination of clinical practice and academic theory), meditation to reduce anxiety, and self-efficacy (Daley et al., 2018). Besides, the passing rate also depends on students, supervisors, and institutions maintaining academic and clinical education standards (Christensen, 2018). Another strategy was introduced to improve the passing rate of NCLEX-RN including online coaching, remediation contract, exit examination review, problem-solving and clinical judgment courses, training debriefing competency examination, adaptive quizzing system course and test, educational curriculum, and learning method revision, and students at risk in the adaptive quizzing program and locus of control identification (Mushawwir et al., 2019).

Previous research has reported that students find it easier to answer competency exam questions because students are active and diligent in following a whole series of theories and skills during lectures and have an impact on increasing passing competency exams (Oducado et al., 2019). Likewise, Wardani's research showed that training strategies and motivations such as holding workshops or seminars that discuss tips and tricks for passing competency tests provided by clinical instructors have a great influence on nursing students before taking competency tests (Wardani, 2019). Besides, the maximum learning strategy of students is also an important point to improve the passing rate (Corrigan-Magaldi et al., 2014).

This study aimed to explore the predictors of the INCE passing rate. The results of this study are expected to be an evaluation and reference material to improve the achievement of the INCE passing rate. However, previous study results revealed that many other factors significantly affect the passing rate of a competency examination.

Methods

Ethical statement

The informed consent form was done electronically. The participants were required to fill out an informed consent form by clicking on the "AGREE" button on the screen after reading research information and before being given full access to the instrument. This research was obtaining ethical approval (No.60/H.4.8.4.5.31/PP36-KOMETIK/2019) from the Health Research Ethics Commission of Hasanuddin University.

Study design

Quantitative nonexperimental research with a cross-sectional design was used in this study.

Tools and participants

Two instruments were developed using a Guttman scale for demographic data and questions related to the institution roles, nursing professional practice system, national predictor exam, understanding of blueprint, nurse academic achievement, and physical and psychological conditions. The validity test of the instrument has a product-moment value of 0.83 and data collection was performed using Google Form. The link to the instrument was sent to the faculty and alumni coordinator or person in charge as assigned by the nursing school administrator. The questionnaires were distributed to 727 graduating nurses from 34 nursing institutions in 11 regions in Indonesia between the year of graduation nurse 2012 until 2019 using cluster sampling.

Statistics

Analysis of univariate, bivariate and multivariate statistical data was conducted. Bivariate analysis was performed using the chi-square test with a significance value of $p \leq 0.05$ whereas

multivariate analysis used multiple regression analysis test.

Results

The participants included both first takers (44.70%) and retakers (55.30%). The mean age of participants was 26 years, with minimum and maximum ages of 22–25 and 20–52 years for the first taker and retaker groups, respectively. Most of the respondents (n = 275; 37.5% in the retaker group). were women and had working status Full-time (n = 265; 36.9% in the retaker group). The majority of the respondents worked in hospitals (n = 137; 28.7% in the first taker group). Most of the respondents graduated in 2019 (n = 176; 24.2% in the first taker group) and were retakers more than once (n = 353, 48.2%). Demographic data are presented in (Table 1). Most respondents in both groups came from Sulawesi and Gorontalo regions (n = 442, 60.8%) (Table 2). The correlation of several predictor factors plays an important role in the passing rate of a competency examination. A correlation was found between national predictor exam (p = 0.002), understanding of blueprint (p = 0.001), nursing professional practice system (p = 0.001), institution roles (p = 0.009), and nurse academic achievement (p = 0.000). Meanwhile, there was no correlation between college type and physical and psychological conditions with INCE passing rate (Table 3). The most dominant factors related to the passing rate of INCE after a linear regression analysis of five independent variables. The beta value showed that the national predictor exam is the most correlation factor of INCE at 0.095 (Table 4).

Discussion

Correlation between national predictor exam and INCE passing rate

The national predictor exam involves answering a test of questions before taking the real competency examination (Haryanti et al., 2016). The important component in a predictor exam activity is the development of good quality test questions by the rules of formulating questions

as a test tool, Besides, a predictor exam is a test that is performed before the main exam to provide an overview of the actual test implementation so it needs to be carried out to prospective nursing graduates (Kariasa et al., 2019).

In Indonesia, before the INCE real exam was held, several nursing institutions conducted preparation, including providing debriefing or theoretical review during lectures for approximately two weeks and several institutions giving local predictors exam. In addition, the national committee of INCE also provides opportunities for all institutions to include their students in the predictor exam national-scale which was held three times before INCE. The results of each predictor exam will be announced on the ukners.kemendikbud.go.id website and each institution will provide improvement, re-review the obstacle of the students who did not pass after the predictor exam.

A previous study revealed that 85% of participants who had taken the predictor exam were more ready to take INCE than those who only received an explanation of INCE implementation. Besides, the results of predictor exam evaluation can be used as a predictor for passing INCE (Krisdianto & Kusumawati, 2019). Better predictor exam results will give a greater chance of passing INCE, but worse results may mean a greater chance of failure (Abdillah, 2019). These results agree with previous studies that revealed that 86.4% of participants who passed INCE had higher INCE predictor exam value or equal to the INCE score value and had a 3.4 times greater chance of passing INCE than those whose predictor exam value was lower than the INCE passing score (Nuryati et al., 2020).

Another research supporting the above arguments showed that respondents who took the INCE predictor exam had a 20.69% chance of passing, whereas those who took the INCE predictor exam more than once had 37.5% (Hartina et al., 2018). Students who have

participated in the predictor exam will have a description of the question type and tend to be more prepared when working on the questions than students who have not taken the predictor exam (Cerebus, 2020). The results of the INCE predictor exam can be an evaluation for their success in the competency examination, and the right solution is needed as a form of quality assurance in the provision of future nursing education (Wijaya et al., 2017).

Following the rules of implementing predictor exam as an evaluation ability to answer predictor exam questions, students were given a predictor exam result sheet that contained seven reviews of competency examination questions including competency area, competency domain, scientific field, nursing process, health effort, and basic human needs (Kariasa et al., 2019). Based on this review, students and lecturers can improve these items so that they can maximize the preparation of taking the actual INCE (Abdillah, 2019). The NCLEX-RN at health institutions in India combines predictor exams as a measure of readiness to take competency tests with online coaching. If the predictor exam results match the competency test standards, students can take NCLEX-RN (Krisdianto & Kusumawati, 2019).

Correlation between understanding of blueprint and INCE passing rate

A blueprint is a basic framework or guideline used to design the development of competency exam questions. Blueprint can provide information on the area, a description of the material being tested, and an overview of the test methods to be used, and references to (Kariasa et al., 2019). Understanding the blueprint as a prediction factor becomes an important point for readiness to take INCE (Krisdianto & Kusumawati, 2019). These with previous studies that found that good readiness of participants is directly proportional to the INCE results and better exam preparation will provide an opportunity to pass INCE. Some aspects that become the core

of readiness include cognitive maturity and physical and psychological readiness (Wardani, 2019).

Cognitive readiness requires an understanding of a blueprint that contains the scope of competency test questions, a total of packages, item questions, and a strategy to answer each question that becomes focus items before INCE (Kariasa et al., 2019). Understanding of the blueprint is obtained through training courses of competency examinations or clinical registration (Wardani, 2019). The implementation of the NCLEX-RN also requires all students to take a competency examination training course to assess the acquisition of individual knowledge and implement strategies to correct knowledge gaps, and this meeting reviews the content of the material, blueprint conducting competency examination, and online examinations for NCLEX-RN preparation (Cole & Adams, 2014).

A previous study on post-NCLEX-RN students revealed that failure is caused by a lack of optimal preparation in terms of cognitive abilities such as a blueprint of competency examination and nursing material as students were confused and doubtful in answering correctly during the implementation process (Monroe, 2019). Another study supported that understanding of blueprint influenced NCLEX-RN national passing rates from 83.82% to 87.0% in examined groups of students with maximum readiness such as understanding of blueprint, NCLEX-RN implementation process, grid, and strategy of answering each review question (Frith et al., 2018). A study in line with a literature review found cognitive readiness as an important factor in passing INCE (Krisdianto & Kusumawati, 2019).

Correlation between nursing professional practice system and INCE passing rate

There are downside risks of INCE failure to the student, the school where the student attended, and, in some cases, the employer. The integrated curriculum must conduct continuing education

on the professional level (Haryanti et al., 2016). Nursing professional practice is a practical activity in hospitals with the implementation of theory during academic learning (Lestari, 2017). Besides, professional practice in hospitals can train professional development, and care skills, and hone analytical skills in solving various real cases both in the hospital and community (Haryanti et al., 2016).

Given the importance of this exam, one way to help ensure knowledge and skill development during the education process is the implementation of professionally developed standardized tests. These tests can identify weak areas for students and have excellent predictive validity to passing the INCE. A previous study has revealed that the seriousness of institutions in preparing students to take a competency examination is required to increase the passing rate percentage. The preparation can be done through academic stages and nursing professional practice systems in a hospital or community (Lukmanulhakim & Pusporini, 2018). An online study has shown that gaining competence, theory, and learning experience in practical fields that support the growth and development of professional abilities is needed by every student. Integrating academic education and nursing professional practice system is a standard curriculum between theory in the academic stage and clinical experience in the professional practice stage (Czekanski et al., 2018).

Nursing professional practice plays an important role in increasing graduation because the items to be tested in the INCE are based on the real cases of the patient being treated in the hospital (the patient's illness, medical history, etc.) what care is given while in the hospital until the patient's problem is resolved. Students who have followed the nursing professional practice stage will be accustomed to dealing with real patient cases so that the positive impact can make it easier for students to answer competency exam questions and have the opportunity to pass.

Educational curriculum development is a strategy that strengthens student knowledge by constructing curriculum contents that reflect the essence of education of professional nurses and other professional standards (Shoemaker et al., 2017). In addition to an integrated curriculum, teaching strategies that enhance student skills in critical thinking and reflection such as concept mapping, case reflection, disease history data, analysis, nursing problem determination, and nursing care management can help prepare students to answer competency test questions, and these teaching strategies are obtained while undergoing professional education (Corrigan-Magaldi et al., 2014).

The preparation strategy implemented at Alabama University for NCLEX-RN includes the application of a clinical nursing course, which is a combination of clinical and theoretical activities at one time, classroom lectures, and discussion of case studies, simulations, and other interactive learning strategies. Students are also assigned to conduct case studies outside the classroom, which allowed students to gain clinical reasoning based on existing theoretical concepts. At the end of the program, students will take an exit exam to assess their ability, and the passing grade scores are adjusted to the passing grade competency examination scores (Mager et al., 2017).

Correlation between institution roles and INCE passing rate

Based on the results of this study, the institution's role is correlated with the INCE passing rate ($p = 0.009$). A previous study identified extrinsic factors that contributed to the success of competency examination, including the ability of the institution's manager or lecturer to prepare students from the first to the final semesters and to strengthen learning strategies (Wardani, 2019). A previous study also revealed that nursing managers must be advanced in terms of providing the best facilities and infrastructure in the learning process by using the

latest information technology and updating learning resources (Corrigan-Magaldi et al., 2014). In addition, using software and skilled managing information technology in examinations will help students succeed in examinations, especially in computer-based exams (Pence & Wood, 2018).

The results of previous studies agree with the results of this study that the success of competency examination depends on a combination of mentoring and teaching-learning strategies conducted by the institution to help students be confident and critical thinkers. Student involvement, a supportive learning environment, and weekly follow-up by the faculty turned out to be beneficial for the development, retention, and achievement of students in competency examination (Corrigan-Magaldi et al., 2014).

Correlation between nurse academic achievement and INCE passing rate

The graduation requirement for the nursing profession program is determined by results of nurse academic achievement or grade point average (GPA) that illustrate cognitive abilities and skills. Nurse academic achievement is the success of learning achievement (Fajar et al., 2019). Students with a high GPA at academic and professional stages have high motivation to study diligently in a cognitive, affective, and psychomotor manner, and they tend to have good intellectual and technical analysis and concept (Kim et al., 2019). A previous qualitative study has shown that higher nurse academic achievement means a higher opportunity to pass a competency examination (Hartina et al., 2018). Academic ability in theory and skill determines the passing of competency examination (Krisdianto & Kusumawati, 2019). Similarly, the results of a previous study revealed that the passing of INCE is influenced by nurse academic achievement (Czekanski et al., 2018). High academic ability in theory that is assessed based on GPA generally passed the competency examination (Syah, 2018).

Through an objective assessment, students will get different GPA results depending on achievements and activities possessed by each student in a series of nursing professional practices that are an output of the learning process (Kim et al., 2019). Learning achievements or outcomes are the realizations of potential skills or capacities, and learning outcomes are judged on the ability of knowledge, thinking skills, and motor skills (Carrick, 2017).

Limitations

The limitation in this study is the participants do not represent all Regions that are members of AINEC.

Conclusion

Overall, several predictor factors that contribute to the success of the INCE are the national predictor exam, understanding of the blueprint, nursing professional practice system, and nurse academic achievement. However, it is necessary to conduct future research related to other factors that can determine the passing rate of the competency test is necessary. The results of this study are expected to become supporting data for system improvement in institutions to better prepare students for INCE, application case-based questions during lecture exams as well as guidance before taking INCE. Also, this research can be an input for students to better prepare themselves before facing INCE.

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Tables

Table 1. Demographic distribution based on age, gender, work status, workplace, year of passing nurse and status of INCE

Characteristics	Group				Total	
	First taker		Retaker			
	n	%	n	%	n	%
Age (Mean 26 years old)	Min-Max (22-55)		Min-Max (20-52)			
Gender						
Male	88	12.1	127	17.5	215	29.6
Female	237	32.6	275	37.5	512	70.4
Work status						
work	234	32.2	268	36.9	502	69.1
Does not work	91	12.5	134	18.3	225	30.9
Workplace						
Hospital	137	28.7	89	18.7	226	47.4
Public health center	34	7.1	107	22.4	141	29.6
Care clinic	36	7.5	21	4.4	57	11.9
Home Care	3	0.6	1	0.2	4	0.8
Public health Office	5	1.0	14	2.9	19	4.0
Company	4	0.8	4	0.8	8	1.7
Administration	2	0.4	8	1.7	10	2.1
Educational Institution	3	0.6	6	1.3	9	1.9
Year of graduation nurse						
2019	176	24.2	27	3.7	203	27.9
2018	65	8.9	24	3.3	89	12.1
2017	42	5.8	25	3.4	67	9.2
2016	29	4.0	152	20.7	181	24.7
2015	9	1.2	106	14.5	115	15.7
2014	2	0.3	58	7.9	60	8.2
2013	0	0.0	7	1.0	7	1.0
2012	2	0.3	3	0.4	5	0.7
Status of INCE						
First taker	325	44.7	0	0.0	325	44.7
Retaker	0	0.0	50	6.8	50	6.8
Retaker more than once	0	0.0	353	48.2	353	48.2

Table 2. Respondents by region

Region	Group				Total	
	First taker		Retaker			
	n	%	n	%	n	%
Sulawesi and Gorontalo	136	18.7	306	42.1	442	60.8
Jawa and Banten	62	8.5	21	2.9	83	11.4
Sumatera (Lampung, Sumut and Aceh)	18	2.5	57	7.8	75	10.3
Bali and Nusa Tenggara Barat	71	9.8	7	1.0	78	10.7
Maluku and Papua	38	5.2	11	1.5	49	6.7

Table 4. Multiple linear regression test

Variables	Unstandardized Coefficients		Standardized Coefficient	*t*	Sig.
	B	std.error	Beta		
Institution roles	.109	.046	.083	2.360	.019
Nursing professional practice system	.181	.085	.075	2.128	.034
National predictor exam	-.076	.029	-.095*	-2.604	.009
Understanding of blueprint	-.088	.034	-.088	-2.560	.011
Nurse academic achievement	-.168	.016	-.361	-10.569	.000

Table 3. Correlation several predictor factors in the INCE

Characteristics	Group				Total		P-value
	First taker		Retaker				
	n	%	n	%	n	%	
Institution roles							
Good	282	38.8	319	43.5	601	82.7	0.009*
Less	43	5.9	83	11.4	126	17.3	
Nursing professional practice system							
Standard	320	44.0	375	51.6	695	95.6	0.001*
Non standard	5	0.7	27	3.7	32	4.4	
National predictor exam							
Never	33	4.5	73	10.1	106	14.6	
One time	195	26.8	240	33.0	435	59.8	0.002*
More than once	97	13.3	89	12.2	186	25.6	
BluePrint UKNI							
Understand	162	22.3	250	34.4	412	56.7	0.001*
Not understand	163	22.4	152	20.9	315	43.3	
Nurse academic achievement GPA average							
3.00-3.25	14	1.9	78	10.7	92	12.7	
3.26-3.50	46	6.3	116	16.0	162	22.3	0.000*
3.51-3.75	72	9.0	99	13.5	171	23.5	
3.76-4.00	193	26.5	109	15.0	302	41.5	
College							
State University	86	11.8	93	12.8	179	24.6	0.301
Private university	239	32.9	309	42.5	548	75.4	
Psychological Factors							
Anxious	295	40.6	349	48.0	644	88.6	0.096
Not worried	30	4.1	53	7.2	83	11.3	
Physical condition							
Healthy	316	43.5	387	53.2	703	96.7	0.470
Sick	9	1.2	15	2.0	24	3.3	

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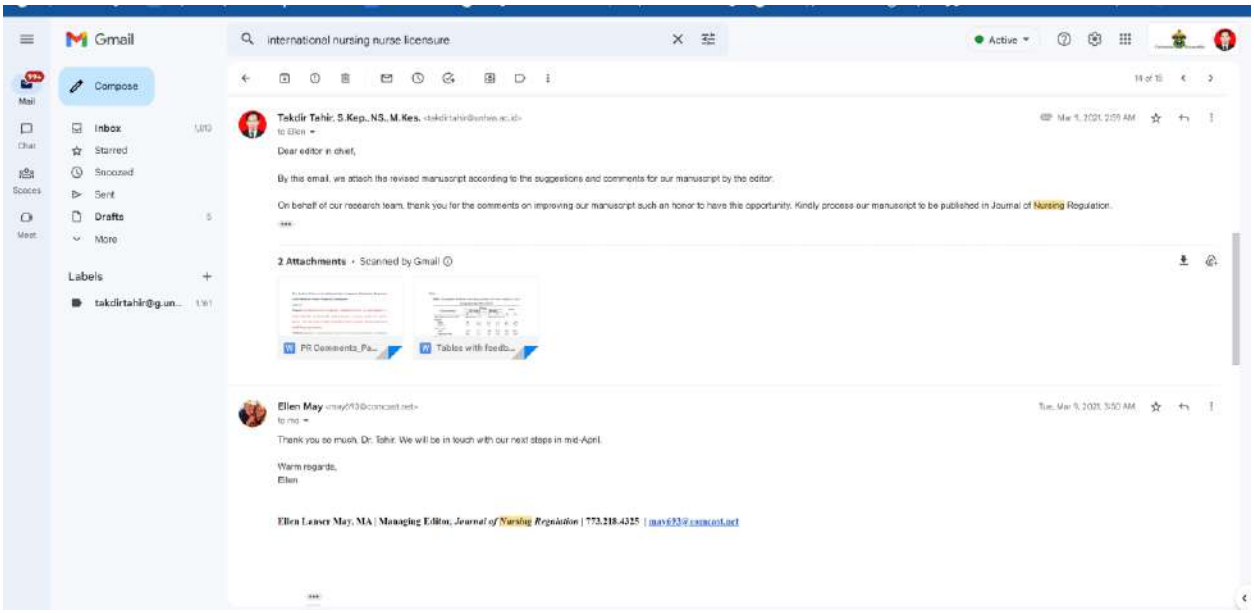

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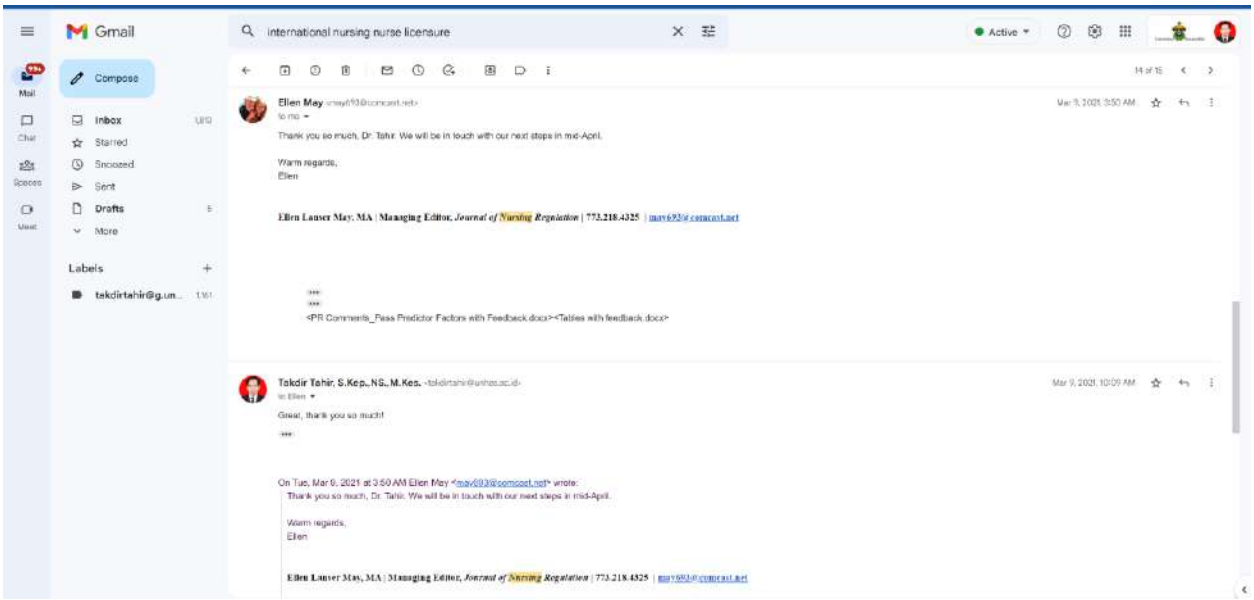

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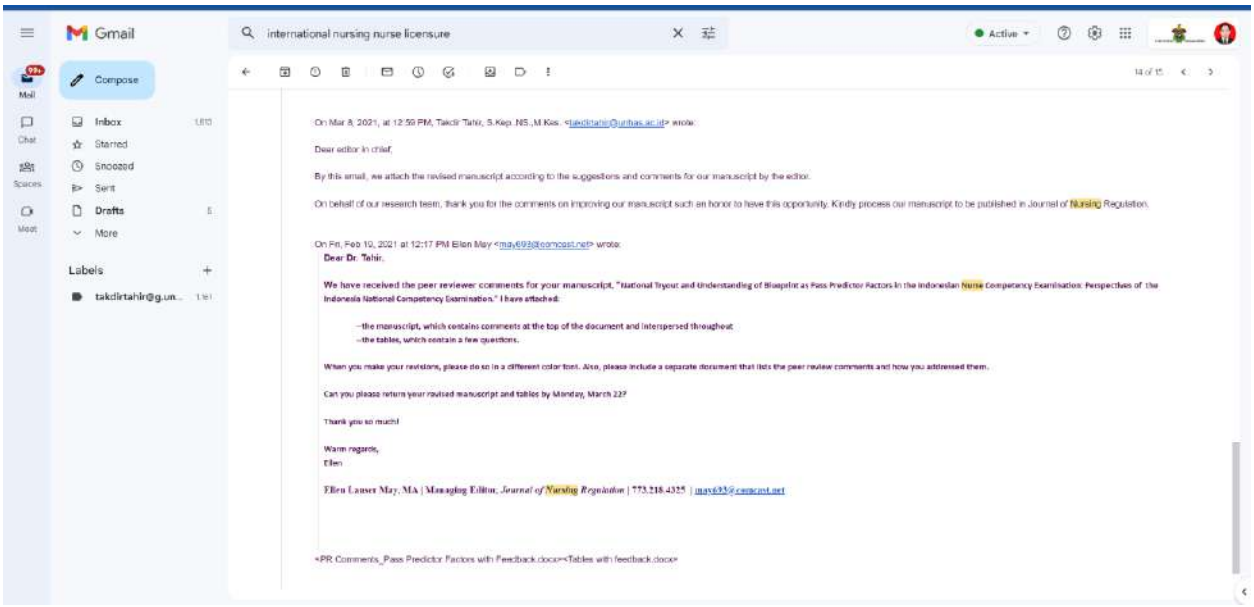

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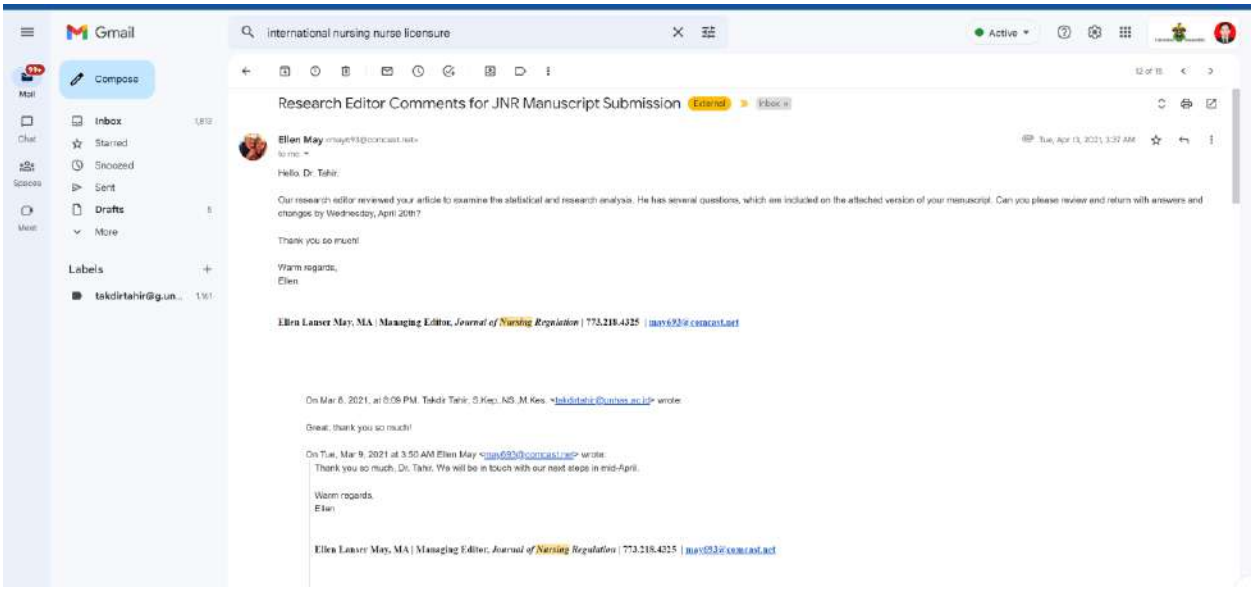

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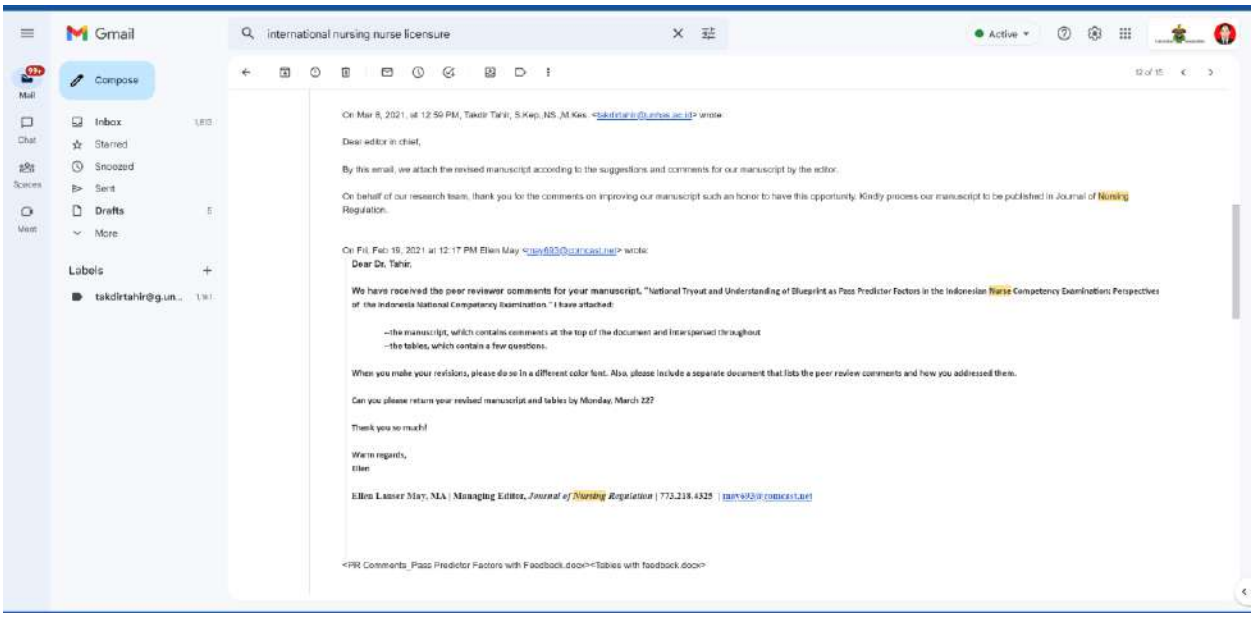

15. 13 April 2021 (2) (Lamp. 1: “Tahir Manuscript with Questions from Research Editor_0412”)

Pass Correlational Factors in the Indonesian Nurse Competency Examination: Perspectives on the Indonesia National Competency Examination

Abstract:

Purpose: The Indonesian Nurse Competency Examination (INCE) has been designed as a legally defensible, psychometrically sound examination to measure readiness for entry-to-practice. This study aimed to explore the predictor factors associated with the passing rate in the INCE nursing institutions.

Methods: Quantitative nonexperimental research with a cross-sectional design was conducted. The questionnaire with the Guttman scale was distributed to 727 graduating from various nursing institutions in Indonesia between the year of graduation nurse 2012 and 2019 using cluster sampling. Pearson correlation statistical test showed a significant level at p-value = 0.05.

Results: There was a correlation between national predictor exam ($p = 0.002$), understanding of blueprint ($p = 0.001$), nursing professional practice system ($p = 0.001$), institution roles ($p = 0.009$), and nurse academic achievement grade point average (GPA) ($p = 0.000$) with the INCE passing rate.

Conclusion: The success of the INCE is determined by factors of the national predictor exam, understanding of the blueprint, nursing professional practice system, and nurse academic achievement. However, it is necessary to conduct future research related to other factors that can determine the passing rate of the competency examination.

Keywords: Competence examination, National predictor exam, Understanding of blueprint, Nursing professional practice system, Nurse academic achievement.

Introduction

The nursing profession is a component of a professional health service provider that competently fulfills the standards in carrying out professional duties, and must prove competency through competency test evaluation (Valizadeh et al., 2019). The Association of Indonesian Nurse Education Center (AINEC) through the national committee of INCE is charged with the maintenance of minimum practice standards for nurses entering the workforce. The INCE develops psychometrically sound standardized licensure examinations, INCE consistent with the current practice of an entry-level competent nurse is one part of that maintenance. (Haryanti et al., 2016). INCE is dedicated to developing psychometrically sound and legally defensible nurse licensure and certification examinations consistent with current practice (Liu & Aungsuroch, 2018; Kariasa et al., 2019). The purpose of conducting a competency examination is to achieve graduate competency standards as evidenced by a registration certificate, which in this case is the competence of nurse generalists according to the regulation of the minister of health of the Republic of Indonesia number 83 of 2019.

INCE pass rates are likely the most accepted outcome metric for nursing education, as graduates must be licensed for practice. Indonesia is not the only state that implements a competency examination system for health workers to obtain licensed professional practice. Other countries are also conducting competency examinations including China established the National Nursing Licensure Examination (NNLE), the United States of America's National

Council Licensure Examination for Registered Nurses (NCLEX -RN), and the Korean Nursing Licensing Examination (Hou et al., 2019). Similar to Indonesia, these states also make competency examination and accreditation status as parameters to determine the quality-nursing program (Sears et al., 2015).

Besides, the passing score set by the national committee of INCE is 48.33% as a benchmark with a total of 180 questions within 180 minutes using computer-based exams and INCE will be held three times a year (Kariasa et al., 2019). Different states have different regulations related to pass rates. As a result, nursing programs are generally judged on their first-time INCE pass rate. According to data from the secretariat of the INCE committee the average of participants who did not pass the INCE for three periods each year from 2017 was 18,403 out of 58,791 participants, in 2018 it was 19,699 out of 61,834 participants, and in 2019 there were 20,691 out of 59,796 participants. Several factors may be impact of increase failure rate in the INCE, including the absence of an exit exam so that the institution does not feel responsible for passing the student competency test after passing ners. Also, several institutions have not implemented competency test-based questions during lectures so that students are not used to answering competency test questions from an early. Previously published studies showed that until 2018, the low overall competency examination passing rate of under 60% was still a problem (Masfuri, 2018).

Faculty are in the best position to set the competency score. Given the cost of higher education, it seems wise and ethical to provide every resource available to students to assist them with passing competency exams (Smith et al., 2019). The majority of students and faculty are concerned about student performance on the INCE. High failure rates can damage a nursing

program's reputation and can cause a possible loss of new students. The low national pass rate influenced by several factors are related to the passing rate of competency examinations in Indonesia including exam readiness, national predictor exam, academic achievement, and institution roles (Hartina et al., 2018). In the United States, several attempts were made before the implementation of the NCLEX-RN, including clinical nursing courses (a combination of clinical practice and academic theory), meditation to reduce anxiety, and self-efficacy (Daley et al., 2018). Besides, the passing rate also depends on students, supervisors, and institutions maintaining academic and clinical education standards (Christensen, 2018). Another strategy was introduced to improve the passing rate of NCLEX-RN including online coaching, remediation contract, exit examination review, problem-solving and clinical judgment courses, training debriefing competency examination, adaptive quizzing system course and test, educational curriculum, and learning method revision, and students at risk in the adaptive quizzing program and locus of control identification (Mushawwir et al., 2019).

Previous research has reported that students find it easier to answer competency exam questions because students are active and diligent in following a whole series of theories and skills during lectures and have an impact on increasing passing competency exams (Oducado et al., 2019). Likewise, Wardani's research showed that training strategies and motivations such as holding workshops or seminars that discuss tips and tricks for passing competency tests provided by clinical instructors have a great influence on nursing students before taking competency tests (Wardani, 2019). Besides, the maximum learning strategy of students is also an important point to improve the passing rate (Corrigan-Magaldi et al., 2014).

This study aimed to explore the predictors of the INCE passing rate. The results of this

study are expected to be an evaluation and reference material to improve the achievement of the INCE passing rate. However, previous study results revealed that many other factors significantly affect the passing rate of a competency examination.

Methods

Ethical statement

The informed consent form was done electronically. The participants were required to fill out an informed consent form by clicking on the "AGREE" button on the screen after reading research information and before being given full access to the instrument. This research was obtaining ethical approval (No.60/H.4.8.4.5.31/PP36-KOMETIK/2019) from the Health Research Ethics Commission of Hasanuddin University.

Study design

Quantitative nonexperimental research with a cross-sectional design was used in this study.

Tools and participants

Two instruments were developed using a Guttman scale for demographic data and questions related to the institution roles, nursing professional practice system, national predictor exam, understanding of blueprint, nurse academic achievement, and physical and psychological conditions. The validity test of the instrument has a product-moment value of 0.83 and data collection was performed using Google Form. The link to the instrument was sent to the faculty and alumni coordinator or person in charge as assigned by the nursing school administrator.

The questionnaires were distributed to 727 graduating nurses from 34 nursing institutions in 11 regions in Indonesia between the year of graduation nurse 2012 until 2019 using cluster sampling.

Statistics

Univariable and multivariable statistical analyses were conducted. Bivariate comparisons were performed using the chi-square test with a significance value of $p \leq 0.05$ whereas multivariable analysis used multiple regression analysis test.

Results

The participants included both first takers (44.70%) and retakers (55.30%). The mean age of participants was 26 years, with minimum and maximum ages of 22–25 and 20–52 years for the first taker and retaker groups, respectively. Most of the respondents (n = 275; 37.5% in the retaker group) were women and had working status of Full-time (n = 265; 36.9% in the retaker group). The majority of the respondents worked in hospitals (n = 137; 28.7% in the first taker group). Most of the respondents graduated in 2019 (n = 176; 24.2% in the first taker group) and were retakers (n = 353, 48.2%). Demographic data are presented in (Table 1). Most respondents in both groups came from Sulawesi and Gorontalo regions (n = 442, 60.8%) (Table 2). A correlation was found between national predictor exam (p = 0.002), understanding of blueprint (p = 0.001), nursing professional practice system (p = 0.001), institution roles (p = 0.009), and nurse academic achievement (p = 0.000). Meanwhile, there was no correlation between college type and physical and psychological conditions with INCE passing rate (Table 3). The most dominant factors related to the passing rate of INCE after a linear regression analysis of five

independent variables. The beta value showed that the national predictor exam is the most correlation factor of INCE at 0.095 (Table 4).

Discussion

Correlation between national predictor exam and INCE passing rate

The national predictor exam involves answering a test of questions before taking the real competency examination (Haryanti et al., 2016). The important component in a predictor exam activity is the development of good quality test questions by the rules of formulating questions as a test tool; a predictor exam is a test that is performed before the main exam to provide an overview of the actual test implementation so it needs to be carried out to prospective nursing graduates (Kariasa et al., 2019).

In Indonesia, before the INCE real exam was held, several nursing institutions conducted preparation, including providing debriefing or theoretical review during lectures for approximately two weeks and several institutions giving local predictors exam. In addition, the national committee of INCE also provides opportunities for all institutions to include their students in the predictor exam national-scale which was held three times before INCE. The results of each predictor exam will be announced on the ukners.kemendikbud.go.id website and each institution will provide improvement, re-review the obstacle of the students who did not pass after the predictor exam.

A previous study revealed that 85% of participants who had taken the predictor exam were more ready to take INCE than those who only received an explanation of INCE implementation. Furthermore, the results of predictor exam evaluation can be used as a

predictor for passing INCE (Krisdianto & Kusumawati, 2019). Better predictor exam results will give a greater chance of passing INCE, but worse results may mean a greater chance of failure (Abdillah, 2019). These results agree with previous studies that revealed that 86.4% of participants who passed INCE had higher INCE predictor exam value or equal to the INCE score value and had a 3.4 times greater chance of passing INCE than those whose predictor exam value was lower than the INCE passing score (Nuryati et al., 2020).

Another research supporting the above arguments showed that respondents who took the INCE predictor exam had a 20.69% chance of passing, whereas those who took the INCE predictor exam more than once had 37.5% (Hartina et al., 2018). Students who have participated in the predictor exam will have a description of the question type and tend to be more prepared when working on the questions than students who have not taken the predictor exam (Cerebus, 2020). The results of the INCE predictor exam can be an evaluation for their success in the competency examination, and the right solution is needed as a form of quality assurance in the provision of future nursing education (Wijaya et al., 2017).

Following the rules of implementing predictor exam as an evaluation ability to answer predictor exam questions, students were given a predictor exam result sheet that contained seven reviews of competency examination questions including competency area, competency domain, scientific field, nursing process, health effort, and basic human needs (Kariasa et al., 2019). Based on this review, students and lecturers can improve these items so that they can maximize the preparation of taking the actual INCE (Abdillah, 2019). The NCLEX-RN at health institutions in India combines predictor exams as a measure of readiness to take

competency tests with online coaching. If the predictor exam results match the competency test standards, students can take NCLEX-RN (Krisdianto & Kusumawati, 2019).

Correlation between understanding of blueprint and INCE passing rate

A blueprint is a basic framework or guideline used to design the development of competency exam questions. Blueprint can provide information on the area, a description of the material being tested, and an overview of the test methods to be used, and references to (Kariasa et al., 2019). Understanding the blueprint as a prediction factor becomes an important point for readiness to take INCE (Krisdianto & Kusumawati, 2019). These with previous studies that found that good readiness of participants is directly proportional to the INCE results and better exam preparation will provide an opportunity to pass INCE. Some aspects that become the core of readiness include cognitive maturity and physical and psychological readiness (Wardani, 2019).

Cognitive readiness requires an understanding of a blueprint that contains the scope of competency test questions, a total of packages, item questions, and a strategy to answer each question that becomes focus items before INCE (Kariasa et al., 2019). Understanding of the blueprint is obtained through training courses of competency examinations or clinical registration (Wardani, 2019). The implementation of the NCLEX-RN also requires all students to take a competency examination training course to assess the acquisition of individual knowledge and implement strategies to correct knowledge gaps, and this meeting reviews the content of the material, blueprint conducting competency examination, and online examinations for NCLEX-RN preparation (Cole & Adams, 2014).

A previous study on post-NCLEX-RN students revealed that failure is caused by a lack of optimal preparation in **Tables**

Table 1. Demographic distribution based on age, gender, work status, workplace, year of passing nurse and status of INCE

Characteristics	Group				Article I.		Total
	First taker		Retaker				
	n	%	n	%	n	%	
Age (Mean 26 years old)	Min-Max (22-55)		Min-Max (20-52)				
Gender							
Male	88	12.1	127	17.5	215	29.6	
Female	237	32.6	275	37.5	512	70.4	
Work status							
work	234	32.2	268	36.9	502	69.1	
Does not work	91	12.5	134	18.3	225	30.9	
Workplace							
Hospital	137	28.7	89	18.7	226	47.4	
Public health center	34	7.1	107	22.4	141	29.6	
Care clinic	36	7.5	21	4.4	57	11.9	
Home Care	3	0.6	1	0.2	4	0.8	
Public health Office	5	1.0	14	2.9	19	4.0	
Company	4	0.8	4	0.8	8	1.7	
Administration	2	0.4	8	1.7	10	2.1	
Educational Institution	3	0.6	6	1.3	9	1.9	
Year of graduation nurse							
2019	176	24.2	27	3.7	203	27.9	
2018	65	8.9	24	3.3	89	12.1	
2017	42	5.8	25	3.4	67	9.2	
2016	29	4.0	152	20.7	181	24.7	
2015	9	1.2	106	14.5	115	15.7	
2014	2	0.3	58	7.9	60	8.2	
2013	0	0.0	7	1.0	7	1.0	
2012	2	0.3	3	0.4	5	0.7	
Status of INCE							
First taker	325	44.7	0	0.0	325	44.7	
Retaker	0	0.0	50	6.8	50	6.8	
Retaker more than once	0	0.0	353	48.2	353	48.2	

Table 2. Respondents by region

Region	Group				Article II. Total	
	First taker		Retaker			
	n	%	n	%	n	%
Sulawesi and Gorontalo	136	18.7	306	42.1	442	60.8
Jawa and Banten	62	8.5	21	2.9	83	11.4
Sumatera (Lampung, Sumut and Aceh)	18	2.5	57	7.8	75	10.3
Bali and Nusa Tenggara Barat	71	9.8	7	1.0	78	10.7
Maluku and Papua	38	5.2	11	1.5	49	6.7

Table 4. Multiple linear regression test

Variables	Unstandardized Coefficients		Standardized Coefficient	*t*	Sig.
	B	std.error	Beta		
Institution roles	.109	.046	.083	2.360	.019
Nursing professional practice system	.181	.085	.075	2.128	.034
National predictor exam	-.076	.029	-.095*	-2.604	.009
Understanding of blueprint	-.088	.034	-.088	-2.560	.011
Nurse academic achievement	-.168	.016	-.361	-10.569	.000

Table 3. Correlation several predictor factors in the INCE

Characteristics	Group				Article III. Total		Article IV. P-value
	First taker		Retaker				
	n	%	n	%	n	%	
Institution roles							
Good	282	38.8	319	43.5	601	82.7	0.009*
Less	43	5.9	83	11.4	126	17.3	
Nursing professional practice system							
Standard	320	44.0	375	51.6	695	95.6	0.001*
Non standard	5	0.7	27	3.7	32	4.4	
National predictor exam							
Never	33	4.5	73	10.1	106	14.6	
One time	195	26.8	240	33.0	435	59.8	0.002*
More than once	97	13.3	89	12.2	186	25.6	
BluePrint UKNI							
Understand	162	22.3	250	34.4	412	56.7	0.001*
Not understand	163	22.4	152	20.9	315	43.3	
Nurse academic achievement GPA average							
3.00-3.25	14	1.9	78	10.7	92	12.7	
3.26-3.50	46	6.3	116	16.0	162	22.3	0.000*
3.51-3.75	72	9.0	99	13.5	171	23.5	
3.76-4.00	193	26.5	109	15.0	302	41.5	
College							
State University	86	11.8	93	12.8	179	24.6	0.301
Private university	239	32.9	309	42.5	548	75.4	
Psychological Factors							
Anxious	295	40.6	349	48.0	644	88.6	0.096
Not worried	30	4.1	53	7.2	83	11.3	
Physical condition							
Healthy	316	43.5	387	53.2	703	96.7	0.470
Sick	9	1.2	15	2.0	24	3.3	

terms of cognitive abilities such as a blueprint of competency examination and nursing material as students were confused and doubtful in answering correctly during the implementation process (Monroe, 2019). Another study supported that understanding of blueprint influenced NCLEX-RN national passing rates from 83.82% to 87.0% in examined groups of students with maximum readiness such as understanding of blueprint, NCLEX-RN implementation process, grid, and strategy of answering each review question (Frith et al., 2018). A study in line with a literature review found cognitive readiness as an important factor in passing INCE (Krisdianto & Kusumawati, 2019).

Correlation between nursing professional practice system and INCE passing rate

There are downside risks of INCE failure to the student, the school where the student attended, and, in some cases, the employer. The integrated curriculum must conduct continuing education on the professional level (Haryanti et al., 2016). Nursing professional practice is a practical activity in hospitals with the implementation of theory during academic learning (Lestari, 2017). Besides, professional practice in hospitals can train professional development, and care skills, and hone analytical skills in solving various real cases both in the hospital and community (Haryanti et al., 2016).

Given the importance of this exam, one way to help ensure knowledge and skill development during the education process is the implementation of professionally developed standardized tests. These tests can identify weak areas for students and have excellent predictive validity to passing the INCE. A previous study has revealed that the seriousness of institutions in preparing students to take a competency examination is required to increase the

passing rate percentage. The preparation can be done through academic stages and nursing professional practice systems in a hospital or community (Lukmanulhakim & Pusporini, 2018). An online study has shown that gaining competence, theory, and learning experience in practical fields that support the growth and development of professional abilities is needed by every student. Integrating academic education and nursing professional practice system is a standard curriculum between theory in the academic stage and clinical experience in the professional practice stage (Czekanski et al., 2018).

Nursing professional practice plays an important role in increasing graduation because the items to be tested in the INCE are based on the real cases of the patient being treated in the hospital (the patient's illness, medical history, etc.) what care is given while in the hospital until the patient's problem is resolved. Students who have followed the nursing professional practice stage will be accustomed to dealing with real patient cases so that the positive impact can make it easier for students to answer competency exam questions and have the opportunity to pass.

Educational curriculum development is a strategy that strengthens student knowledge by constructing curriculum contents that reflect the essence of education of professional nurses and other professional standards (Shoemaker et al., 2017). In addition to an integrated curriculum, teaching strategies that enhance student skills in critical thinking and reflection such as concept mapping, case reflection, disease history data, analysis, nursing problem determination, and nursing care management can help prepare students to answer competency test questions, and these teaching strategies are obtained while undergoing professional education (Corrigan-Magaldi et al., 2014).

The preparation strategy implemented at Alabama University for NCLEX-RN includes the application of a clinical nursing course, which is a combination of clinical and theoretical activities at one time, classroom lectures, and discussion of case studies, simulations, and other interactive learning strategies. Students are also assigned to conduct case studies outside the classroom, which allowed students to gain clinical reasoning based on existing theoretical concepts. At the end of the program, students will take an exit exam to assess their ability, and the passing grade scores are adjusted to the passing grade competency examination scores (Mager et al., 2017).

Correlation between institution roles and INCE passing rate

Based on the results of this study, the institution's role is correlated with the INCE passing rate ($p = 0.009$). A previous study identified extrinsic factors that contributed to the success of competency examination, including the ability of the institution's manager or lecturer to prepare students from the first to the final semesters and to strengthen learning strategies (Wardani, 2019). A previous study also revealed that nursing managers must be advanced in terms of providing the best facilities and infrastructure in the learning process by using the latest information technology and updating learning resources (Corrigan-Magaldi et al., 2014). In addition, using software and skilled managing information technology in examinations will help students succeed in examinations, especially in computer-based exams (Pence & Wood, 2018).

The results of previous studies agree with the results of this study that the success of competency examination depends on a combination of mentoring and teaching-learning strategies conducted by the institution to help students be confident and critical thinkers.

Student involvement, a supportive learning environment, and weekly follow-up by the faculty turned out to be beneficial for the development, retention, and achievement of students in competency examination (Corrigan-Magaldi et al., 2014).

Correlation between nurse academic achievement and INCE passing rate

The graduation requirement for the nursing profession program is determined by results of nurse academic achievement or grade point average (GPA) that illustrate cognitive abilities and skills. Nurse academic achievement is the success of learning achievement (Fajar et al., 2019). Students with a high GPA at academic and professional stages have high motivation to study diligently in a cognitive, affective, and psychomotor manner, and they tend to have good intellectual and technical analysis and concept (Kim et al., 2019). A previous qualitative study has shown that higher nurse academic achievement means a higher opportunity to pass a competency examination (Hartina et al., 2018). Academic ability in theory and skill determines the passing of competency examination (Krisdianto & Kusumawati, 2019). Similarly, the results of a previous study revealed that the passing of INCE is influenced by nurse academic achievement (Czekanski et al., 2018). High academic ability in theory that is assessed based on GPA generally passed the competency examination (Syah, 2018).

Through an objective assessment, students will get different GPA results depending on achievements and activities possessed by each student in a series of nursing professional practices that are an output of the learning process (Kim et al., 2019). Learning achievements or outcomes are the realizations of potential skills or capacities, and learning outcomes are judged on the ability of knowledge, thinking skills, and motor skills (Carrick, 2017).

Limitations

The limitation in this study is the participants do not represent all Regions that are members of AINEC.

Conclusion

Overall, several predictor factors that contribute to the success of the INCE are the national predictor exam, understanding of the blueprint, nursing professional practice system, and nurse academic achievement. However, it is necessary to conduct future research related to other factors that can determine the passing rate of the competency test is necessary. The results of this study are expected to become supporting data for system improvement in institutions to better prepare students for INCE, application case-based questions during lecture exams as well as guidance before taking INCE. Also, this research can be an input for students to better prepare themselves before facing INCE.

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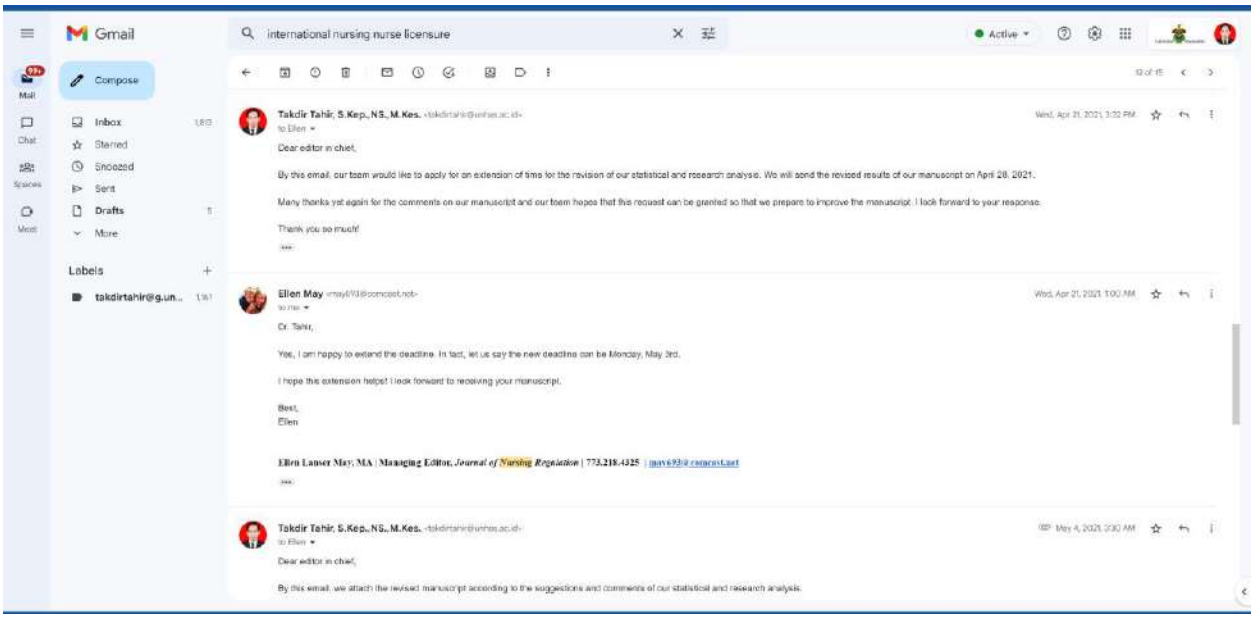

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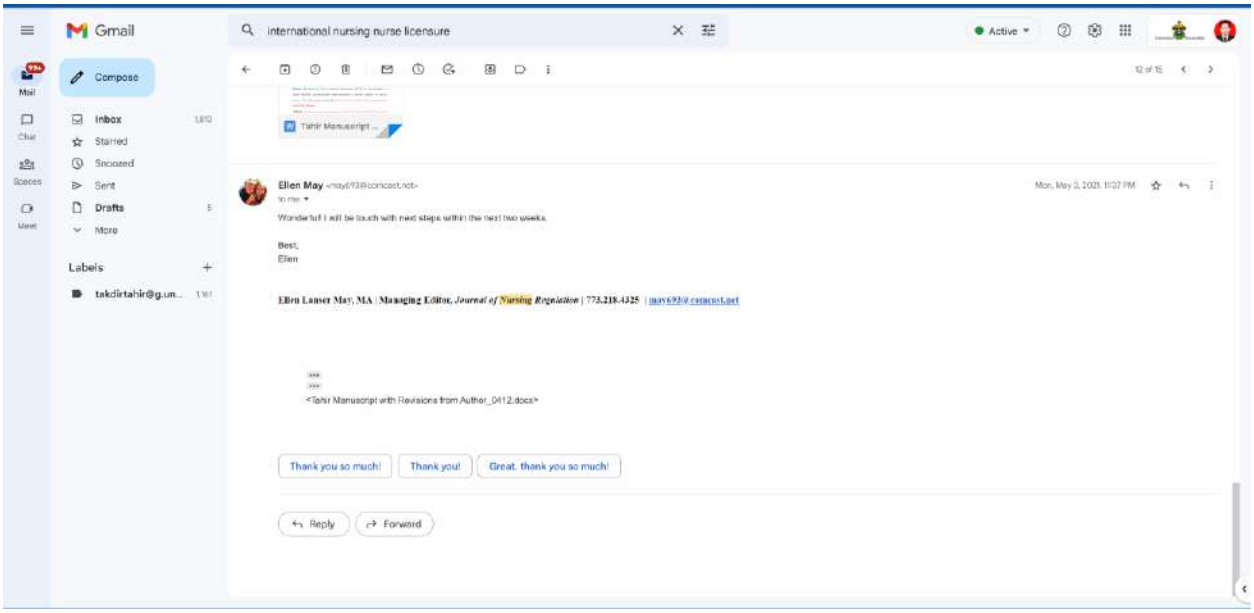

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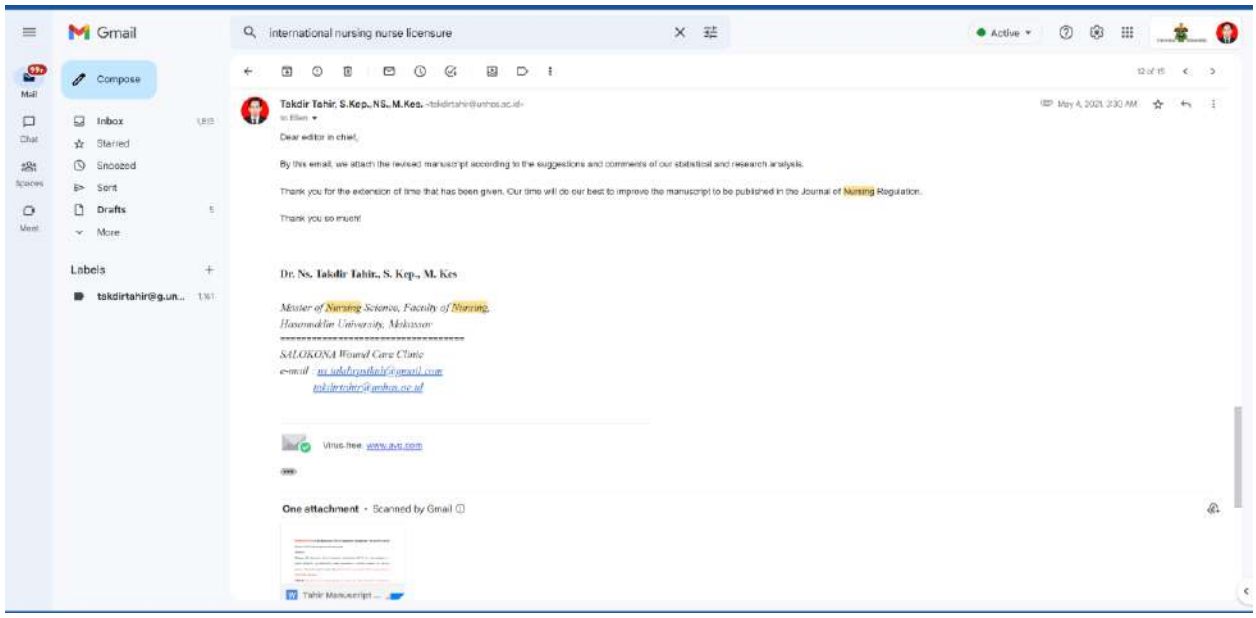

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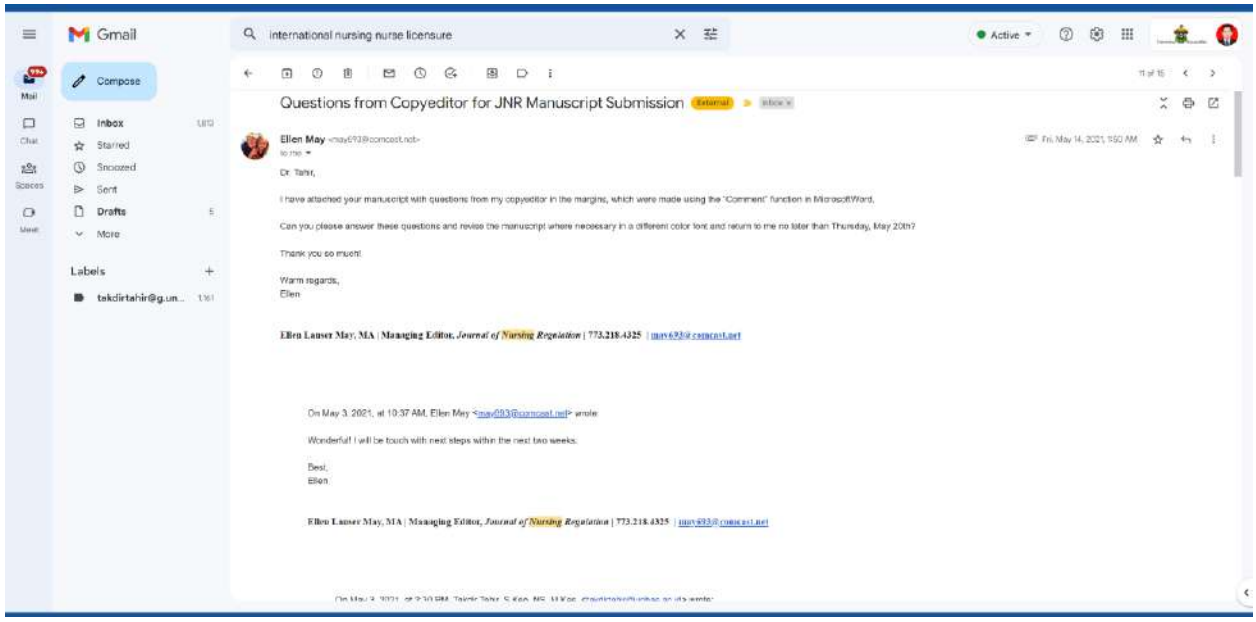

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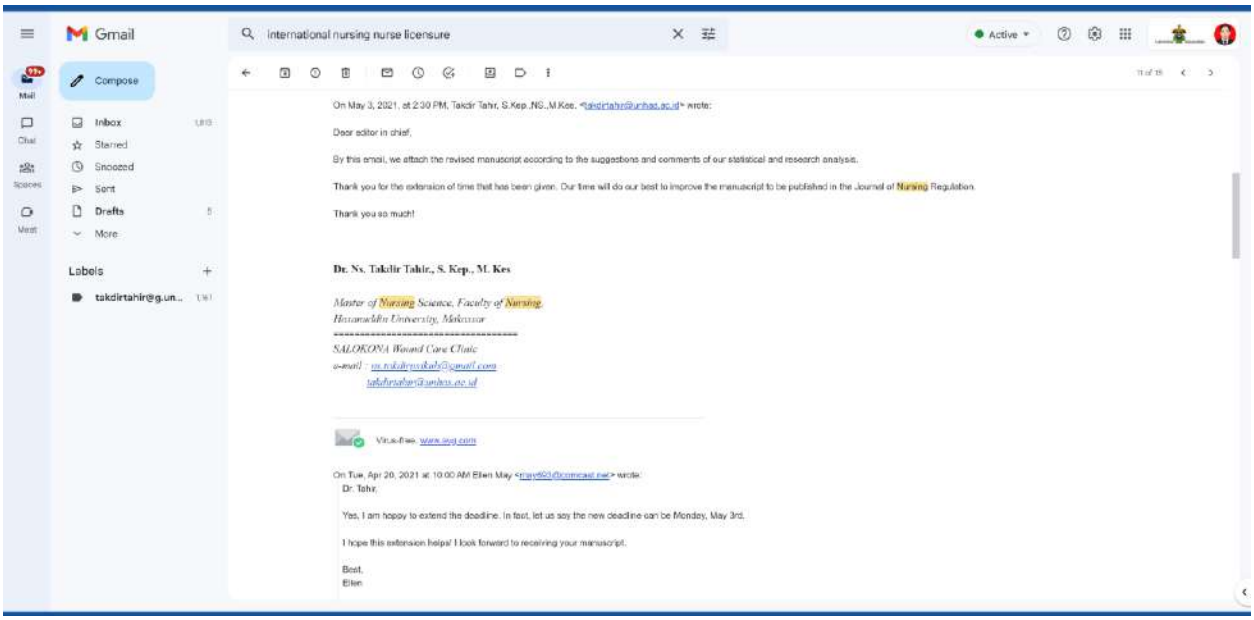

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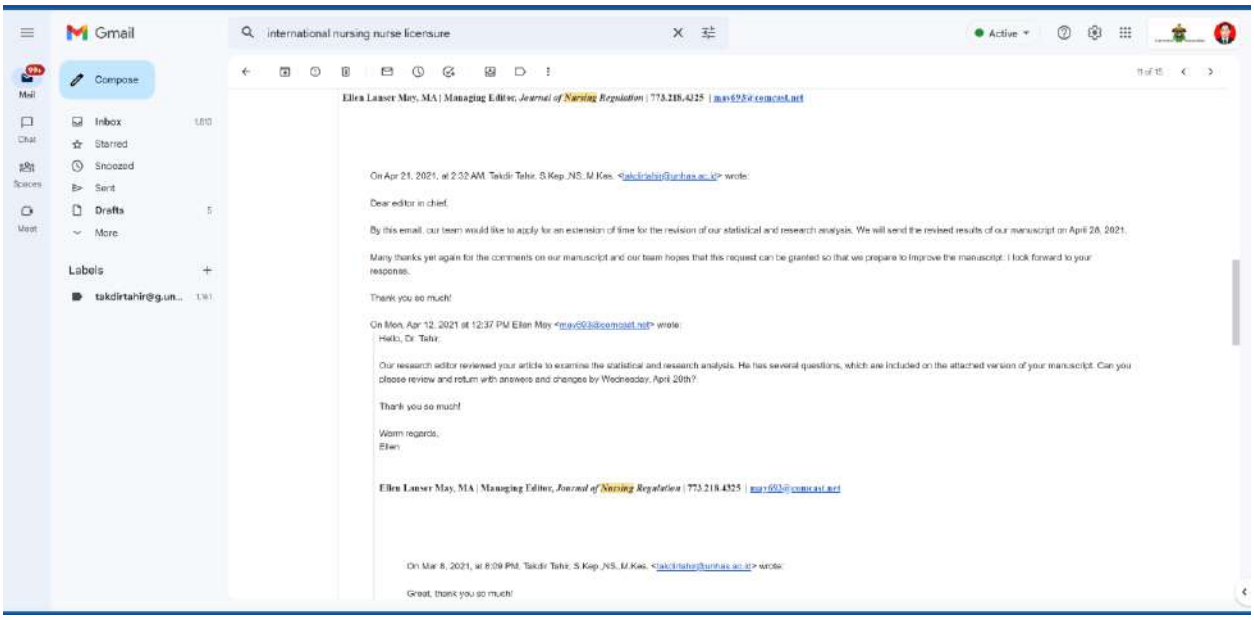

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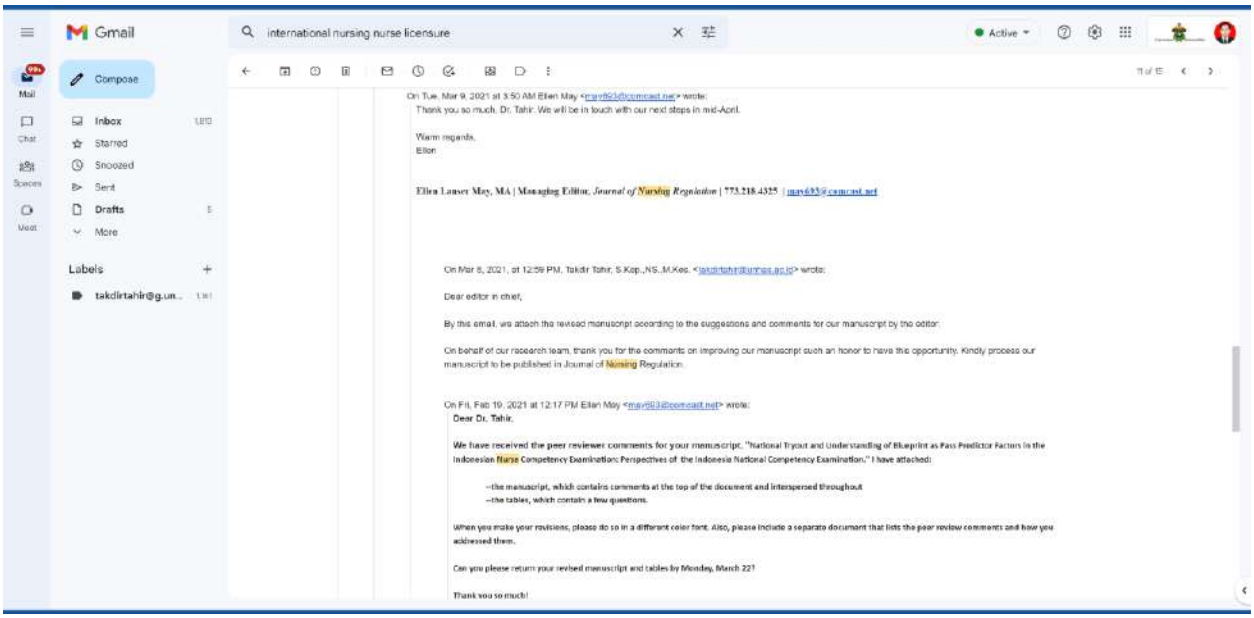

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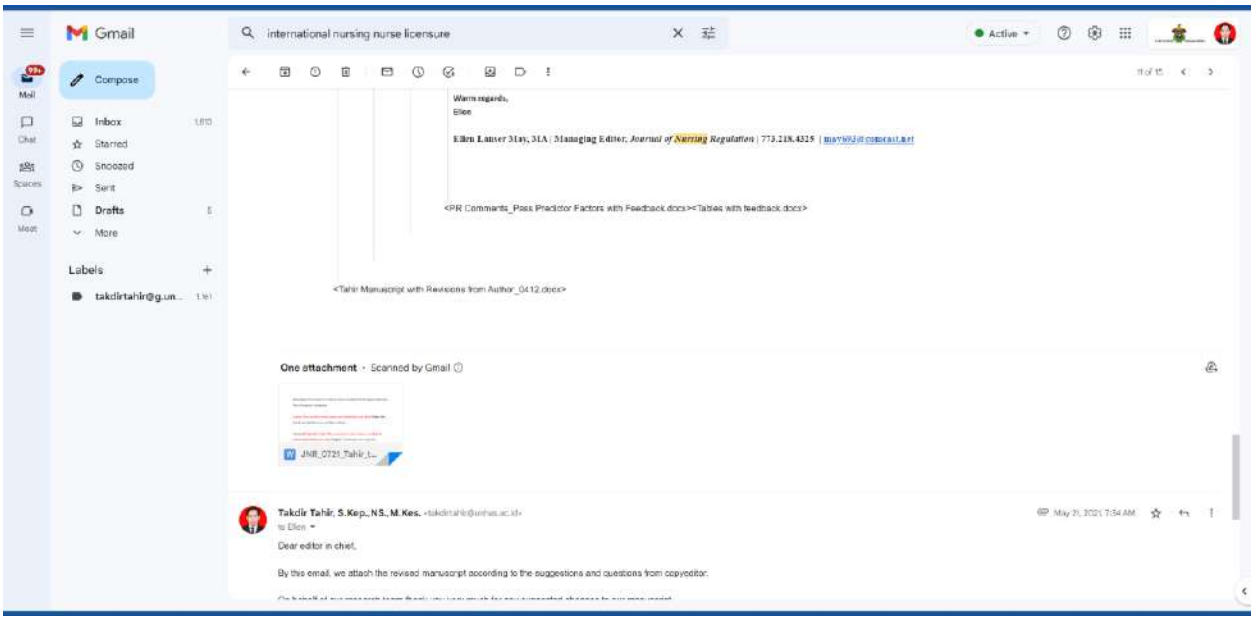

24. 14 Mei 2021 (Lampiran 1: "JNR_0721_Tahir_to author_0513")

International Nurse Licensure: Predictor Factors Associated With Passing the Indonesian Nurse Competency Examination

(Author: Please provide academic degrees and credentials for each author.)Takdir Tahir; Suni Hariati; Fifi Riskayani; and Midawati Djafar

/Abstract/Background: (Author: Please provide two to three sentences describing the context/background for your study.) Purpose: The Indonesian Nurse Competency Examination (INCE) has been designed as a legally defensible, psychometrically sound examination to measure readiness for entry to practice in Indonesia. This study aimed to explore the predictor factors associated with the nurses passing the INCE. **Methods:** In this cross-sectional study, 727 participants (estimated sample was 720) were secured using consecutive sampling. The survey instrument, which collected participant demographics and university characteristics, was developed by the research team and underwent testing for validity and reliability. **Results:** INCE pass rate was associated with age ($p = .00$), grade point average ($p = .00$), examination status ($p = .00$), region of the university ($p = .00$), availability of a standard internship program at the university ($p = .001$), knowledge about the INCE blueprint ($p = .001$), institution roles ($p = .011$), and taking the national predictor examination ($p = .002$). The most predictive factor for passing the INCE was availability of a standard internship program ($p = .029$; $OR = 3.204$). **Conclusion:** The existence of an internship program was the main factor that predicted whether a participant passed the INCE. Thus, nursing universities

need to provide internship programs based on the national standard. Future research is needed related to other factors that were associated with passing the INCE.

/Keywords/*Keywords:* Competence examination, internship program, Association of Indonesian Nurse Education Center, institution roles, national predictor examination, nurse licensure

/text/Nurses represent just one professional health service provider that must prove competency through competency test evaluation (Valizadeh et al., 2019). In Indonesia, the Association of Indonesian Nurse Education Center (AINEC) is charged with the maintenance of minimum practice standards for nurses entering the workforce. Like similar organizations in other countries, the AINEC is dedicated to developing psychometrically sound and legally defensible nurse licensure and certification examinations consistent with current practice (Liu & Aungsuroch, 2018; Kariasa et al., 2019). The Indonesian Nurse Competency Examination (INCE), which is a psychometrically sound standardized licensure examination to ensure competence of entry-level nurses, is one part of that maintenance (Haryanti et al., 2016). The purpose of competency examinations is to ensure graduate competency as evidenced by a registration certificate, which in this case is the competence of nurse generalists according to the regulation of the Ministry of Health of the Republic of Indonesia number 83 of 2019.

Like Indonesia, many other countries require competency examinations before health care workers can be licensed for professional practice, including the National Nursing Licensure

Examination (NNLE) in China, the NCLEX-RN in the United States, and the Nursing Licensing Examination in Korea (Hou et al., 2019). Also similar to Indonesia, these countries use competency examination and accreditation status as parameters to determine the quality of nursing programs (Sears et al., 2015). INCE pass rates are a primary outcome metric for nursing education in Indonesia.

The INCE is computer based and is held three times per year (Kariasa et al., 2019). The passing score set by the national committee of the INCE is 47.8% (participants must provide the correct answer for at least 86 of 180 questions within 180 minutes). Different states have different regulations related to pass rates. As a result, nursing programs are generally judged on their first-time INCE pass rate. According to data from the secretariat of the INCE committee, 18,403 of 58,791 participants (31.3%) did not pass the INCE in 2017, 19,699 of 61,834 participants (31.9%) did not pass in 2018, and 20,691 of 59,796 participants (34.6%) did not pass in 2019. Several factors may have influenced this increased failure rate, including that many nursing schools do not hold exit examinations so that the institution does not feel it can be held responsible for whether their students pass the INCE. Also, several institutions have not implemented competency test–based questions during lectures, which means that students are not used to answering the type of questions used in the INCE. Regardless of these factors, previously published studies have shown that until 2018, the low overall INCE pass rate of under 60% was still a problem (Masfuri, 2018).

Faculty are in the best position to prepare nurses for the licensure examinations. Given the cost

of higher education, it seems wise and ethical to provide every resource available to students to assist them with passing competency examinations (Smith Glasgow et al., 2019). The majority of students and faculty are concerned about student performance on the INCE. High failure rates can damage a nursing program's reputation and can cause a possible loss of new students. The low pass rates seen in other countries are related to factors seen in Indonesia, including examination readiness, use of national predictor examinations, academic achievement, and institution roles (Hartina et al., 2017). For example, in the United States, several factors were investigated to identify predictors of NCLEX-RN performance, including course grades, grade point average (GPA), and standardized tests (Daley et al., 2018). One study found that a transition course for senior-level nursing students that focused on standardized testing and test-taking strategies, remediation, faculty success, and student ownership of success improved the pass rate at a U.S. nursing school (Christensen, 2018). A review article reported several other strategies that were introduced to improve the pass rate of NCLEX-RN, including online coaching, remediation contract, exit examination review, problem-solving and clinical judgment courses, training debriefing competency examination, adaptive quizzing system course and test, educational curriculum, learning method revision, and locus of control identification (Mushawwir et al., 2019).

Previous research has reported that students find it easier to answer competency examination questions because students are active and diligent in following a whole series of theories and skills during lectures and have an impact on increasing passing competency exams (Oducado et al., 2019). Likewise, Wardani's research showed that training strategies and motivations, such

as holding workshops or seminars that discuss tips and tricks for passing competency tests, provided by clinical instructors predicted success on the competency examination in Yogyakarta, Indonesia (Wardani, 2019). Faculty-mediated courses tailored for at-risk students can also increase the success of students in passing such examinations (Corrigan-Magaldi et al., 2014).

This study aimed to explore the predictors of the INCE pass rate. Understanding the predictors of INCE performance can then help guide initiatives to improve nurses' success in passing the INCE. However, previous study results revealed that many other factors significantly affect whether nurses passing a competency examination.

/H1/Methods

/H2/Study Design

A cross-sectional design was used to analyze factors that are associated with passing the INCE in 2019 in Indonesia. The INCE was implemented quarterly in 2019. It is administered throughout Indonesia, which is divided into five regions: (a) Sulawesi and Gorontalo, (b) Java, (c) Sumatera, (d) Bali and Nusa Tenggara, and (e) Papua and Maluku.

/H2/Sample

A total of 49,979 nurses took the INCE during 2019 (first period, 16,417; second period, 13,058; third period, 20,504). The pass rate during those three periods ranged from 48% to 68%. The required sample size for the present study was calculated using sample size estimation for calculating population proportion.

$$n = deff \times \frac{N\hat{p}\hat{q}}{\frac{d^2}{1.96^2}(N-1) + \hat{p}\hat{q}}$$

where

n = sample size
$deff$ = design effect
N = population size
$\hat{p}$ = the estimated proportion
$\hat{q} = 1 - \hat{p}$
d = desired absolute precision or absolute level of precision

In this study, the estimated proportion was 50%, the absolute level of proportion was 5%, and the confidence interval was 99%. The required sample size based on that formula was 655. Due to incomplete data and drop out, we sought an additional 65 participants (10%), leading to a total of 720 participants required.

A link to the questionnaire was sent to the faculty and alumni coordinator or person in charge as assigned by the administrator at each of the XX nursing schools in Indonesia. The person in charge distributed the survey to alumni to recruit volunteer participants. Consecutive sampling was used. Participants were required to have graduated from a nursing school between 2012 and 2019. The study objectives, process, and confidentiality and the participants' right to withdraw from the study at any time was explained. All participants provided written informed

consent prior to beginning the questionnaires. Ultimately, 727 responses were received and included in the study findings. These participants represented 34 nursing schools in 11 regions in Indonesia.

/H2/Survey Instrument

The instrument used in this study gathered information regarding nurses' socioeconomic characteristics, institution roles, internship program, knowledge about the INCE blueprint, taking the national predictor examination, psychological health, and general health. Socioeconomic characteristics were assessed by a questionnaire consisting of age, gender, university funding status (public or private), grade point average, examination status (ie, number of times the INCE was taken), and region of the university. Questions regarding the institution roles, internship program, knowledge about the INCE blueprint, taking the national predictor examination, psychological health, and general health were developed using a Guttman scale. Validity and reliability tests revealed a Pearson product-moment correlation coefficient of 0.83. The questionnaire regarding institution roles consisted of 6 questions; internship program, 10 questions; knowledge about INCE blueprint, 10 questions; national predictor examination, 10 questions; psychological status, 5 questions; and general health status, 5 questions. The variables were divided into categories and means were calculated.

The dependent variable (INCE pass status defined as "competent" for those who passed on their first attempt and "not competent" for those who did not pass on their first attempt) was collected using the national data downloaded from the INCE website. The passing score for the

INCE was determined to be 47.8% using the Angoff method in 2019.

/H2/Data Analyses

A Google form was used for data collection. The related factors of INCE pass status were performed using bivariate and multivariate analyses. Frequency distributions and descriptive statistics were conducted to describe participant characteristics. Chi-squared (χ^2) statistics were used to test associations between socioeconomic characteristics, institution roles, internship program, knowledge about the INCE blueprint, participating in the national predictor examination, psychological health, and general health to INCE status. Multivariate analysis used logistic regression models to examine the factors that best predicted INCE status.

/H2/Ethical Statement

The informed consent form was collected electronically. The participants were required to fill out an informed consent form by clicking on the "agree" button on the screen after reading research information and before being given full access to the survey instrument. This research obtained ethical approval (No.60/H.4.8.4.5.31/PP36-KOMETIK/2019) from the Health Research Ethics Commission of Hasanuddin University.

/H1/Results

/H2/Correlation Between Participant Characteristic and INCE Status

A total of 727 bachelor nurse alumni participated in this study. Table 1 shows the respondent characteristic by INCE pass status. The majority of the respondents was female (n = 512,

70.4%), and the majority of male (n = 127, 59.1%) and female respondents (n = 275, 53.7%) were identified as not competent. Most participants (n = 433, 59.6%) were aged between 20 and 25 years, and most participants in this age range were competent (n = 232, 53.6%). Most participants attending private universities (n = 309, 56.4%) and public universities (n = 93, 52.0%) had an INCE status of not competent. The majority of participants who had a GPA higher than 3.50 were INCE competent (n = 473, 56%). All participants who had taken the examination two times (n = 50) and more than two times (n = 352) were not competent (100%). The regions with the largest proportions of participants who were considered INCE competent were Java (n = 83, 74.7%), Bali and Nusa Tenggara (n = 78,91%), and Papua and Maluku (n = 49, 77,6%). Table 1 shows the relationship of characteristics with the INCE status. Age, GPA, examination status, and region of the university were significant factors ($p < .05$) related to INCE status.

Table 1

Relationship Between Participant Characteristic and INCE Status (N = 727)

Characteristic	Total	INCE Status		p^a
	N = 727	Competent	Not Competent	
	n (%)	*n* (%)	*n* (%)	
Gender				
Male	215 (29.6)	88 (40.9)	127 (59.1)	.213
Female	512 (70.4)	237 (46.3)	275 (53.7)	
Age (years)				
20–25	433 (59.6)	232 (53.6)	201 (46.4)	.000*
26–45	286 (39.3)	87 (30.4)	199 (69.6)	
46–65	8 (1.1)	6 (75.0)	2 (25.0)	
University Funding Status				
Public	179 (24.6)	86 (48.0)	93 (52.0)	.343
Private	548 (75.4)	239 (43.6)	309 (56.4)	
Grade Point Average				
3.00–3.50	254 (34.9)	60 (23.6)	194 (76.4)	.000*
3.50–4.00	473 (65.1)	265 (56.0)	208 (44.0)	
Examination Status				.000*

First examination	325 (44.7)	325 (100.0)	0 (0.0)	
Second examination	50 (6.9)	0 (0.0)	50 (100.0)	
> 2 examinations	352 (48.4)	0 (0.0)	352 (100.0)	
Region of University				
Sulawesi and Gorontalo	442 (60.8)	136 (30.8)	306 (69.2)	.000*
Java	83 (11.4)	62 (74.7)	21 (25.3)	
Sumatra	75 (10.3)	18 (24.0)	57 (76.0)	
Bali and Nusa Tenggara	78 (10.7)	71 (91.0)	7 (9.0)	
Papua and Maluku	49 (6.7)	38 (77.6)	11 (22.4)	

Note. INCE = Indonesian Nurse Competence Examination. [a] Chi-square test

* $p < .05$

/H2/Related Factors of INCE Status

The remaining factors investigated related to INCE status are shown in Table 2. Among the 727 participants who had good institution roles (n = 601), 46.9% were INCE competent, whereas 34.1% of those with poor institution roles were INCE competent. Participants at universities that had standard internship programs were more likely to be INCE competent than those without a standard internship program (46.0% vs 15.6%, respectively). Most of the participants who participated in the national predictor examination more than once (52.2%) were competent. Participants with poor knowledge about the INCE blueprint were more likely to be competent (51.7%) than those with good knowledge (39.3%). Table 2 also shows the relationship of the related factor for INCE pass status. The internship program, knowledge about INCE blueprint, institution roles, and national predictor examination were statistically significant ($p < .05$) with INCE pass status.

Table 2

Related Factors for INCE Status ($N = 727$)

Characteristic	Total	INCE Status		p^a
	$N = 727$	Competent	Not Competent	
	n (%)	n (%)	n (%)	

Institution Roles				
Good	601 (82.7)	282 (46.9)	319 (53.1)	.011*
Poor	126 (17.3)	43 (34.1)	83 (65.9)	
Availability of Internship Program				
Standard	695 (95.6)	320 (46.0)	375 (54.0)	.001*
Not standard	32 (4.4)	5 (15.6)	27 (84.4)	
National Predictor Examination				
Never participated	106 (14.6)	33 (31.1)	73 (68.9)	.002*
One time	435 (59.8)	195 (44.8)	240 (55.2)	
More than one	186 (25.6)	97 (52.2)	89 (47.8)	
Knowledge About INCE Blueprint				
Good	412 (56.7)	162 (39.3)	250 (60.7)	.001*
Poor	315 (43.3)	163 (51.7)	152 (48.3)	
Psychological Status				
Anxiety	644 (88.6)	295 (45.8)	349 (54.2)	.121
No anxiety	83 (11.4)	30 (36.1)	53 (63.9)	
Health Status				
Healthy	703 (96.7)	316 (45.0)	387 (55.0)	.608
Sick	24 (3.3)	9 (37.5)	15 (62.5)	

Note. INCE = Indonesia Nurse Competence Examination. [a] Chi-square test.

* $p < .05$

Table 3 shows the predictive factors that qualified for logistic regression analysis. There are seven predictors (age, GPA, region of university, institution roles, availability of internship program, participation in the national predictor examination, and knowledge about the INCE blueprint) that had p values < .05. These predictor factors were analyzed using logistic regression as shown in Table 4. Model 2 shows that age, GPA, region of university, availability of an internship program, and knowledge about the INCE blueprint were the significant independent variables associated with INCE pass status. Institution roles and participating in the national predictor examination served as confounding factors that influenced the INCE pass status and independent variables (ie, age, GPA, region of university, internship program, and knowledge about INCE blueprint). The dominant variable that influenced the INCE pass status

was the internship program (*OR* = 3.204). Students at universities with a standard internship program were 3.204 times more likely than students without such access to pass the INCE.

Table 3

Predictive Factors Selected for Logistic Regression Analysis

Variables	*p*
Age	.000
Grade point average	.000
Region of university	.000
Institution roles	.009
Availability of internship program	.002
Participation in national predictor examination	.001
Knowledge about INCE blueprint	.001

Note. INCE = Indonesia Nursing Competence Examination.

Table 4
Logistic Regression Result of Predictors of INCE Status

Variables	INCE Status							
	Model 1				Model 2			
	p	*OR*	95% CI		*p*	*OR*	95% CI	
			Lower	Upper			Lower	Upper
Age	.000	2.731	1.934	3.856	.000	2.715	1.925	3.830
GPA	.000	0.217	0.148	0.319	.000	0.218	0.149	0.319
Region of university	.000	0.516	0.439	0.607	.000	0.515	0.443	0.598
Internship program	.028	3.303	1.137	9.596	.029	3.204	1.124	9.135
Knowledge about INCE blueprint	.03	0.683	0.484	0.965	.029	0.682	0.484	0.962
Institution roles	.365	1.240	0.779	1.973				
Participation in national predictor examination	.693	1.065	0.778	1.458				

Note. INCE = Indonesia Nursing Competence Examination.

/H1/Discussion

/H2/Correlation Between GPA and INCE Pass Status

The results of this study show that GPA is one of the independent variables associated with INCE status. Previous studies have reported that there is a relationship between a nurse's GPA and passing the competency test of (Hartina et al., 2017; Lukmanulhakim & Pusporini, 2018). In the United States, students who had a GPA of 3.80 or higher had an 11% greater chance of passing the competency test than students with a GPA of less than 3.80 (Wambuguh et al., 2016). In Indonesia, nurses with high academic ability that was assessed based on GPA generally passed the competency examination (Syah, 2017). Students with a high GPA at academic and professional stages tend to have high motivation, study diligently, and have good intellectual and technical analysis skills (Kim et al., 2019).

The academic GPA referred to in this study is the cumulative value obtained by respondents during their undergraduate program. Students who achieve a good academic GPA are assumed to have a good understanding of the subjects they have learned. They will likely be able to understand the concepts and theories obtained during the lecture process, so they have better analytical skills that make it easier for these students to answer questions on the Test of Competence for Indonesian Nurses (Hartina et al., 2017).

/H2/Correlation Between Internship Program and INCE Passing Status

The dominant variable in the present study that influenced the INCE pass status was the availability of a standard internship program at the university (*OR* = 3.204). When a nurse fails the INCE, it can affect the student, the school where the student attended, and, in some cases, the employer. Thus, the integrated curriculum must include training at the professional level (Haryanti et al., 2016). Nursing professional practice is a practical activity in hospitals with the

implementation of nursing theory during academic learning (Lestari, 2014). Additionally, professional practice in a hospital internship setting can provide professional development, improve patient care skills, and hone analytical skills in solving various real cases both in the hospital and community (Haryanti et al., 2016).

Given the importance of the INCE, one way to help ensure knowledge and skill development during the education process is the implementation of professionally developed standardized tests. Such tests could identify a student's areas in need of improvement and would have excellent predictive validity to passing the INCE. A study by Lukmanulhakim & Pusporini (2018) revealed that to increase the INCE pass rate, institutions must prepare students to take competency examinations. Preparation can be done through academic stages and nursing professional practice systems in a hospital or community. An online study by Czekanski et al. (2018) showed that gaining competence, theory, and learning experience in practical fields that support the growth and development of professional abilities is needed by every student. Integrating academic education and nursing professional practice system is a standard curriculum between nursing theory in the academic stage and clinical experience in the professional practice stage (Czekanski et al., 2018).

Nursing professional practice plays an important role in increasing graduation because INCE questions are based on real patient cases (the patient's illness, medical history, etc.) and the care that is provided until the patient's condition is resolved. Students who have followed the nursing professional practice stage will be accustomed to dealing with real patient cases so that

the positive impact can make it easier for students to answer competency examination questions and improve the likelihood of passing.

Educational curriculum development is a strategy that strengthens student knowledge by constructing curriculum contents that reflect the essence of education of professional nurses and other professional standards (Shoemaker et al., 2017). In addition to an integrated curriculum, professional education can enhance student skills in critical thinking and reflection, such as concept mapping, case reflection, disease history data, analysis, nursing problem determination, and nursing care management (Corrigan-Magaldi et al., 2014). It may also help prepare students to answer competency test questions.

For example, the NCLEX-RN preparation strategy implemented at Alabama University includes the application of a clinical nursing course, which is a combination of clinical and theoretical activities at one time, classroom lectures, and discussion of case studies, simulations, and other interactive learning strategies. Students are also assigned to conduct case studies outside the classroom, which allow students to gain clinical reasoning based on existing theoretical concepts. At the end of the program, students take an exit examination to assess their ability, and the passing grade scores are adjusted to the passing grade competency examination scores (Mager et al., 2017).

/H2/Correlation Between National Predictor Examination and INCE Pass Status

The national predictor examination is a practice examination for nurses before they take the INCE (Haryanti et al., 2016). The most valuable component of a predictor examination is the use of good quality test questions that reflect the actual test implementation (Kariasa et al., 2019).

In Indonesia, before the INCE is held, several nursing institutions conduct preparation, including providing debriefing or theoretical review during lectures for approximately 2 weeks, and several institutions administer local predictor examinations. In addition, the national committee of INCE also provides opportunities for all institutions to include their students in the national predictor examination, which is held three times before each INCE. The results of each predictor examination are announced on the ukners.kemendikbud.go.id website, and each participating institution provides assistance to those students who did not pass by reviewing the obstacles those students faced.

A previous study revealed that 85% of participants who had taken the predictor examination were more ready to take INCE than those who received only an explanation of INCE implementation. Furthermore, the results of the predictor examination evaluation can be used as a predictor for passing INCE (Krisdianto & Kusumawati, 2019). Better predictor examination results indicate a greater chance of passing the INCE, and worse results likewise may mean a greater chance of failure (Abdillah, 2019). These results agree with a previous study that

revealed that 86.4% of participants who passed the INCE had an INCE predictor examination score greater than or equal to the INCE passing score and had a 3.4 times greater chance of passing the INCE than those whose predictor examination value was lower than the INCE passing score (Nuryati et al., 2020).

Respondents who took the national predictor examination had a 20.69% chance of passing, whereas those who took it more than once had a 37.5% chance of passing (Hartina et al., 2017). Students who have participated in the predictor examination tend to be more prepared for the INCE than students who have not taken the predictor examination (Serembus, 2016). The right solution is needed as a form of quality assurance in the provision of future nursing education (Wijaya et al., 2017).

Considering that the predictor examination can be used as an evaluation of one's ability to answer INCE questions, students were given a predictor examination result sheet that contained seven reviews of competency examination questions, including competency area, competency domain, scientific field, nursing process, health effort, and basic human needs (Kariasa et al., 2019). Based on this review, students and lecturers can improve these items so that they can maximize the preparation of taking the actual INCE (Abdillah, 2019). The NCLEX-RN at health institutions in India combines predictor examinations as a measure of readiness to take competency tests with online coaching. If the predictor examination results match the competency test standards, students can take the NCLEX-RN (Krisdianto & Kusumawati, 2019).

/H2/Correlation Between Knowledge About the INCE Blueprint and INCE Passing Status

The INCE blueprint is a basic framework or guideline used to design the development of the examination questions. Blueprints can provide information on the topic area, a description of the material being tested, an overview of the test methods to be used, and references (Kariasa et al., 2019). Understanding the blueprint as a predictive factor becomes an important tool in determining one's readiness in taking the INCE (Krisdianto & Kusumawati, 2019). These and other studies found that the readiness of participants is directly proportional to the INCE results. Thus, better examination preparation could provide a greater chance of passing the INCE. Some aspects that become the core of readiness include cognitive maturity and physical and psychological readiness (Wardani, 2019).

A literature review found cognitive readiness to be an important factor in passing the INCE (Krisdianto & Kusumawati, 2019). Cognitive readiness requires an understanding of a given blueprint that contains the scope of the competency test questions, which are a total of packages, item questions, and strategies to answer each question (Kariasa et al., 2019). Understanding of the blueprint is obtained through training courses for competency examinations or clinical registration (Wardani, 2019). At one U.S. nursing school, students were required to take a competency examination training course to assess students' knowledge. Strategies such as reviewing the blueprint for the examination were implemented to correct knowledge gaps, and the authors reported improved grades and pass rates on the NCLEX (Cole & Adams, 2014).

A study pertaining to students who took the NCLEX-RN revealed that failure was often caused by a lack of optimal preparation in terms of cognitive abilities such as a blueprint of competency examination and nursing material. Students who failed were confused and doubtful that they were answering the questions correctly (Monroe, 2019). Another study supported the understanding of the examination blueprint: a nursing program reported NCLEX-RN national pass rates from 83.8% to 87.0%, which were achieved through an understanding of the blueprint, understanding the NCLEX-RN implementation process, and answering each review question (Frith et al., 2008).

/H2/Correlation Between Institution Roles and INCE Pass Status

Based on the results of this study, the institution's role is correlated with the INCE pass status. A previous study identified extrinsic factors that contributed to the success of the competency examination, including the ability of the institution's manager or lecturer to prepare students from the first to the final semesters and to strengthen learning strategies (Wardani, 2019). A previous study also revealed that nursing managers must be advanced in terms of providing the best facilities and infrastructure in the learning process by using the latest information technology and updating learning resources (Corrigan-Magaldi et al., 2014). In addition, using computer adaptive quizzing in nurse training was associated with passing the NCLEX (Pence & Wood, 2018).

The results of previous studies agree with the results of this study that the success of a competency examination depends on a combination of mentoring and teaching-learning strategies conducted by the institution to help students be confident and critical thinkers. Student involvement, a supportive learning environment, and weekly follow-up by the faculty was beneficial for the development, retention, and achievement of students in competency examination (Corrigan-Magaldi et al., 2014).

/H1/Limitations

The primary limitation in this study is that the participants do not represent all regions that are members of AINEC who participated in INCE in 2019. Another limitation is that participants who failed the INCE were overrepresented in this study, as 55% of respondents included in this study failed the first attempt at the INCE but approximately 35% overall failed in 2019. Additionally, participants were volunteers, and it is possible self-selection bias occurred.

/H1/Conclusion

Overall, several predictor factors that contribute to the success of the INCE are age, GPA, region of university, knowledge about the INCE blueprint, institution roles, participation in the national predictor examination, and access to a standard internship program, which had the greatest influence. The results of this study are expected to become supporting data for system

improvement in institutions to better prepare students for the INCE. Also, these findings can be put to use by students to better prepare themselves before taking the INCE.

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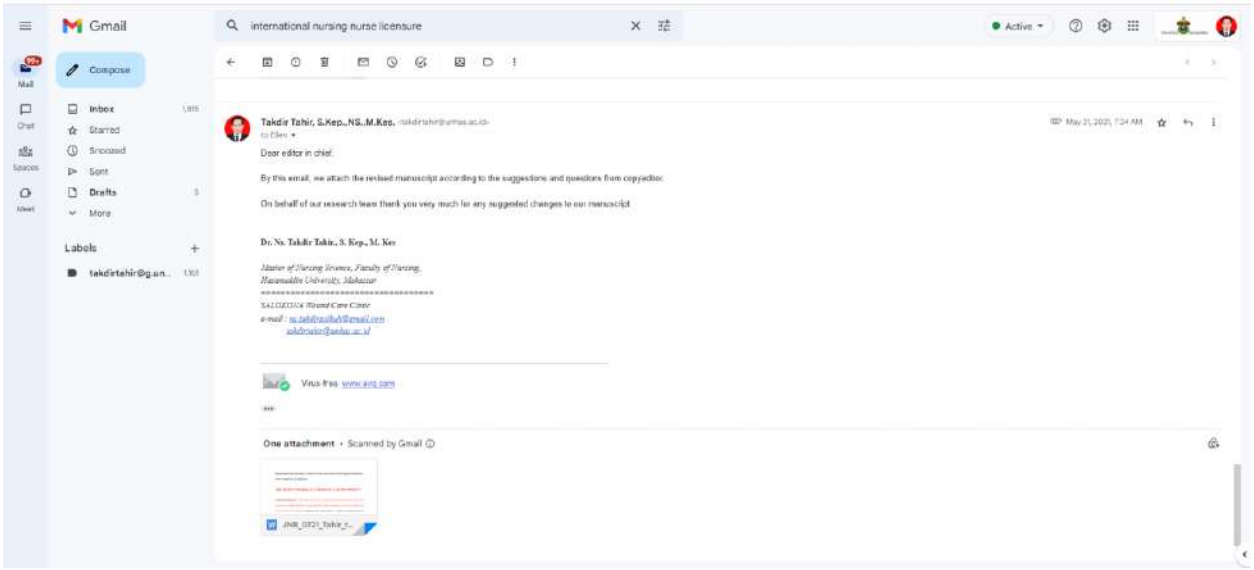
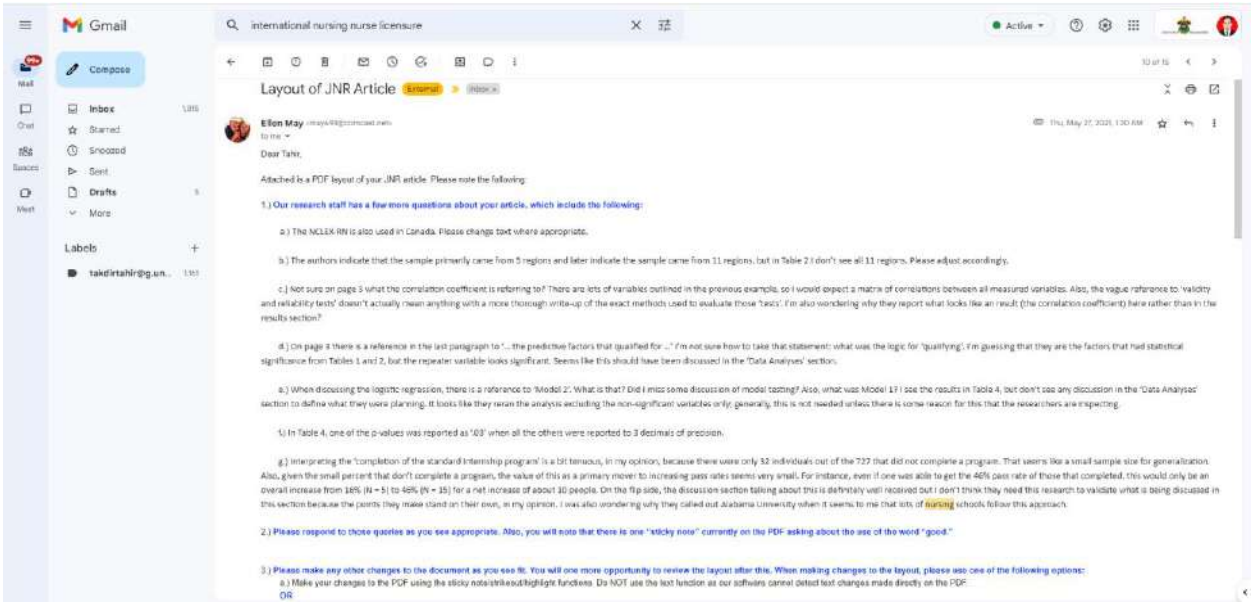
(Author: Do you have any conflicts of interest?)

25. 21 Mei 2021



26. 27 Mei 2021 (1)



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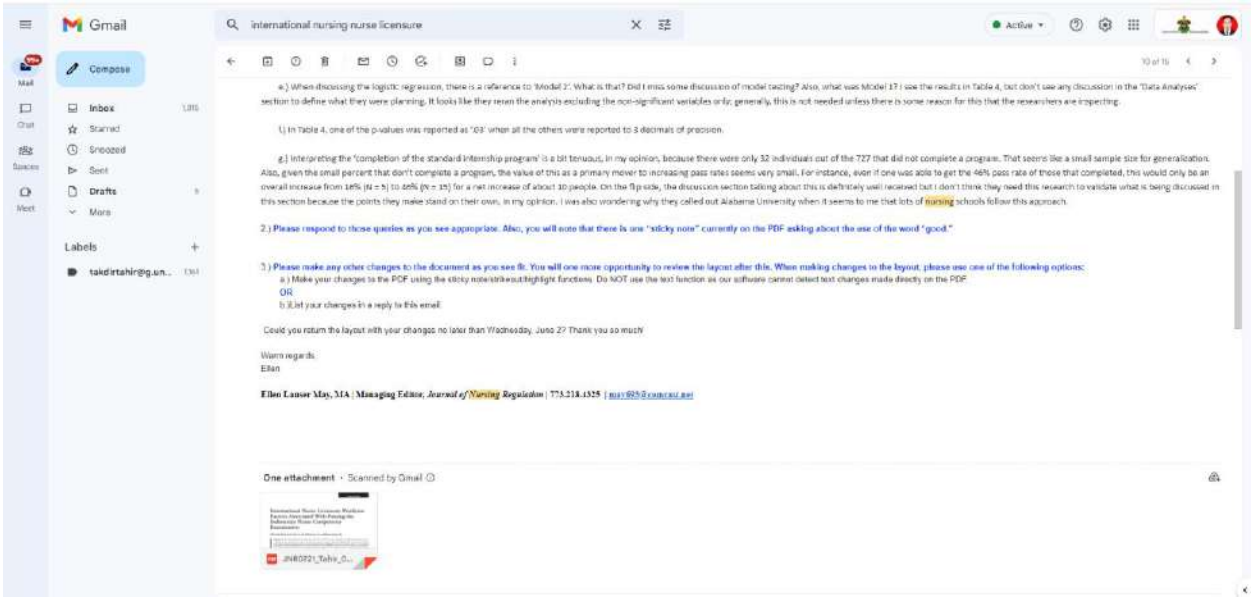

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TABLE 4

Logistic Regression Result of Predictors of INCE Status

Variables	INCE Status							
	Model 1				Model 2			
	p	*OR*	95% *CI*		*p*	*OR*	95% *CI*	
			Lower	Upper			Lower	Upper
Age	.000	2.731	1.934	3.856	.000	2.715	1.925	3.830
GPA	.000	0.217	0.148	0.319	.000	0.218	0.149	0.319
Region of university	.000	0.516	0.439	0.607	.000	0.515	0.443	0.598
Completion of a standard internship program	.028	3.303	1.137	9.596	.029	3.204	1.124	9.135
Knowledge about the INCE blueprint	.03	0.683	0.484	0.965	.029	0.682	0.484	0.962
Examination preparation from the institution	.365	1.240	0.779	1.973				
Participation in national predictor examination	.693	1.065	0.778	1.458				

Note. INCE = Indonesia Nursing Competency Examination.

that nursing faculty must be advanced in terms of providing the best facilities and infrastructure in the learning process by using the latest information technology and updating learning resources (Corrigan-Magaldi et al., 2014). In addition, using computer-adaptive quizzing in nurse training was associated with passing the NCLEX (Pence & Wood, 2018).

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Conclusion

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TABLE 3

Predictive Factors Selected for Logistic Regression Analysis

Variables	*p*
Age	.000
Grade point average	.000
Region of university	.000
Examination preparation from the institution	.009
Completion of standard internship program	.002
Participation in national predictor examination	.001
Knowledge about the INCE blueprint	.001

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existing theoretical concepts. At the end of the program, students take an exit examination to assess their ability, and the passing grade scores are adjusted to the passing grade competency examination scores (Mager et al., 2017).

Association Between National Predictor Examination and INCE Pass Status

The national predictor examination is a practice examination for nurses before they take the INCE (Haryanti et al., 2016). The most valuable component of a predictor examination is the use of good quality test questions that reflect the actual test implementation (Kariasa et al., 2019). In Indonesia, before the INCE is held, most nursing institutions conduct preparation sessions, such as providing debriefing or theoretical review during lectures for approximately 2 weeks, and most institutions giving students practice answering questions that resemble INCE questions. In addition, the national committee of the INCE also provides opportunities for all institutions to include their students in the national predictor examination, which is held three times before each INCE. The results of each predictor examination are announced on the INCE website, and each participating institution provides assistance to those students who did not pass by reviewing the obstacles those students faced.

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Association Between Examination Preparation From the Institution and INCE Pass Status

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TABLE 2

Related Factors for INCE Status (*N* = 727)

Characteristic	Total *N* = 727	INCE Status		*p*[a]
		Competent	Not Competent	
	n (%)	*n* (%)	*n* (%)	
Examination Preparation From the Institution				.011*
Good	601 (82.7)	282 (46.9)	319 (53.1)	
Poor	126 (17.3)	43 (34.1)	83 (65.9)	
Completion of Internship Program				.001*
Standard	695 (95.6)	320 (46.0)	375 (54.0)	
Not standard	32 (4.4)	5 (15.6)	27 (84.4)	
National Predictor Examination				.002*
Never participated	106 (14.6)	33 (31.1)	73 (68.9)	
Completed once	435 (59.8)	195 (44.8)	240 (55.2)	
Completed more than once	186 (25.6)	97 (52.2)	89 (47.8)	
Knowledge About the INCE Blueprint				.001*
Good	412 (56.7)	162 (39.3)	250 (60.7)	
Poor	315 (43.3)	163 (51.7)	152 (48.3)	
Psychological Status				.121
Anxiety	644 (88.6)	295 (45.8)	349 (54.2)	
No anxiety	83 (11.4)	30 (36.1)	53 (63.9)	
Health Status				.608
Healthy	703 (96.7)	316 (45.0)	387 (55.0)	
Sick	24 (3.3)	9 (37.5)	15 (62.5)	

Note. INCE = Indonesia Nurse Competency Examination.
[a] Chi-square test.
* $p < .05$

include training at the professional level (Haryanti et al., 2016). Nursing professional practice is a practical activity in hospitals with the implementation of nursing theory during academic learning (Lestari, 2014). Additionally, professional practice in a hospital internship setting can provide professional development, improve patient care skills, and hone analytical skills in solving various real cases both in the hospital and community (Haryanti et al., 2016).

Institutions must prepare students to take competency examinations. Preparation can be done through academic stages and nursing professional practice systems in a hospital or community. An online study by Czekanski et al. (2018) showed that gaining competence, theory, and learning experience in practical fields that support the growth and development of professional abilities is needed by every student. Integrating academic education and a nursing professional practice system is a standard curriculum between nursing theory in the academic stage and clinical experience in the professional practice stage (Czekanski et al., 2018).

Nursing professional practice plays an important role in increasing graduation because INCE questions are based on real patient cases (the patient's illness, medical history, etc.) and the care that is provided until the patient's condition is resolved. After the nursing professional practice stage, students will be accustomed to dealing with real patient cases, thus making it easier for students to answer competency examination questions and improving the likelihood of passing.

Educational curriculum development is a strategy that strengthens student knowledge by constructing curriculum contents that reflect the essence of education of professional nurses and other professional standards (Shoemaker et al., 2017). In addition to an integrated curriculum, professional education can enhance student skills in critical thinking and reflection, such as concept mapping, case reflection, disease history data, analysis, nursing problem determination, and nursing care management (Corrigan-Magaldi et al., 2014). It may also help prepare students to answer competency test questions.

For example, the NCLEX-RN preparation strategy implemented at Alabama University includes the application of a clinical nursing course, which is a combination of clinical and theoretical activities at one time, classroom lectures, and discussion of case studies, simulations, and other interactive learning strategies. Students are also assigned to conduct case studies outside the classroom, which allow students to gain clinical reasoning based on

TABLE 1

Relationship Between Participant Characteristic and INCE Status (*N* = 727)

Characteristic	Total *N* = 727	INCE Status		*p*[a]
		Competent	Not Competent	
	n (%)	*n* (%)	*n* (%)	
Gender				.213
Male	215 (29.6)	88 (40.9)	127 (59.1)	
Female	512 (70.4)	237 (46.3)	275 (53.7)	
Age (years)				.000*
20–25	433 (59.6)	232 (53.6)	201 (46.4)	
26–45	286 (39.3)	87 (30.4)	199 (69.6)	
46–65	8 (1.1)	6 (75.0)	2 (25.0)	
University Funding Status				.343
Public	179 (24.6)	86 (48.0)	93 (52.0)	
Private	548 (75.4)	239 (43.6)	309 (56.4)	
Grade Point Average				.000*
3.00–3.50	254 (34.9)	60 (23.6)	194 (76.4)	
3.50–4.00	473 (65.1)	265 (56.0)	208 (44.0)	
Examination Status				.000*
First examination	325 (44.7)	325 (100.0)	0 (0.0)	
Second examination	50 (6.9)	0 (0.0)	50 (100.0)	
> 2 examinations	352 (48.4)	0 (0.0)	352 (100.0)	
Region of University				.000*
Sulawesi and Gorontalo	442 (60.8)	136 (30.8)	306 (69.2)	
Java	83 (11.4)	62 (74.7)	21 (25.3)	
Sumatra	75 (10.3)	18 (24.0)	57 (76.0)	
Bali and Nusa Tenggara	78 (10.7)	71 (91.0)	7 (9.0)	
Papua and Maluku	49 (6.7)	38 (77.6)	11 (22.4)	

Note. INCE = Indonesian Nurse Competency Examination.
[a] Chi-square test
* $p < .05$

Discussion

Association Between GPA and INCE Pass Status

The results of this study show that GPA is one of the independent variables associated with INCE status. Previous studies have reported that there is a relationship between a nurse's GPA and passing the competency test (Hartina et al., 2017; Lukmanulhakim & Pusporini, 2018). In the United States, students who had a GPA of 3.80 or higher had an 11% greater chance of passing the competency test than students with a GPA of less than 3.80 (Wambuguh et al., 2016). In Indonesia, nurses with high academic ability that was assessed based on GPA generally passed the competency examination (Syah, 2017). Students with a high GPA at academic and professional stages tend to have high motivation, study diligently, and have good intellectual and technical analysis skills (Kim et al., 2019).

The academic GPA referred to in this study is the cumulative value obtained by respondents during their undergraduate program. Students who achieve a good academic GPA are assumed to have a good understanding of the subjects they have learned. They will likely be able to understand the concepts and theories obtained during the lecture process, so they have better analytical skills that make it easier for these students to answer questions on the INCE (Hartina et al., 2017).

Association Between Completion of Standard Internship Program and INCE Pass Status

The dominant variable in the present study that influenced INCE pass status was the completion of a standard internship program at the university (*OR* = 3.204). When a nurse fails the INCE, it can affect the student, the university where the student attended, and, in some cases, the employer. Thus, the integrated curriculum must

blueprint, taking the national predictor examination, psychological health, and general health were developed using a Guttman scale. Validity and reliability tests revealed a Pearson product-moment correlation coefficient of 0.83. The questionnaire regarding examination preparation from the institution consisted of 6 questions; completion of a standard internship program, 10 questions; knowledge about the INCE blueprint, 10 questions; taking the national predictor examination, 10 questions; psychological status, 5 questions; and general health status, 5 questions. The variables were divided into categories and means were calculated.

The dependent variable (INCE pass status defined as "competent" for those who passed on their first attempt and "not competent" for those who did not pass on their first attempt) was collected using the national data downloaded from the INCE website. Using the Angoff method, the passing score for the INCE in 2019 was determined to be 47.8%.

Data Analyses

A Google form was used for data collection. The related factors of INCE pass status were performed using bivariate and multivariate analyses. Frequency distributions and descriptive statistics were conducted to describe participant characteristics. Chi-squared (χ^2) statistics were used to test associations between socioeconomic characteristics, examination preparation from the institution, internship program, knowledge about the INCE blueprint, participating in the national predictor examination, psychological health, and general health to INCE status. Multivariate analysis used logistic regression models to examine the factors that best predicted INCE status.

Ethical Statement

The informed consent form was collected electronically. The participants were required to fill out an informed consent form by clicking on the "agree" button on the screen after reading information regarding the research project and before being given full access to the survey instrument. Respondents identities and responses were kept confidential. This research obtained ethical approval (No.60/H.4.8.4.5.31/PP36-KOMETIK/2019) from the Health Research Ethics Commission of Hasanuddin University.

Results

Associated Between Participant Characteristic and INCE Status

A total of 727 bachelor nurse alumni participated in this study. Table 1 shows the respondent characteristic by INCE pass status. The majority of the respondents was female (n = 512, 70.4%), and the majority of male (n = 127, 59.1%) and female respondents (n = 275, 53.7%) were identified as not competent. Most participants (n = 433, 59.6%) were aged between 20 and 25 years, and most participants in this age range were competent (n = 232, 53.6%). Most participants attending private universities (n = 309, 56.4%) and public universities (n = 93, 52.0%) had an INCE status of not competent. The majority of participants who had a GPA higher than 3.50 were INCE competent (n = 473, 56%). All participants who had taken the examination two times (n = 50) and more than two times (n = 352) were considered not competent (100%). The regions with the largest proportions of participants who were considered INCE competent were Java (n = 83, 74.7%), Bali and Nusa Tenggara (n = 78,91%), and Papua and Maluku (n = 49, 77,6%). Table 1 shows the relationship of characteristics with INCE status. Age, GPA, examination status, and region of the university were significant factors ($p < .05$) related to INCE status.

Related Factors of INCE Status

The remaining factors investigated related to INCE status are shown in Table 2. Among the 727 participants who had good preparation for the examination from the institution (n = 601), 46.9% were INCE competent, whereas 34.1% of those with poor preparation for the examination from the institution were INCE competent. Participants that completed a standard internship program were more likely to be INCE competent than those who did not complete a standard internship program (46.0% vs. 15.6%, respectively). Most of the participants who participated in the national predictor examination more than once (52.2%) were competent. Participants with poor knowledge about the INCE blueprint were more likely to be competent (51.7%) than those with good knowledge (39.3%). Table 2 also shows the relationship of the related factor for INCE pass status. The internship program, knowledge about the INCE blueprint, examination preparation from the institution, and national predictor examination were statistically significant ($p < .05$) with INCE pass status.

Table 3 shows the predictive factors that qualified for logistic regression analysis. There are seven predictors (age, GPA, region of university, preparation for the examination from the institution, completion of a standard internship program, participation in the national predictor examination, and knowledge about the INCE blueprint) that had p values < .05. These predictor factors were analyzed using logistic regression as shown in Table 4. Model 2 shows that age, GPA, region of the university, completion of an internship program, and knowledge about the INCE blueprint were the significant independent variables associated with INCE pass status. Examination preparation from the institution and participating in the national predictor examination served as confounding factors that influenced the INCE pass status and independent variables (ie, age, GPA, region of university, completion of a standard internship program, and knowledge about the INCE blueprint). The dominant variable that influenced the INCE pass status was the completion of a standard internship program (OR = 3.204). Students at universities who completed a standard internship program were 3.204 times more likely than students without such access to pass the INCE.

used in the INCE. Regardless of these factors, previously published studies have shown that until 2018, the low overall INCE pass rate of under 70% was still a problem (Masfuri, 2018).

Faculty are in the best position to prepare nurses for licensure examinations. Given the cost of higher education, it seems wise and ethical to provide every resource available to students to assist them with passing competency examinations (Smith Glasgow et al., 2019). The majority of students and faculty are concerned about student performance on the INCE. One of the ways to measure the quality or reputation of nursing institutions in Indonesia is through the institution's alumni who have passed the INCE. The low passing rate is caused by several factors including examination readiness, use of national predictor examinations, and academic achievement (Hartina et al., 2017). Similar to Indonesia, in the United States, several factors were investigated to identify predictors of NCLEX-RN performance, including course grades, grade point average (GPA), and standardized tests (Daley et al., 2018). One study found that a transition course for senior-level nursing students that focused on standardized testing and test-taking strategies, remediation, faculty success, and student ownership of success improved the pass rate at a U.S. nursing school (Christensen, 2018). A review article reported several other strategies that were introduced to improve the pass rate of NCLEX-RN, including online coaching, remediation contract, exit examination review, problem-solving and clinical judgment courses, training debriefing competency examination, adaptive quizzing system course and test, educational curriculum, learning method revision, and locus of control identification (Mushawwir et al., 2019).

Previous research has reported that students find it easier to answer competency examination questions because students are active and diligent in following a whole series of theories and skills during lectures, which have an impact on increasing pass rates on competency examinations (Abdillah, 2019). Likewise, Wardani's research showed that training strategies and motivations, such as attending workshops or seminars that discuss tips and tricks for passing competency tests, provided by clinical instructors, predicted success on the competency examination in Yogyakarta, Indonesia (Wardani, 2019). In students at risk, success in competency examinations depends on a combination of mentoring and strategy teaching and learning that can help students become confident and critical thinkers. Mentoring for lecturers is a vital component of this transformative process (Corrigan-Magaldi et al., 2014). This study aimed to explore the predictors of the INCE pass rate. Understanding the predictors of INCE performance can then help guide initiatives to improve nurses' success in passing the INCE.

Methods

Study Design

A cross-sectional design was used to analyze factors that were associated with passing the INCE over 3 testing periods in 2019 in Indonesia. The INCE is administered throughout Indonesia, spread over 12 regions, but participants in this research are primarily from 5 regions: (a) Sulawesi and Gorontalo, (b) Java, (c) Sumatera, (d) Bali and Nusa Tenggara, and (e) Papua and Maluku.

Sample

A total of 49,979 nurses took the INCE during 2019 (first period, 16,417; second period, 13,058; third period, 20,504). The pass rate during those three periods ranged from 48% to 68%. The required sample size for the present study was calculated using sample size estimation for calculating population proportion.

In this study, the estimated proportion was 50%, the absolute level of proportion was 5%, and the confidence interval was 99%. The required sample size based on that formula was 655. To account for incomplete data and dropout, we sought an additional 65 participants (10%), leading to a total of 720 participants required.

$$n = deff \times \frac{N\hat{p}\hat{q}}{\frac{d^2}{1.96^2}(N-1) + \hat{p}\hat{q}}$$

where

n = sample size
$deff$ = design effort
N = population size
$\hat{p}$ = the estimated proportion
$\hat{q} = 1 - \hat{p}$
d = desired absolute precision or absolute level of precision

A link to the questionnaire was sent to the faculty and alumni coordinator or person in charge as assigned by the administrator at each of the nursing schools in Indonesia. The person in charge distributed the survey to alumni to recruit volunteer participants. Consecutive sampling was used. Participants were required to have graduated from a nursing school between 2012 and 2019. The study objectives, process, and confidentiality and the participants' right to withdraw from the study at any time were explained. All participants provided written informed consent before beginning the questionnaires. Ultimately, 727 responses were received and included in the study findings. These participants represented 34 nursing schools in 11 regions in Indonesia.

Survey Instrument

The instrument used in this study gathered information regarding nurses' socioeconomic characteristics, completion of a standard internship program, preparation for the examination from the institution, knowledge about the INCE blueprint, taking the national predictor examination, psychological health, and general health. Socioeconomic characteristics were assessed by a questionnaire consisting of age, gender, university funding status (public or private), grade point average, examination status (ie, number of times the INCE was taken), and region of the university. Questions regarding the institution's role to prepare students for the exam, completion of a standard internship program, knowledge about the INCE

International Nurse Licensure: Predictor Factors Associated With Passing the Indonesian Nurse Competency Examination

Takdir Tahir, Dr, Ns; Suni Hariati, Dr, Ns; Fifi Riskayani, Ns; and Midawati Djafar, Ns

Background: The Indonesian Nurse Competency Examination (INCE) has been designed as a legally defensible, psychometrically sound examination to measure readiness for entry to practice in Indonesia. **Purpose:** This study aimed to explore the predictor factors associated with the nurses passing the INCE. **Methods:** In this cross-sectional study, 727 participants (estimated sample was 720) were secured using consecutive sampling. The survey instrument, which collected participant demographics and characteristics of institutions, was developed by the research team and underwent testing for validity and reliability. **Results:** INCE pass rate was associated with age ($p = .00$), grade point average ($p = .00$), examination status ($p = .00$), region of the university ($p = .00$), completion of a standard internship program ($p = .001$), knowledge about the INCE blueprint ($p = .001$), preparation for the examination from the institution ($p = .011$), and taking the national predictor examination ($p = .002$). The most predictive factor for passing the INCE was the completion of a standard internship program ($p = .029$; $OR = 3.204$). **Conclusion:** Completion of a standard internship program was the main factor that predicted whether a participant passed the INCE. Thus, nursing universities need to provide internship programs based on the national standard. Future research is needed related to other factors that were associated with passing the INCE.

Keywords: Competence examination, standard internship program, Association of Indonesian Nurse Education Center, examination preparation from the institution, national predictor examination, nurse licensure.

Nurses represent just one professional health service provider that must prove competency through competency test evaluation (Valizadeh et al., 2019). In Indonesia, the Association of Indonesian Nurse Education Center (AINEC) is charged with the maintenance of minimum practice standards for nurses entering the workforce. Like similar organizations in other countries, the AINEC is dedicated to developing psychometrically sound and legally defensible nurse licensure and certification examinations consistent with current practice (Kariasa et al., 2019). The Indonesian Nurse Competency Examination (INCE), which is a psychometrically sound standardized licensure examination to ensure the competence of entry-level nurses, is one part of that maintenance (Haryanti et al., 2016). Likewise, the purpose of competency examinations is to ensure graduate competency as evidenced by a registration certificate, which in this case is the competence of nurse generalists according to the regulation of the Ministry of Health of the Republic of Indonesia.

Like Indonesia, many other countries require competency examinations before healthcare workers can be licensed for professional practice, including the National Nursing Licensure Examination in China, the NCLEX-RN in the United States, and the Nursing Licensing Examination in Korea (Hou et al., 2019). Also similar to Indonesia, these countries use competency examination and accreditation status as parameters to determine the quality of nursing programs (Sears et al., 2015). INCE pass rates are a primary outcome metric for nursing education in Indonesia.

The INCE is computer based and is held three times per year (Kariasa et al., 2019). The passing score set by the national committee of the INCE is 47.8% (participants must provide the correct answer for at least 86 of 180 questions within 180 minutes). As a result, nursing programs are generally judged on their first-time INCE pass rate. According to data that were collected using the national data downloaded from the INCE website, 18,403 of 58,791 participants (31.3%) did not pass the INCE in 2017, 19,699 of 61,834 participants (31.9%) did not pass in 2018, and 20,691 of 59,796 participants (34.6%) did not pass in 2019. Several factors may have influenced this increased failure rate, including that many nursing schools do not hold exit examinations so that the institution does not feel it can be held responsible for whether their students pass the INCE. Also, several institutions have not implemented competency test–based questions during lectures, which means that students are not used to answering the type of questions

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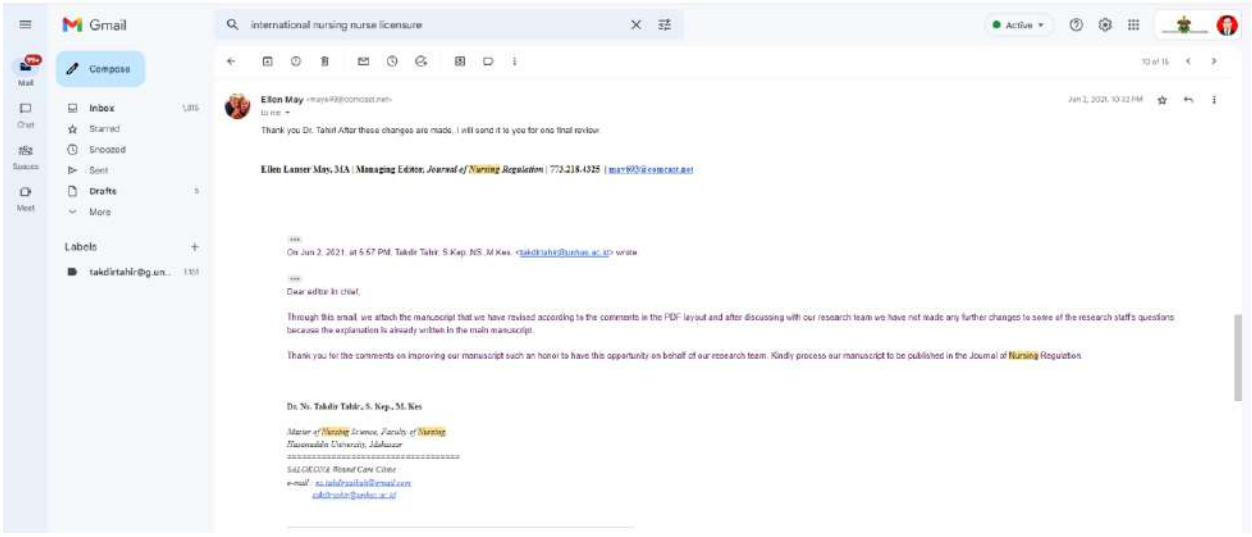
Conflict of Interest: None

29. 02 Juni 2021



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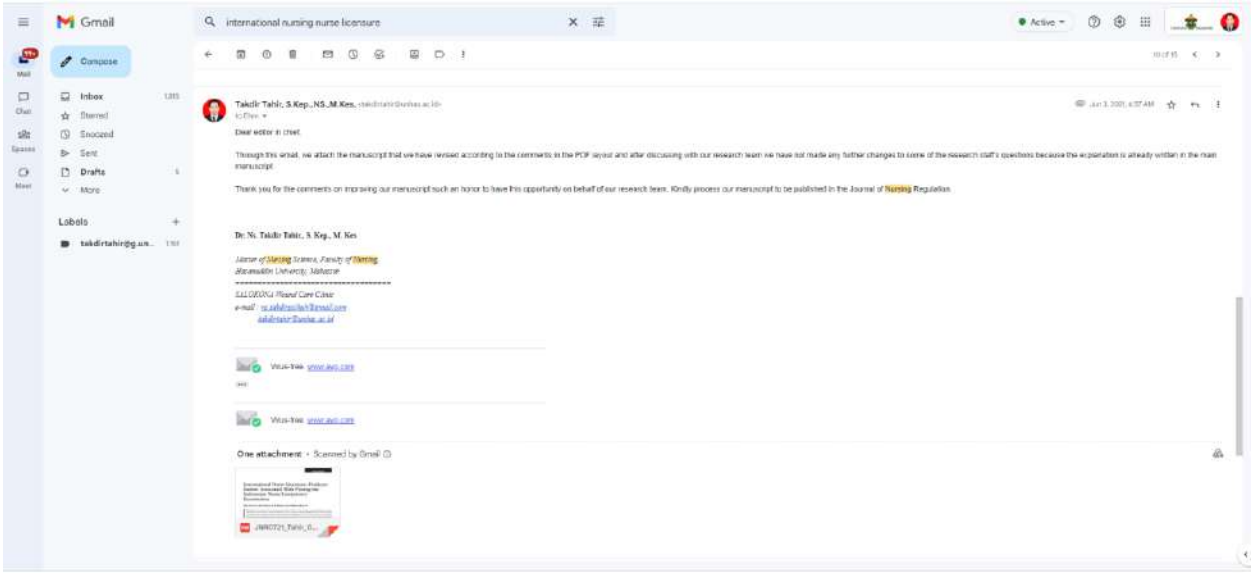
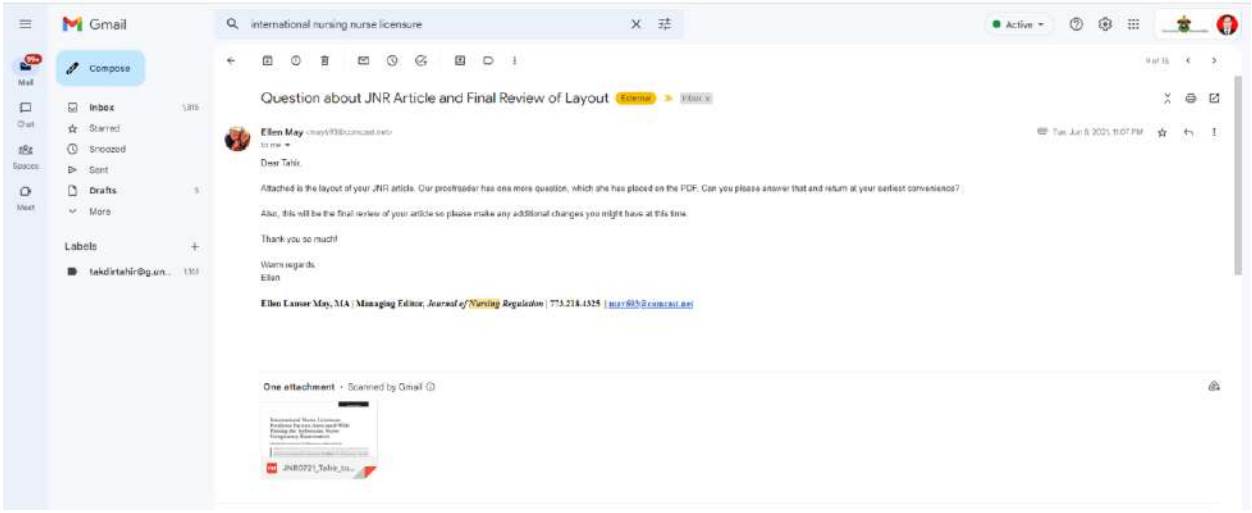


31. 08 Juni 2021



32. 08 Juni 2021 (Lampiran 1: "JNR0721_Tahir_to author_0608")

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used in the INCE. Regardless of these factors, previously published studies have shown that until 2018, the low overall INCE pass rate of under 70% was still a problem (Masfuri, 2018).

Faculty are in the best position to prepare nurses for licensure examinations. Given the cost of higher education, it seems wise and ethical to provide every resource available to students to assist them with passing competency examinations (Smith Glasgow et al., 2019). The majority of students and faculty are concerned about student performance on the INCE. One of the ways to measure the quality or reputation of nursing institutions in Indonesia is through the institution's alumni who have passed the INCE. The low pass rate is caused by several factors, including examination readiness, use of national predictor examinations, and academic achievement (Hartina et al., 2017). Similar to Indonesia, in the United States, several factors were investigated to identify predictors of NCLEX-RN performance, including course grades, grade point average (GPA), and standardized tests (Daley et al., 2018). One study found that a transition course for senior-level nursing students that focused on standardized testing and test-taking strategies, remediation, faculty success, and student ownership of success improved the pass rate at a U.S. nursing school (Christensen, 2018). A review article reported several other strategies that were introduced to improve the pass rate of NCLEX-RN, including online coaching, remediation contract, exit examination review, problem-solving and clinical judgment courses, training and debriefing for a competency examination, adaptive quizzing system course and test, educational curriculum, learning method revision, and locus of control identification (Mushawwir et al., 2019).

Previous research has reported that students find it easier to answer competency examination questions because students are active and diligent in following a whole series of theories and skills during lectures, which have an impact on increasing pass rates on competency examinations (Abdillah, 2019). Likewise, Wardani's research showed that training strategies and motivations, such as attending workshops or seminars that discuss tips and tricks for passing competency tests, provided by clinical instructors, predicted success on the competency examination in Yogyakarta, Indonesia (Wardani, 2019). In students at risk, success in competency examinations depends on a combination of mentoring and strategy teaching and learning that can help students become confident and critical thinkers. Mentoring for lecturers is a vital component of this transformative process (Corrigan-Magaldi et al., 2014). This study aimed to explore the predictors of the INCE pass rate. Understanding the predictors of INCE performance can then help guide initiatives to improve nurses' success in passing the INCE.

Methods

Study Design

A cross-sectional design was used to analyze factors that were associated with passing the INCE over three testing periods in 2019 in Indonesia. The INCE is administered throughout Indonesia, spread over 12 regions, but participants in this research study were from 5 regions: (a) Sulawesi and Gorontalo, (b) Java, (c) Sumatera, (d) Bali and Nusa Tenggara, and (e) Papua and Maluku.

Sample

A total of 49,979 nurses took the INCE during 2019 (first period, 16,417; second period, 13,058; third period, 20,504). The pass rate during those three periods ranged from 48% to 68%. The required sample size for the present study was calculated using sample size estimation for calculating population proportion.

In this study, the estimated proportion was 50%, the absolute level of proportion was 5%, and the confidence interval was 99%. The required sample size based on that formula was 655. To account for incomplete data and dropout, we sought an additional 65 participants (10%), leading to a total of 720 participants required.

$$n = deff \times \frac{N\hat{p}\hat{q}}{\frac{d^2}{1.96^2}(N-1) + \hat{p}\hat{q}}$$

where

n = sample size
$deff$ = design effort
N = population size
$\hat{p}$ = the estimated proportion
$\hat{q} = 1 - \hat{p}$
d = desired absolute precision or absolute level of precision

A link to the questionnaire was sent to the faculty and alumni coordinator or person in charge as assigned by the administrator at each of the nursing schools in Indonesia. The person in charge distributed the survey to alumni to recruit volunteer participants. Consecutive sampling was used. Participants were required to have graduated from a nursing school between 2012 and 2019. The study objectives, process, and confidentiality and the participants' right to withdraw from the study at any time were explained. All participants provided written informed consent before beginning the questionnaires. Ultimately, 727 responses were received and included in the study findings. These participants represented 34 nursing schools in 11 regions in Indonesia.

Survey Instrument

The instrument used in this study gathered information regarding nurses' socioeconomic characteristics, completion of a standard internship program, preparation for the examination from the institution, knowledge about the INCE blueprint, taking the national predictor examination, psychological health, and general health. Socioeconomic characteristics were assessed by a questionnaire consisting of age, gender, university funding status (public or private), grade point average, examination status (ie, number of times the INCE was taken), and region of the university. Questions regarding examination preparation from the institution, completion of a standard internship program, knowledge about the INCE blueprint,

taking the national predictor examination, psychological health, and general health were developed using a Guttman scale. Validity and reliability tests revealed a Pearson product-moment correlation coefficient of 0.83. The questionnaire regarding examination preparation from the institution consisted of 6 questions; completion of a standard internship program, 10 questions; knowledge about the INCE blueprint, 10 questions; taking the national predictor examination, 10 questions; psychological status, 5 questions; and general health status, 5 questions. The variables were divided into categories and means were calculated.

The dependent variable (INCE pass status defined as "competent" for those who passed on their first attempt and "not competent" for those who did not pass on their first attempt) was collected using the national data downloaded from the INCE website. Using the Angoff method, the passing score for the INCE in 2019 was determined to be 47.8%.

Data Analyses

A Google form was used for data collection. The related factors of INCE pass status were performed using bivariate and multivariate analyses. Frequency distributions and descriptive statistics were conducted to describe participant characteristics. Chi-squared (χ^2) statistics were used to test associations between socioeconomic characteristics, examination preparation from the institution, completion of a standard internship program, knowledge about the INCE blueprint, participating in the national predictor examination, psychological health, and general health to INCE status. Multivariate analysis used logistic regression models to examine the factors that best predicted INCE status.

Ethical Statement

The informed consent form was collected electronically. The participants were required to fill out an informed consent form by clicking on the "agree" button on the screen after reading information regarding the research project and before being given full access to the survey instrument. Respondents' identities and responses were kept confidential. This research obtained ethical approval (No.60/H.4.8.4.5.31/PP36-KOMETIK/2019) from the Health Research Ethics Commission of Hasanuddin University.

Results

Association Between Participant Characteristic and INCE Status

A total of 727 bachelor nurse alumni participated in this study. Table 1 shows the respondent characteristic by INCE pass status. The majority of the respondents was female (n = 512, 70.4%), and the majority of male (n = 127, 59.1%) and female respondents (n = 275, 53.7%) were identified as not competent. Most participants (n = 433, 59.6%) were aged between 20 and 25 years, and most participants in this age range were competent (n = 232, 53.6%). Most participants attending private universities (n = 309, 56.4%) and public universities (n = 93, 52.0%) had an INCE status of not competent. The majority of participants who had a GPA higher than 3.50 were INCE competent (n = 473, 56%). All participants who had taken the examination two times (n = 50) or more than two times (n = 352) were considered not competent (100%). The regions with the largest proportions of participants who were considered INCE competent were Java (n = 83, 74.7%), Bali and Nusa Tenggara (n = 78,91%), and Papua and Maluku (n = 49, 77.6%). Table 1 shows the relationship of characteristics with INCE status. Age, GPA, examination status, and region of the university were significant factors ($p < .05$) related to INCE status.

Related Factors of INCE Status

The remaining factors investigated related to INCE status are shown in Table 2. Among the 727 participants who had good preparation for the examination from the institution (n = 601), 46.9% were INCE competent, whereas 34.1% of those with poor preparation for the examination from the institution were INCE competent. Participants who completed a standard internship program were more likely to be INCE competent than those who did not complete a standard internship program (46.0% vs. 15.6%, respectively). Most of the participants who participated in the national predictor examination more than once (52.2%) were competent. Participants with poor knowledge about the INCE blueprint were more likely to be competent (51.7%) than those with good knowledge (39.3%). Table 2 also shows the relationship of the related factor for INCE pass status. The internship program, knowledge about the INCE blueprint, examination preparation from the institution, and national predictor examination were statistically significant ($p < .05$) with INCE pass status.

Table 3 shows the predictive factors that qualified for logistic regression analysis. There are seven predictors (age, GPA, region of university, preparation for the examination from the institution, completion of a standard internship program, participation in the national predictor examination, and knowledge about the INCE blueprint) that had p values < .05. These predictor factors were analyzed using logistic regression as shown in Table 4. Model 2 shows that age, GPA, region of the university, completion of an internship program, and knowledge about the INCE blueprint were the significant independent variables associated with INCE pass status. Examination preparation from the institution and participating in the national predictor examination served as confounding factors that influenced the INCE pass status and independent variables (ie, age, GPA, region of university, completion of a standard internship program, and knowledge about the INCE blueprint). The dominant variable that influenced the INCE pass status was the completion of a standard internship program (OR = 3.204). Students at universities who completed a standard internship program were 3.204 times more likely than students without such access to pass the INCE.

TABLE 1

Relationship Between Participant Characteristic and INCE Status (*N* = 727)

Characteristic	Total *N* = 727 *n* (%)	INCE Status: Competent *n* (%)	INCE Status: Not Competent *n* (%)	*p*[a]
Gender				.213
Male	215 (29.6)	88 (40.9)	127 (59.1)	
Female	512 (70.4)	237 (46.3)	275 (53.7)	
Age (years)				.000*
20–25	433 (59.6)	232 (53.6)	201 (46.4)	
26–45	286 (39.3)	87 (30.4)	199 (69.6)	
46–65	8 (1.1)	6 (75.0)	2 (25.0)	
University Funding Status				.343
Public	179 (24.6)	86 (48.0)	93 (52.0)	
Private	548 (75.4)	239 (43.6)	309 (56.4)	
Grade Point Average				.000*
3.00–3.50	254 (34.9)	60 (23.6)	194 (76.4)	
3.50–4.00	473 (65.1)	265 (56.0)	208 (44.0)	
Examination Status				.000*
First examination	325 (44.7)	325 (100.0)	0 (0.0)	
Second examination	50 (6.9)	0 (0.0)	50 (100.0)	
> 2 examinations	352 (48.4)	0 (0.0)	352 (100.0)	
Region of University				.000*
Sulawesi and Gorontalo	442 (60.8)	136 (30.8)	306 (69.2)	
Java	83 (11.4)	62 (74.7)	21 (25.3)	
Sumatra	75 (10.3)	18 (24.0)	57 (76.0)	
Bali and Nusa Tenggara	78 (10.7)	71 (91.0)	7 (9.0)	
Papua and Maluku	49 (6.7)	38 (77.6)	11 (22.4)	

Note. INCE = Indonesian Nurse Competency Examination.
[a] Chi-square test
* $p < .05$

Discussion

Association Between GPA and INCE Pass Status

The results of this study show that GPA is one of the independent variables associated with INCE status. Previous studies have reported that there is a relationship between a nurse's GPA and passing the competency test (Hartina et al., 2017; Lukmanulhakim & Pusporini, 2018). In the United States, students who had a GPA of 3.80 or higher had an 11% greater chance of passing the competency test than students with a GPA of less than 3.80 (Wambuguh et al., 2016). In Indonesia, nurses with high academic ability that was assessed based on GPA generally passed the competency examination (Syah, 2017). Students with a high GPA at academic and professional stages tend to have high motivation, study diligently, and have good intellectual and technical analysis skills (Kim et al., 2019).

The academic GPA referred to in this study is the cumulative value obtained by respondents during their undergraduate program. Students who achieve an academic GPA equal to or above 3.00 are assumed to have a good understanding of the subjects that have been learned. They will likely be able to understand the concepts and theories obtained during the lecture process, so they have better analytical skills that make it easier for these students to answer questions on the INCE (Hartina et al., 2017).

Association Between Completion of Standard Internship Program and INCE Pass Status

The dominant variable in the present study that influenced INCE pass status was the completion of a standard internship program at the university (*OR* = 3.204). When a nurse fails the INCE, it can affect the student, the university where the student attended, and, in some cases, the employer. Thus, the integrated curriculum must

TABLE 2

Related Factors for INCE Status (*N* = 727)

Characteristic	Total *N* = 727	INCE Status		*p*[a]
		Competent	Not Competent	
	n (%)	*n* (%)	*n* (%)	
Examination Preparation From the Institution				.011*
Good	601 (82.7)	282 (46.9)	319 (53.1)	
Poor	126 (17.3)	43 (34.1)	83 (65.9)	
Completion of Internship Program				.001*
Standard	695 (95.6)	320 (46.0)	375 (54.0)	
Not standard	32 (4.4)	5 (15.6)	27 (84.4)	
National Predictor Examination				.002*
Never participated	106 (14.6)	33 (31.1)	73 (68.9)	
Completed once	435 (59.8)	195 (44.8)	240 (55.2)	
Completed more than once	186 (25.6)	97 (52.2)	89 (47.8)	
Knowledge About the INCE Blueprint				.001*
Good	412 (56.7)	162 (39.3)	250 (60.7)	
Poor	315 (43.3)	163 (51.7)	152 (48.3)	
Psychological Status				.121
Anxiety	644 (88.6)	295 (45.8)	349 (54.2)	
No anxiety	83 (11.4)	30 (36.1)	53 (63.9)	
Health Status				.608
Healthy	703 (96.7)	316 (45.0)	387 (55.0)	
Sick	24 (3.3)	9 (37.5)	15 (62.5)	

Note. INCE = Indonesia Nurse Competency Examination.
[a] Chi-square test.
* $p < .05$

include training at the professional level (Haryanti et al., 2016). Nursing professional practice is a practical activity in hospitals with the implementation of nursing theory during academic learning (Lestari, 2014). Additionally, professional practice in a hospital internship setting can provide professional development, improve patient care skills, and hone analytical skills in solving various real cases both in the hospital and community (Haryanti et al., 2016).

Institutions must prepare students to take competency examinations. Preparation can be done through academic stages and nursing professional practice systems in a hospital or community. An online study by Czekanski et al. (2018) showed that gaining competence, theory, and learning experience in practical fields that support the growth and development of professional abilities is needed by every student. Integrating academic education and a nursing professional practice system is a standard curriculum between nursing theory in the academic stage and clinical experience in the professional practice stage (Czekanski et al., 2018).

Nursing professional practice plays an important role in increasing graduation because INCE questions are based on real patient cases (the patient's illness, medical history, etc.) and the care that is provided until the patient's condition is resolved. After the nursing professional practice stage, students will be accustomed to dealing with real patient cases, thus making it easier for students to answer competency examination questions and improving the likelihood of passing.

Educational curriculum development is a strategy that strengthens student knowledge by constructing curriculum contents that reflect the essence of education of professional nurses and other professional standards (Shoemaker et al., 2017). In addition to an integrated curriculum, professional education can enhance student skills in critical thinking and reflection, such as concept mapping, case reflection, disease history data, analysis, nursing problem determination, and nursing care management (Corrigan-Magaldi et al., 2014). It may also help prepare students to answer competency test questions.

For example, the NCLEX-RN preparation strategy implemented at Alabama University includes the application of a clinical nursing course, which is a combination of clinical and theoretical activities at one time, classroom lectures, and discussion of case studies, simulations, and other interactive learning strategies. Students are also assigned to conduct case studies outside the classroom, which allow students to gain clinical reasoning based on

TABLE 3

Predictive Factors Selected for Logistic Regression Analysis

Variables	*p*
Age	.000
Grade point average	.000
Region of university	.000
Examination preparation from the institution	.009
Completion of standard internship program	.002
Participation in national predictor examination	.001
Knowledge about the INCE blueprint	.001

Note. INCE = Indonesia Nursing Competency Examination.

existing theoretical concepts. At the end of the program, students take an exit examination to assess their ability, and the passing grade scores are adjusted to the passing grade competency examination scores (Mager et al., 2017).

Association Between National Predictor Examination and INCE Pass Status

The national predictor examination is a practice examination for nurses before they take the INCE (Haryanti et al., 2016). The most valuable component of a predictor examination is the use of good quality test questions that reflect the actual test implementation (Kariasa et al., 2019). In Indonesia, before the INCE is held, most nursing institutions conduct preparation sessions, such as providing debriefing or theoretical review during lectures for approximately 2 weeks, and most institutions giving students practice answering questions that resemble INCE questions. In addition, the national committee of the INCE also provides opportunities for all institutions to include their students in the national predictor examination, which is held three times before each INCE. The results of each predictor examination are announced on the INCE website, and each participating institution provides assistance to those students who did not pass by reviewing the obstacles those students faced.

A previous study revealed that 85% of participants who had taken the predictor examination were more ready to take the INCE than those who received only an explanation of INCE implementation. Furthermore, the results of the predictor examination evaluation can be used as a predictor for passing the INCE (Krisdianto & Kusumawati, 2019). Better predictor examination results indicate a greater chance of passing the INCE, and worse results likewise may mean a greater chance of failure (Abdillah, 2019). These results agree with a previous study that revealed that 86.4% of participants who passed the INCE had an INCE predictor examination score greater than or equal to the INCE passing score and had a 3.4 times greater chance of passing the INCE than those whose predictor examination value was lower than the INCE passing score (Nuryati et al., 2020). Respondents who took the national predictor examination had a 20.7% chance of passing, whereas those who took it more than once had a 37.5% chance of passing (Hartina et al., 2017). Students who have participated in the predictor examination tend to be more prepared for the INCE than students who have not taken the predictor examination (Serembus, 2016).

Association Between Knowledge About the INCE Blueprint and INCE Pass Status

The INCE blueprint is a basic framework or guideline used to design the development of the examination questions. Blueprints can provide information on the topic area, a description of the material being tested, an overview of the test methods to be used, and references (Kariasa et al., 2019). Understanding the blueprint as a predictive factor becomes an important tool in determining one's readiness in taking the INCE (Krisdianto & Kusumawati, 2019). These and other studies found that the readiness of participants is directly proportional to the INCE results. Thus, better examination preparation could provide a greater chance of passing the INCE. Some aspects that become the core of readiness include cognitive maturity and physical and psychological readiness (Wardani, 2019).

A literature review found cognitive readiness to be an important factor in passing the INCE (Krisdianto & Kusumawati, 2019). Cognitive readiness requires an understanding of a given blueprint that contains the scope of the competency test questions and strategies to answer each question (Kariasa et al., 2019). Knowledge related to blueprints is obtained through training courses for dealing with the INCE. At one U.S. nursing school, students were required to take a competency examination training course to assess their knowledge. Strategies such as reviewing the blueprint for the examination were implemented to correct knowledge gaps, and the authors reported improved grades and pass rates on the NCLEX (Cole & Adams, 2014).

A study about students who took the NCLEX-RN revealed that failure was often caused by a lack of optimal preparation in terms of cognitive abilities such as a blueprint of competency examination and nursing material. Students who failed were confused and doubtful that they were answering the questions correctly (Monroe, 2019). Another study supported the understanding of the examination blueprint: a nursing program reported NCLEX-RN national pass rates from 83.8% to 87.0%, which were achieved through an understanding of the blueprint, understanding the NCLEX-RN implementation process, and answering each review question (Frith et al., 2008).

Association Between Examination Preparation From the Institution and INCE Pass Status

Based on the results of this study, the institution's role is correlated with the INCE pass status. A previous study identified extrinsic factors that contributed to the success of the competency examination, including the ability of the institution's faculty to prepare students from the first to the final semesters and to strengthen learning strategies (Wardani, 2019). A previous study also revealed

TABLE 4

Logistic Regression Result of Predictors of INCE Status

Variables	INCE Status							
	Model 1				Model 2			
	p	*OR*	95% *CI*		*p*	*OR*	95% *CI*	
			Lower	Upper			Lower	Upper
Age	.000	2.731	1.934	3.856	.000	2.715	1.925	3.830
Grade point average	.000	0.217	0.148	0.319	.000	0.218	0.149	0.319
Region of university	.000	0.516	0.439	0.607	.000	0.515	0.443	0.598
Completion of a standard internship program	.028	3.303	1.137	9.596	.029	3.204	1.124	9.135
Knowledge about the INCE blueprint	.03	0.683	0.484	0.965	.029	0.682	0.484	0.962
Examination preparation from the institution	.365	1.240	0.779	1.973				
Participation in national predictor examination	.693	1.065	0.778	1.458				

Note. INCE = Indonesia Nursing Competency Examination.

that nursing faculty must be advanced in terms of providing the best facilities and infrastructure in the learning process by using the latest information technology and updating learning resources (Corrigan-Magaldi et al., 2014). In addition, using computer-adaptive quizzing in nurse training was associated with passing the NCLEX (Pence & Wood, 2018).

The results of previous studies agree with the results of this study that the success of a competency examination depends on a combination of mentoring and teaching-learning strategies conducted by the institution to help students be confident and critical thinkers. Student involvement, a supportive learning environment, and weekly follow-up by the faculty were beneficial for the development, retention, and achievement of students in competency examinations (Corrigan-Magaldi et al., 2014).

Limitations

The primary limitation in this study is that the participants do not represent all regions that are members of AINEC who participated in the INCE in 2019. Another limitation is that participants who failed the INCE were overrepresented in this study, as 55% of respondents included in this study failed the first attempt at the INCE but approximately 35% overall failed in 2019. Additionally, participants were volunteers, and it is possible self-selection bias occurred.

Conclusion

Overall, several predictor factors that contribute to the success of the INCE are age, GPA, region of university, knowledge about the INCE blueprint, examination preparation from the institution, participation in the national predictor examination, and access to a standard internship program, which had the greatest influence. The results of this study are expected to become supporting data for system improvement in institutions to better prepare students for the INCE. Also, these findings can be put to use by students to better prepare themselves before taking the INCE.

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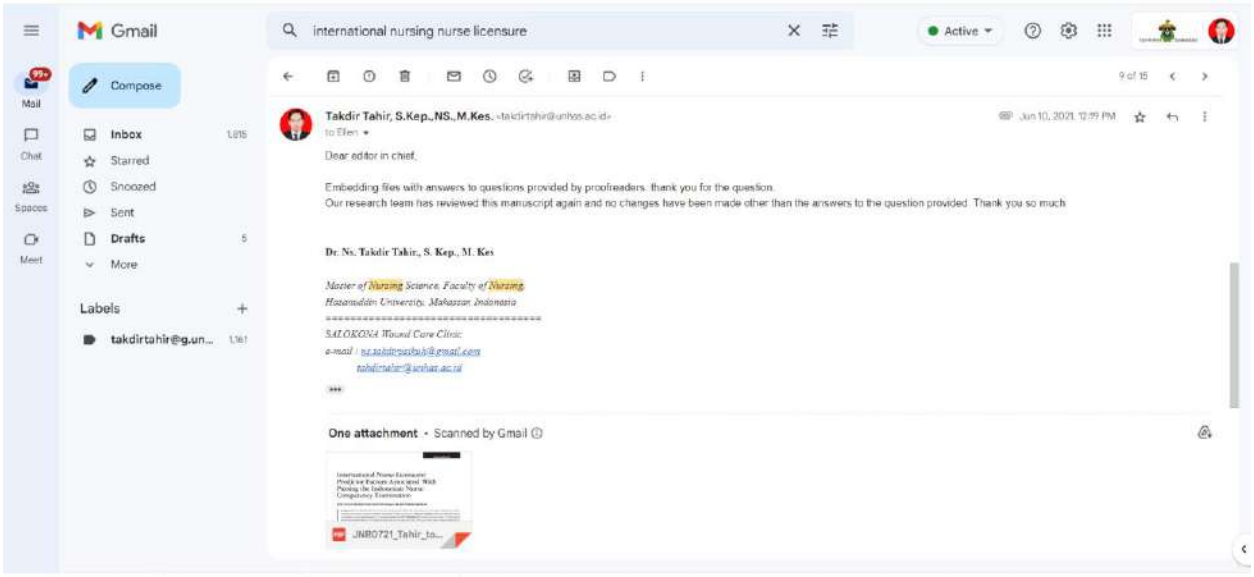

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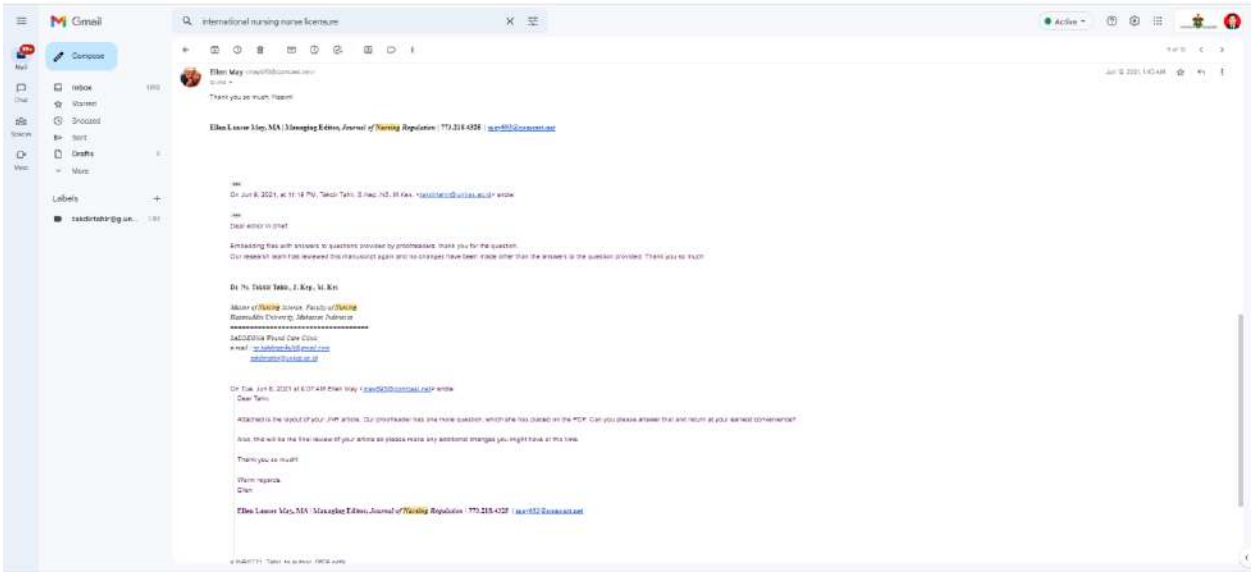

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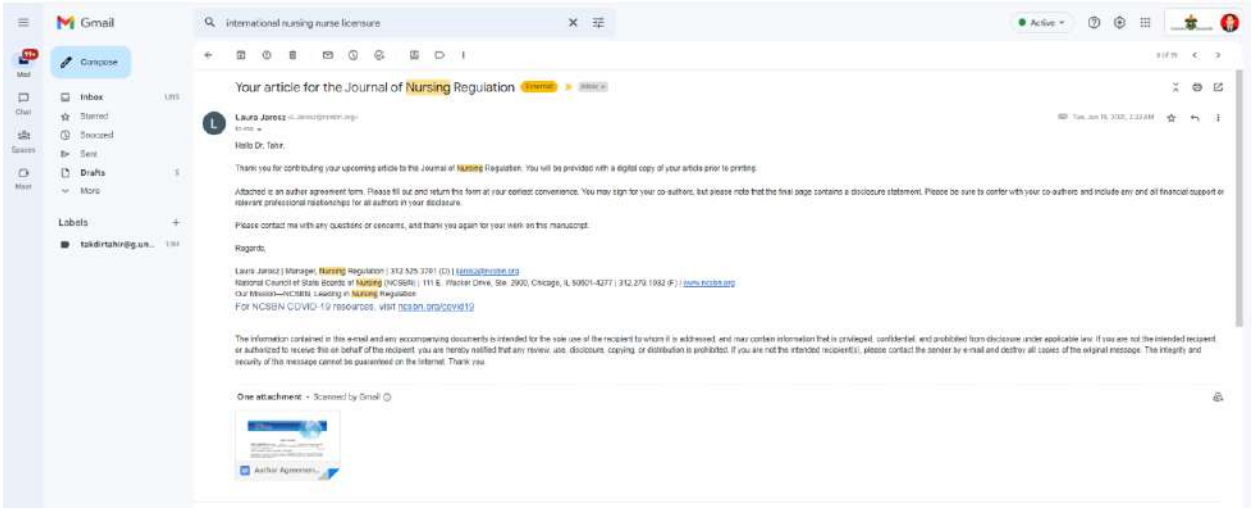

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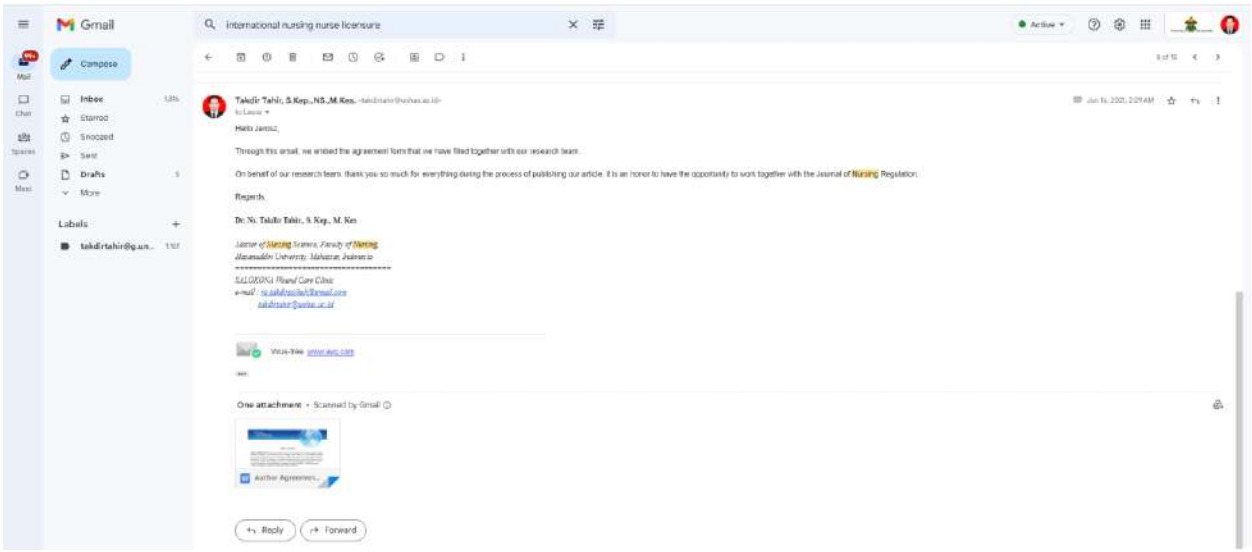

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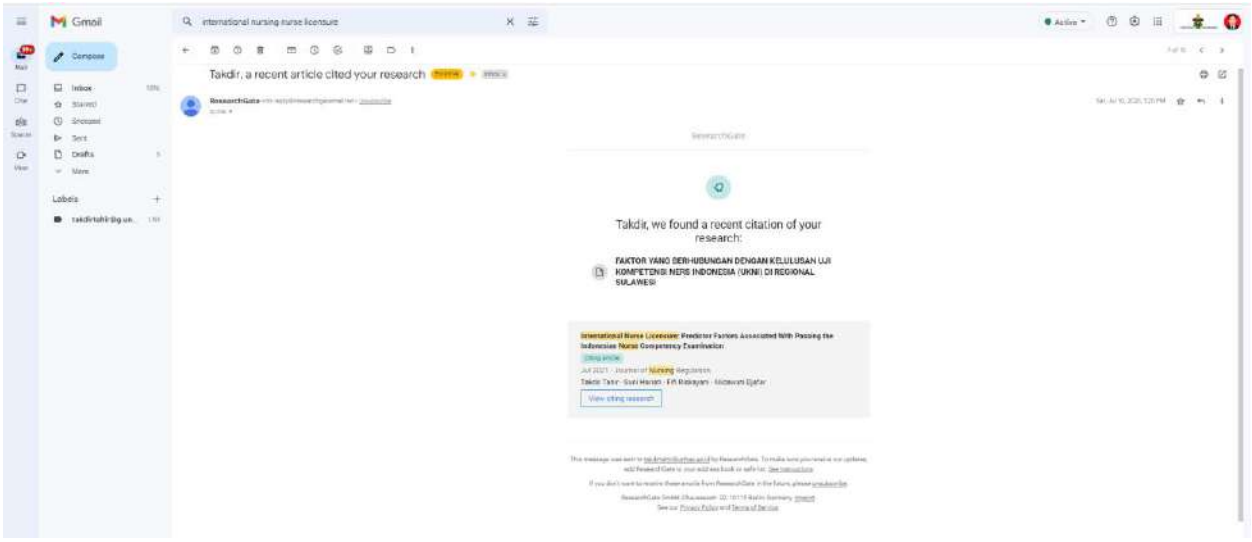

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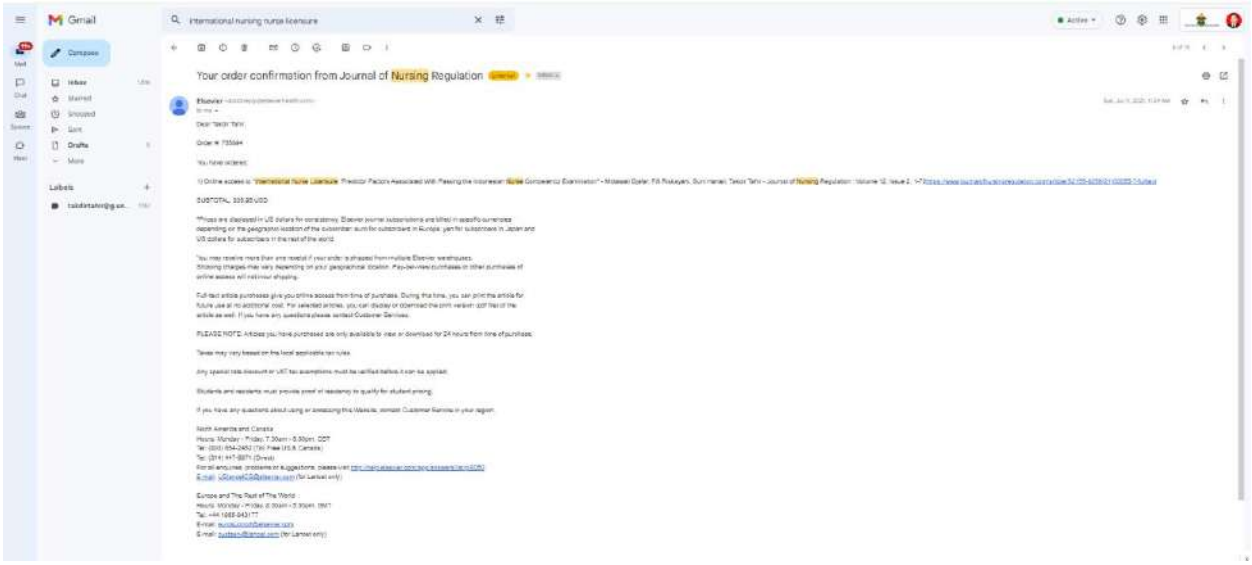

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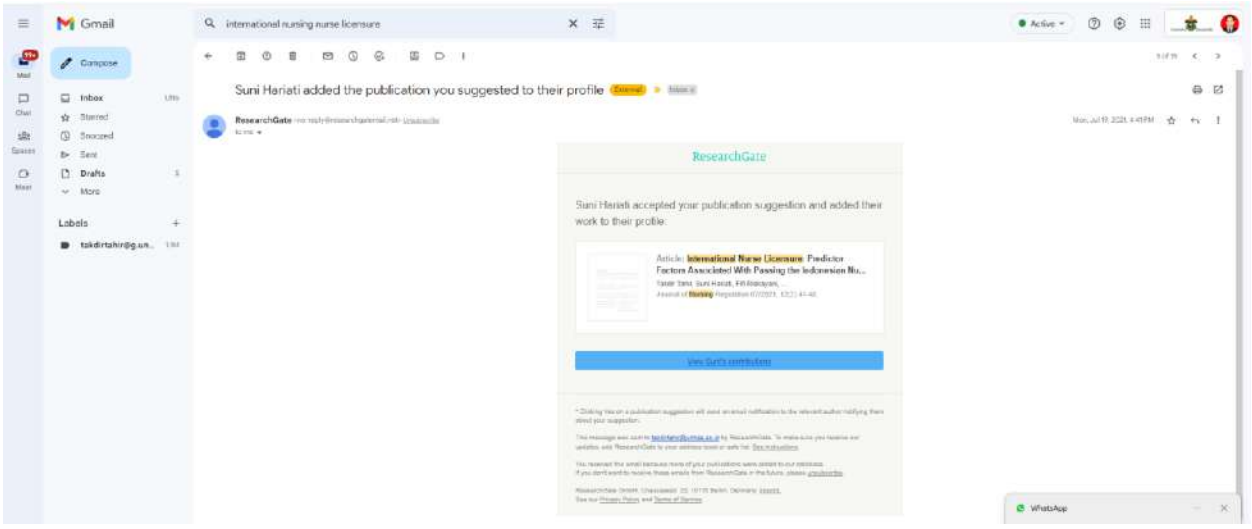

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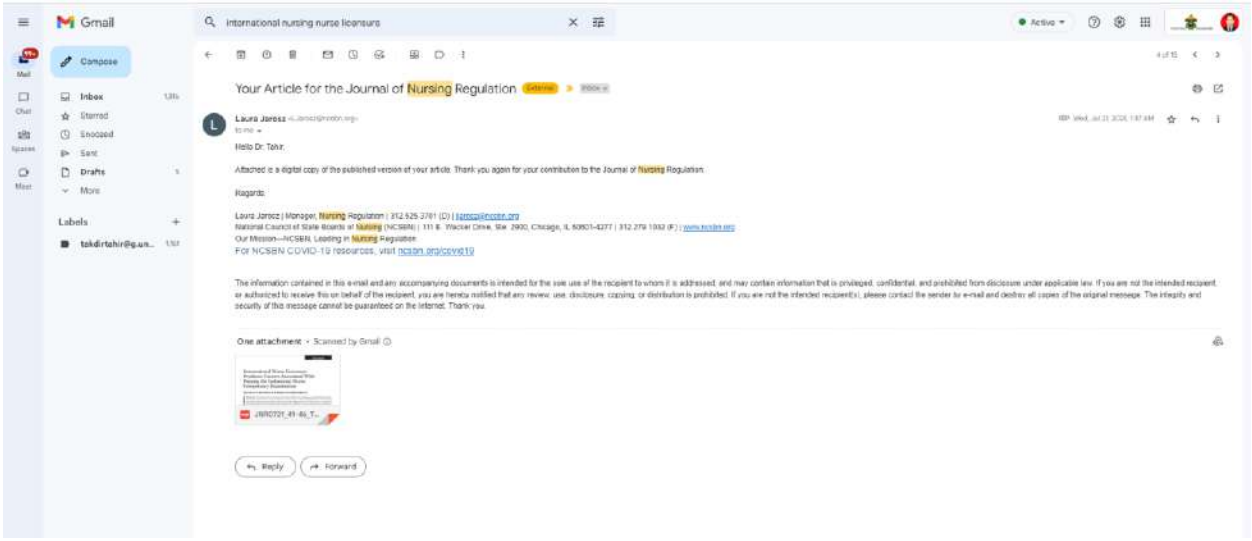

International Nurse Licensure: Predictor Factors Associated With Passing the Indonesian Nurse Competency Examination

Takdir Tahir, Dr, Ns; Suni Hariati, Dr, Ns; Fifi Riskayani, Ns; and Midawati Djafar, Ns

Background: The Indonesian Nurse Competency Examination (INCE) has been designed as a legally defensible, psychometrically sound examination to measure readiness for entry to practice in Indonesia. **Purpose:** This study aimed to explore the predictor factors associated with the nurses passing the INCE. **Methods:** In this cross-sectional study, 727 participants (estimated sample size was 720) were secured using consecutive sampling. The survey instrument, which collected participant demographics and characteristics of institutions, was developed by the research team and underwent testing for validity and reliability. **Results:** INCE pass rate was associated with age ($p = .00$), grade point average ($p = .00$), examination status ($p = .00$), region of the university ($p = .00$), completion of a standard internship program ($p = .001$), knowledge about the INCE blueprint ($p = .001$), preparation for the examination from the institution ($p = .011$), and taking the national predictor examination ($p = .002$). The most predictive factor for passing the INCE was the completion of a standard internship program ($p = .029$; $OR = 3.204$). **Conclusion:** Completion of a standard internship program was the main factor that predicted whether a participant passed the INCE. Thus, nursing universities need to provide internship programs based on the national standard. Additional research is needed related to other factors that were associated with passing the INCE.

Keywords: Competence examination, standard internship program, Association of Indonesian Nurse Education Center, examination preparation from the institution, national predictor examination, nurse licensure.

Nurses represent just one professional health service provider that must prove competency through competency test evaluation (Valizadeh et al., 2019). In Indonesia, the Association of Indonesian Nurse Education Center (AINEC) is charged with the maintenance of minimum practice standards for nurses entering the workforce. Like similar organizations in other countries, the AINEC is dedicated to developing psychometrically sound and legally defensible nurse licensure and certification examinations consistent with current practice (Kariasa et al., 2019). The Indonesian Nurse Competency Examination (INCE), which is a psychometrically sound standardized licensure examination to ensure the competence of entry-level nurses, is one part of that maintenance (Haryanti et al., 2016). Likewise, the purpose of competency examinations is to ensure graduate competency as evidenced by a registration certificate, which in this case is the competence of nurse generalists according to the regulation of the Ministry of Health of the Republic of Indonesia.

Like Indonesia, many other countries require competency examinations before healthcare workers can be licensed for professional practice, including the National Nursing Licensure Examination in China, the NCLEX-RN in the United States, and the Nursing Licensing Examination in Korea (Hou et al., 2019). Also similar to Indonesia, these countries use competency examination and accreditation status as parameters to determine the quality of nursing programs (Sears et al., 2015). INCE pass rates are a primary outcome metric for nursing education in Indonesia.

The INCE is computer based and is held three times per year (Kariasa et al., 2019). The passing score set by the national committee of the INCE is 47.8% (participants must provide the correct answer for at least 86 of 180 questions within 180 minutes). As a result, nursing programs are generally judged on their first-time INCE pass rate. According to data that were collected using the national data downloaded from the INCE website, 18,403 of 58,791 participants (31.3%) did not pass the INCE in 2017, 19,699 of 61,834 participants (31.9%) did not pass in 2018, and 20,691 of 49,979 participants (34.6%) did not pass in 2019. Several factors may have influenced this increased failure rate, including that many nursing schools do not hold exit examinations so that the institution does not feel it can be held responsible for whether their students pass the INCE. Also, several institutions have not implemented competency test–based questions during lectures, which means that students are not used to answering the type of questions

used in the INCE. Regardless of these factors, previously published studies have shown that until 2018, the low overall INCE pass rate of under 70% was still a problem (Masfuri, 2018).

Faculty are in the best position to prepare nurses for licensure examinations. Given the cost of higher education, it seems wise and ethical to provide every resource available to students to assist them with passing competency examinations (Smith Glasgow et al., 2019). The majority of students and faculty are concerned about student performance on the INCE. One of the ways to measure the quality or reputation of nursing institutions in Indonesia is through the institution's alumni who have passed the INCE. The low pass rate is caused by several factors, including examination readiness, use of national predictor examinations, and academic achievement (Hartina et al., 2017). Similar to Indonesia, in the United States, several factors were investigated to identify predictors of NCLEX-RN performance, including course grades, grade point average (GPA), and standardized tests (Daley et al., 2018). One study found that a transition course for senior-level nursing students that focused on standardized testing and test-taking strategies, remediation, faculty success, and student ownership of success improved the pass rate at a U.S. nursing school (Christensen, 2018). A review article reported several other strategies that were introduced to improve the pass rate of NCLEX-RN, including online coaching, remediation contract, exit examination review, problem-solving and clinical judgment courses, training and debriefing for a competency examination, adaptive quizzing system course and test, educational curriculum, learning method revision, and locus of control identification (Mushawwir et al., 2019).

Previous research has reported that students find it easier to answer competency examination questions because students are active and diligent in following a whole series of theories and skills during lectures, which have an impact on increasing pass rates on competency examinations (Abdillah, 2019). Likewise, Wardani's research showed that training strategies and motivations, such as attending workshops or seminars that discuss tips and tricks for passing competency tests, provided by clinical instructors, predicted success on the competency examination in Yogyakarta, Indonesia (Wardani, 2019). In students at risk, success in competency examinations depends on a combination of mentoring and strategy teaching and learning that can help students become confident and critical thinkers. Mentoring for lecturers is a vital component of this transformative process (Corrigan-Magaldi et al., 2014). This study aimed to explore the predictors of the INCE pass rate. Understanding the predictors of INCE performance can then help guide initiatives to improve nurses' success in passing the INCE.

Methods

Study Design

A cross-sectional design was used to analyze factors that were associated with passing the INCE over three testing periods in 2019 in Indonesia. The INCE is administered throughout Indonesia, spread over 12 regions, but participants in this research study were from 5 regions: (a) Sulawesi and Gorontalo, (b) Java, (c) Sumatera, (d) Bali and Nusa Tenggara, and (e) Papua and Maluku.

Sample

A total of 49,979 nurses took the INCE during 2019 (first period, 16,417; second period, 13,058; third period, 20,504). The pass rate during those three periods ranged from 48% to 68%. The required sample size for the present study was calculated using sample size estimation for calculating population proportion.

In this study, the estimated proportion was 50%, the absolute level of proportion was 5%, and the confidence interval was 99%. The required sample size based on that formula was 655. To account for incomplete data and dropout, we sought an additional 65 participants (10%), leading to a total of 720 participants required.

$$n = deff \times \frac{N\hat{p}\hat{q}}{\frac{d^2}{1.96^2}(N-1) + \hat{p}\hat{q}}$$

where

n = sample size
$deff$ = design effort
N = population size
$\hat{p}$ = the estimated proportion
$\hat{q} = 1 - \hat{p}$
d = desired absolute precision or absolute level of precision

A link to the questionnaire was sent to the faculty and alumni coordinator or person in charge as assigned by the administrator at each of the nursing schools in Indonesia. The person in charge distributed the survey to alumni to recruit volunteer participants. Consecutive sampling was used. Participants were required to have graduated from a nursing school between 2012 and 2019. The study objectives, process, and confidentiality and the participants' right to withdraw from the study at any time were explained. All participants provided written informed consent before beginning the questionnaires. Ultimately, 727 responses were received and included in the study findings. These participants represented 34 nursing schools in 11 regions in Indonesia.

Survey Instrument

The instrument used in this study gathered information regarding nurses' socioeconomic characteristics, completion of a standard internship program, preparation for the examination from the institution, knowledge about the INCE blueprint, taking the national predictor examination, psychological health, and general health. Socioeconomic characteristics were assessed by a questionnaire consisting of age, gender, university funding status (public or private), grade point average, examination status (ie, number of times the INCE was taken), and region of the university. Questions regarding examination preparation from the institution, completion of a standard internship program, knowledge about the INCE blueprint,

taking the national predictor examination, psychological health, and general health were developed using a Guttman scale. Validity and reliability tests revealed a Pearson product-moment correlation coefficient of 0.83. The questionnaire regarding examination preparation from the institution consisted of 6 questions; completion of a standard internship program, 10 questions; knowledge about the INCE blueprint, 10 questions; taking the national predictor examination, 10 questions; psychological status, 5 questions; and general health status, 5 questions. The variables were divided into categories and means were calculated.

The dependent variable (INCE pass status defined as "competent" for those who passed on their first attempt and "not competent" for those who did not pass on their first attempt) was collected using the national data downloaded from the INCE website. Using the Angoff method, the passing score for the INCE in 2019 was determined to be 47.8%.

Data Analyses

A Google form was used for data collection. The related factors of INCE pass status were performed using bivariate and multivariate analyses. Frequency distributions and descriptive statistics were conducted to describe participant characteristics. Chi-squared (χ^2) statistics were used to test associations between socioeconomic characteristics, examination preparation from the institution, completion of a standard internship program, knowledge about the INCE blueprint, participating in the national predictor examination, psychological health, and general health to INCE status. Multivariate analysis used logistic regression models to examine the factors that best predicted INCE status.

Ethical Statement

The informed consent form was collected electronically. The participants were required to fill out an informed consent form by clicking on the "agree" button on the screen after reading information regarding the research project and before being given full access to the survey instrument. Respondents' identities and responses were kept confidential. This research obtained ethical approval (No.60/H.4.8.4.5.31/PP36-KOMETIK/2019) from the Health Research Ethics Commission of Hasanuddin University.

Results

Association Between Participant Characteristic and INCE Status

A total of 727 bachelor nurse alumni participated in this study. Table 1 shows the respondent characteristic by INCE pass status. The majority of the respondents was female (n = 512, 70.4%), and the majority of male (n = 127, 59.1%) and female respondents (n = 275, 53.7%) were identified as not competent. Most participants (n = 433, 59.6%) were aged between 20 and 25 years, and most participants in this age range were competent (n = 232, 53.6%). Most participants attending private universities (n = 309, 56.4%) and public universities (n = 93, 52.0%) had an INCE status of not competent. The majority of participants who had a GPA higher than 3.50 were INCE competent (n = 473, 56%). All participants who had taken the examination two times (n = 50) or more than two times (n = 352) were considered not competent (100%). The regions with the largest proportions of participants who were considered INCE competent were Java (n = 83, 74.7%), Bali and Nusa Tenggara (n = 78,91%), and Papua and Maluku (n = 49, 77.6%). Table 1 shows the relationship of characteristics with INCE status. Age, GPA, examination status, and region of the university were significant factors ($p < .05$) related to INCE status.

Related Factors of INCE Status

The remaining factors investigated related to INCE status are shown in Table 2. Among the 727 participants who had good preparation for the examination from the institution (n = 601), 46.9% were INCE competent, whereas 34.1% of those with poor preparation for the examination from the institution were INCE competent. Participants who completed a standard internship program were more likely to be INCE competent than those who did not complete a standard internship program (46.0% vs. 15.6%, respectively). Most of the participants who participated in the national predictor examination more than once (52.2%) were competent. Participants with poor knowledge about the INCE blueprint were more likely to be competent (51.7%) than those with good knowledge (39.3%). Table 2 also shows the relationship of the related factor for INCE pass status. The internship program, knowledge about the INCE blueprint, examination preparation from the institution, and national predictor examination were statistically significant ($p < .05$) with INCE pass status.

Table 3 shows the predictive factors that qualified for logistic regression analysis. There are seven predictors (age, GPA, region of university, preparation for the examination from the institution, completion of a standard internship program, participation in the national predictor examination, and knowledge about the INCE blueprint) that had p values < .05. These predictor factors were analyzed using logistic regression as shown in Table 4. Model 2 shows that age, GPA, region of the university, completion of an internship program, and knowledge about the INCE blueprint were the significant independent variables associated with INCE pass status. Examination preparation from the institution and participating in the national predictor examination served as confounding factors that influenced the INCE pass status and independent variables (ie, age, GPA, region of university, completion of a standard internship program, and knowledge about the INCE blueprint). The dominant variable that influenced the INCE pass status was the completion of a standard internship program (OR = 3.204). Students at universities who completed a standard internship program were 3.204 times more likely than students without such access to pass the INCE.

TABLE 1

Relationship Between Participant Characteristic and INCE Status (*N* = 727)

Characteristic	Total *N* = 727 *n* (%)	INCE Status: Competent *n* (%)	INCE Status: Not Competent *n* (%)	*p*[a]
Gender				.213
Male	215 (29.6)	88 (40.9)	127 (59.1)	
Female	512 (70.4)	237 (46.3)	275 (53.7)	
Age (years)				.000*
20–25	433 (59.6)	232 (53.6)	201 (46.4)	
26–45	286 (39.3)	87 (30.4)	199 (69.6)	
46–65	8 (1.1)	6 (75.0)	2 (25.0)	
University Funding Status				.343
Public	179 (24.6)	86 (48.0)	93 (52.0)	
Private	548 (75.4)	239 (43.6)	309 (56.4)	
Grade Point Average				.000*
3.00–3.50	254 (34.9)	60 (23.6)	194 (76.4)	
3.50–4.00	473 (65.1)	265 (56.0)	208 (44.0)	
Examination Status				.000*
First examination	325 (44.7)	325 (100.0)	0 (0.0)	
Second examination	50 (6.9)	0 (0.0)	50 (100.0)	
> 2 examinations	352 (48.4)	0 (0.0)	352 (100.0)	
Region of University				.000*
Sulawesi and Gorontalo	442 (60.8)	136 (30.8)	306 (69.2)	
Java	83 (11.4)	62 (74.7)	21 (25.3)	
Sumatra	75 (10.3)	18 (24.0)	57 (76.0)	
Bali and Nusa Tenggara	78 (10.7)	71 (91.0)	7 (9.0)	
Papua and Maluku	49 (6.7)	38 (77.6)	11 (22.4)	

Note. INCE = Indonesian Nurse Competency Examination.
[a] Chi-square test
* $p < .05$

Discussion

Association Between GPA and INCE Pass Status

The results of this study show that GPA is one of the independent variables associated with INCE status. Previous studies have reported that there is a relationship between a nurse's GPA and passing the competency test (Hartina et al., 2017; Lukmanulhakim & Pusporini, 2018). In the United States, students who had a GPA of 3.80 or higher had an 11% greater chance of passing the competency test than students with a GPA of less than 3.80 (Wambuguh et al., 2016). In Indonesia, nurses with high academic ability that was assessed based on GPA generally passed the competency examination (Syah, 2017). Students with a high GPA at academic and professional stages tend to have high motivation, study diligently, and have good intellectual and technical analysis skills (Kim et al., 2019).

The academic GPA referred to in this study is the cumulative value obtained by respondents during their undergraduate program. Students who achieve an academic GPA equal to or above 3.00 are assumed to have a good understanding of the subjects that have been learned. They will likely be able to understand the concepts and theories obtained during the lecture process, so they have better analytical skills that make it easier for these students to answer questions on the INCE (Hartina et al., 2017).

Association Between Completion of Standard Internship Program and INCE Pass Status

The dominant variable in the present study that influenced INCE pass status was the completion of a standard internship program at the university (*OR* = 3.204). When a nurse fails the INCE, it can affect the student, the university where the student attended, and, in some cases, the employer. Thus, the integrated curriculum must

TABLE 2

Related Factors for INCE Status (*N* = 727)

Characteristic	Total *N* = 727	INCE Status		*p*[a]
		Competent	Not Competent	
	n (%)	*n* (%)	*n* (%)	
Examination Preparation From the Institution				.011*
Good	601 (82.7)	282 (46.9)	319 (53.1)	
Poor	126 (17.3)	43 (34.1)	83 (65.9)	
Completion of Internship Program				.001*
Standard	695 (95.6)	320 (46.0)	375 (54.0)	
Not standard	32 (4.4)	5 (15.6)	27 (84.4)	
National Predictor Examination				.002*
Never participated	106 (14.6)	33 (31.1)	73 (68.9)	
Completed once	435 (59.8)	195 (44.8)	240 (55.2)	
Completed more than once	186 (25.6)	97 (52.2)	89 (47.8)	
Knowledge About the INCE Blueprint				.001*
Good	412 (56.7)	162 (39.3)	250 (60.7)	
Poor	315 (43.3)	163 (51.7)	152 (48.3)	
Psychological Status				.121
Anxiety	644 (88.6)	295 (45.8)	349 (54.2)	
No anxiety	83 (11.4)	30 (36.1)	53 (63.9)	
Health Status				.608
Healthy	703 (96.7)	316 (45.0)	387 (55.0)	
Sick	24 (3.3)	9 (37.5)	15 (62.5)	

Note. INCE = Indonesia Nurse Competency Examination.
[a] Chi-square test.
* $p < .05$

include training at the professional level (Haryanti et al., 2016). Nursing professional practice is a practical activity in hospitals with the implementation of nursing theory during academic learning (Lestari, 2014). Additionally, professional practice in a hospital internship setting can provide professional development, improve patient care skills, and hone analytical skills in solving various real cases both in the hospital and community (Haryanti et al., 2016).

Institutions must prepare students to take competency examinations. Preparation can be done through academic stages and nursing professional practice systems in a hospital or community. An online study by Czekanski et al. (2018) showed that gaining competence, theory, and learning experience in practical fields that support the growth and development of professional abilities is needed by every student. Integrating academic education and a nursing professional practice system is a standard curriculum between nursing theory in the academic stage and clinical experience in the professional practice stage (Czekanski et al., 2018).

Nursing professional practice plays an important role in increasing graduation because INCE questions are based on real patient cases (the patient's illness, medical history, etc.) and the care that is provided until the patient's condition is resolved. After the nursing professional practice stage, students will be accustomed to dealing with real patient cases, thus making it easier for students to answer competency examination questions and improving the likelihood of passing.

Educational curriculum development is a strategy that strengthens student knowledge by constructing curriculum contents that reflect the essence of education of professional nurses and other professional standards (Shoemaker et al., 2017). In addition to an integrated curriculum, professional education can enhance student skills in critical thinking and reflection, such as concept mapping, case reflection, disease history data, analysis, nursing problem determination, and nursing care management (Corrigan-Magaldi et al., 2014). It may also help prepare students to answer competency test questions.

For example, the NCLEX-RN preparation strategy implemented at Alabama University includes the application of a clinical nursing course, which is a combination of clinical and theoretical activities at one time, classroom lectures, and discussion of case studies, simulations, and other interactive learning strategies. Students are also assigned to conduct case studies outside the classroom, which allow students to gain clinical reasoning based on

TABLE 3

Predictive Factors Selected for Logistic Regression Analysis

Variables	*p*
Age	.000
Grade point average	.000
Region of university	.000
Examination preparation from the institution	.009
Completion of standard internship program	.002
Participation in national predictor examination	.001
Knowledge about the INCE blueprint	.001

Note. INCE = Indonesia Nursing Competency Examination.

existing theoretical concepts. At the end of the program, students take an exit examination to assess their ability, and the passing grade scores are adjusted to the passing grade competency examination scores (Mager et al., 2017).

Association Between National Predictor Examination and INCE Pass Status

The national predictor examination is a practice examination for nurses before they take the INCE (Haryanti et al., 2016). The most valuable component of a predictor examination is the use of good quality test questions that reflect the actual test implementation (Kariasa et al., 2019). In Indonesia, before the INCE is held, most nursing institutions conduct preparation sessions, such as providing debriefing or theoretical review during lectures for approximately 2 weeks, and most institutions giving students practice answering questions that resemble INCE questions. In addition, the national committee of the INCE also provides opportunities for all institutions to include their students in the national predictor examination, which is held three times before each INCE. The results of each predictor examination are announced on the INCE website, and each participating institution provides assistance to those students who did not pass by reviewing the obstacles those students faced.

A previous study revealed that 85% of participants who had taken the predictor examination were more ready to take the INCE than those who received only an explanation of INCE implementation. Furthermore, the results of the predictor examination evaluation can be used as a predictor for passing the INCE (Krisdianto & Kusumawati, 2019). Better predictor examination results indicate a greater chance of passing the INCE, and worse results likewise may mean a greater chance of failure (Abdillah, 2019). These results agree with a previous study that revealed that 86.4% of participants who passed the INCE had an INCE predictor examination score greater than or equal to the INCE passing score and had a 3.4 times greater chance of passing the INCE than those whose predictor examination value was lower than the INCE passing score (Nuryati et al., 2020). Respondents who took the national predictor examination had a 20.7% chance of passing, whereas those who took it more than once had a 37.5% chance of passing (Hartina et al., 2017). Students who have participated in the predictor examination tend to be more prepared for the INCE than students who have not taken the predictor examination (Serembus, 2016).

Association Between Knowledge About the INCE Blueprint and INCE Pass Status

The INCE blueprint is a basic framework or guideline used to design the development of the examination questions. Blueprints can provide information on the topic area, a description of the material being tested, an overview of the test methods to be used, and references (Kariasa et al., 2019). Understanding the blueprint as a predictive factor becomes an important tool in determining one's readiness in taking the INCE (Krisdianto & Kusumawati, 2019). These and other studies found that the readiness of participants is directly proportional to the INCE results. Thus, better examination preparation could provide a greater chance of passing the INCE. Some aspects that become the core of readiness include cognitive maturity and physical and psychological readiness (Wardani, 2019).

A literature review found cognitive readiness to be an important factor in passing the INCE (Krisdianto & Kusumawati, 2019). Cognitive readiness requires an understanding of a given blueprint that contains the scope of the competency test questions and strategies to answer each question (Kariasa et al., 2019). Knowledge related to blueprints is obtained through training courses for dealing with the INCE. At one U.S. nursing school, students were required to take a competency examination training course to assess their knowledge. Strategies such as reviewing the blueprint for the examination were implemented to correct knowledge gaps, and the authors reported improved grades and pass rates on the NCLEX (Cole & Adams, 2014).

A study about students who took the NCLEX-RN revealed that failure was often caused by a lack of optimal preparation in terms of cognitive abilities such as a blueprint of competency examination and nursing material. Students who failed were confused and doubtful that they were answering the questions correctly (Monroe, 2019). Another study supported the understanding of the examination blueprint: a nursing program reported NCLEX-RN national pass rates from 83.8% to 87.0%, which were achieved through an understanding of the blueprint, understanding the NCLEX-RN implementation process, and answering each review question (Frith et al., 2008).

Association Between Examination Preparation From the Institution and INCE Pass Status

Based on the results of this study, the institution's role is correlated with the INCE pass status. A previous study identified extrinsic factors that contributed to the success of the competency examination, including the ability of the institution's faculty to prepare students from the first to the final semesters and to strengthen learning strategies (Wardani, 2019). A previous study also revealed

TABLE 4

Logistic Regression Result of Predictors of INCE Status

Variables	INCE Status							
	Model 1				Model 2			
	p	*OR*	95% *CI*		*p*	*OR*	95% *CI*	
			Lower	Upper			Lower	Upper
Age	.000	2.731	1.934	3.856	.000	2.715	1.925	3.830
Grade point average	.000	0.217	0.148	0.319	.000	0.218	0.149	0.319
Region of university	.000	0.516	0.439	0.607	.000	0.515	0.443	0.598
Completion of a standard internship program	.028	3.303	1.137	9.596	.029	3.204	1.124	9.135
Knowledge about the INCE blueprint	.03	0.683	0.484	0.965	.029	0.682	0.484	0.962
Examination preparation from the institution	.365	1.240	0.779	1.973				
Participation in national predictor examination	.693	1.065	0.778	1.458				

Note. INCE = Indonesia Nursing Competency Examination.

that nursing faculty must be advanced in terms of providing the best facilities and infrastructure in the learning process by using the latest information technology and updating learning resources (Corrigan-Magaldi et al., 2014). In addition, using computer-adaptive quizzing in nurse training was associated with passing the NCLEX (Pence & Wood, 2018).

The results of previous studies agree with the results of this study that the success of a competency examination depends on a combination of mentoring and teaching-learning strategies conducted by the institution to help students be confident and critical thinkers. Student involvement, a supportive learning environment, and weekly follow-up by the faculty were beneficial for the development, retention, and achievement of students in competency examinations (Corrigan-Magaldi et al., 2014).

Limitations

The primary limitation in this study is that the participants do not represent all regions that are members of AINEC who participated in the INCE in 2019. Another limitation is that participants who failed the INCE were overrepresented in this study, as 55% of respondents included in this study failed the first attempt at the INCE but approximately 35% overall failed in 2019. Additionally, participants were volunteers, and it is possible self-selection bias occurred.

Conclusion

Overall, several predictor factors that contribute to the success of the INCE are age, GPA, region of university, knowledge about the INCE blueprint, examination preparation from the institution, participation in the national predictor examination, and access to a standard internship program, which had the greatest influence. The results of this study are expected to become supporting data for system improvement in institutions to better prepare students for the INCE. Also, these findings can be put to use by students to better prepare themselves before taking the INCE.

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