ARTÍCULO ORIGINAL

Gac Méd Caracas 2023;131(Supl 1):S43-S51
DOI: 10.47307/GMC.2023.131.s1.8

Effectiveness of self-acupressure interactive modules as a learning resource in reducing pruritus in hemodialysis patients

Eficacia de los módulos interactivos de auto acupresión como recurso de aprendizaje para reducir el prurito en pacientes en hemodiálisis

Yuanita Panma[1a], Hertuida Clara[b], Siti Nurhayati[2c]

SUMMARY

Introduction: *The prevalence of pruritus in hemodialysis patients is relatively high due to the impact of chronic renal failure. Numerous studies have examined uremic pruritus and acupressure. Patients can learn self-acupressure to relieve pruritus by using an interactive module.*
Objective: *To determine the effectiveness of the self-acupressure interactive module as a learning source in relieving pruritus.*
Methods: *Quasi-experimental research uses a pre-post control group. There were 28 respondents in the intervention group and 29 respondents in the control group. In the intervention group, self-acupressure interactive modules will be added to standard therapy. The East Jakarta hemodialysis unit conducted this investigation. Bivariate analysis used Wilcoxon and Mann-Whitney tests. Respondent and pruritus characteristic questionnaires, Visual Analog Scale for pruritus, also web-based interactive multimedia was used.*
Results: *Most respondents are male, enrolled in college, unemployed, married, having pruritus all over their bodies, having it the day following HD, having persistent pruritus, and not using antihistamines. The respondents' average age was 56.23 years, and they had hemodialysis for an average of 47.82 months. The average pre-intervention scores between the control and intervention groups did not change significantly. The post-intervention scores between the control and intervention groups differed significantly. The difference in the average pruritus score in the intervention group was 2.86, as opposed to the difference of 1.25 in the average pruritus score in the control group.*
Conclusion: *Self-acupressure interactive module can be used by hemodialysis patients as a learning source to relieve pruritus.*

Keywords: *Acupressure, hemodialysis, interactive, module, pruritus, self-acupressure*

DOI: https://doi.org/10.47307/GMC.2023.131.s1.8

ORCID ID: 0000-0001-6416-6091[1a]
ORCID ID: 0000-0002-0532-8932[b]
ORCID ID: 0000-0003-0123-6704[2]

[1]Medical Surgical Nursing Department, Akademi Keperawatan Pasar Rebo, Indonesia,
[2]Pediatric Nursing Department, Akademi Keperawatan Pasar Rebo, Indonesia

Recibido: 29 de enero 2023
Aceptado: 8 de febrero 2023

*Corresponding author: Yuanita Panma
E-mail: nersyuan@gmail.com
Address: Jl. Tanah Merdeka No.16-18, Pasar Rebo, East Jakarta, 13750, Indonesia

RESUMEN

Introducción: *La prevalencia de prurito en pacientes en hemodiálisis es relativamente alta debido al impacto de la insuficiencia renal crónica. Numerosos estudios han examinado el prurito urémico y la acupresión. Los pacientes pueden aprender la auto acupresión para aliviar el prurito mediante el uso de un módulo interactivo.*

Objetivo: *Determinar la eficacia del módulo interactivo de auto acupresión como fuente de aprendizaje para aliviar el prurito.*

Método*: La investigación cuasiexperimental utiliza un grupo de control previo y posterior. Hubo 28 encuestados en el grupo de intervención y 29 encuestados en el grupo de control. En el grupo de intervención, se agregarán módulos interactivos de autoacupresión a la terapia normal. La unidad de hemodiálisis del Este de Yakarta llevó a cabo esta investigación. El análisis bivariado utilizó las pruebas de Wilcoxon y Mann-Whitney. Se utilizaron cuestionarios de características del encuestado y del prurito, escala analógica visual para el prurito y multimedia interactiva basada en la web.*

Resultados*: La mayoría de los encuestados son hombres, matriculados en la universidad, desempleados, casados, con prurito en todo el cuerpo, al día siguiente de la HD, con prurito persistente y sin uso de antihistamínicos. La edad promedio de los encuestados fue de 56,23 años y tenían hemodiálisis por un promedio de 47,82 meses. Las puntuaciones medias previas a la intervención entre el grupo de control y el grupo de intervención no cambiaron significativamente. Las puntuaciones posteriores a la intervención entre los grupos de control y de intervención difirieron significativamente. La diferencia en la puntuación media de prurito en el grupo de intervención fue de 2,86, frente a la diferencia de 1,25 en la puntuación media de prurito en el grupo de control.*

Conclusión*: El módulo interactivo de auto acupresión puede ser utilizado por el paciente de hemodiálisis como fuente de aprendizaje para aliviar el prurito.*

Palabras clave*: Acupresión, hemodiálisis, interactivo, módulo, prurito, auto acupresión*

INTRODUCTION

The issue of pruritus is one that hemodialysis patients with Chronic Renal Failure (CRF) frequently deal with. Patients on hemodialysis frequently experience pruritus due to the symptoms of advanced renal disease. In hemodialysis (HD) patients, pruritus affects 83.4 % of them (1). In Indonesia, the number of instances of pruritus during hemodialysis rose to 9 448 cases in 2017 and 10 807 cases in 2018 (2). Although the exact etiology of pruritus is still debatable, it is thought that a variety of things can contribute to it. Patients with high creatinine, low hemoglobin, dyslipidemia, high levels of C Reactive Protein (CRP), and black race have more intense pruritus, while high-flow dialyzer use is associated with a lower intensity of pruritus (3). Nearly 90 % of dialysis patients experience pruritus, which is linked to higher morbidity and mortality, poorer quality of life, sleep difficulties, and depression (4,5). In addition to disrupting sleep and making it harder to fall asleep, pruritus mental disorders interfere with social interactions, such as anxiety and sadness (6-8) depressive symptoms are not usually included as a clinical parameter in the evaluation of hemodialysis patients. We aimed to identify depressive symptoms and associated risk factors in a large group of individuals with end stage renal disease (ESRD). Despite numerous studies on how pruritus affects the quality of life of hemodialysis patients, the best way to cure pruritus is still unknown because its cause is unknown.

One treatment method for treating a patient's pruritus symptoms is acupressure. According to Kılıç and Taşcı research (9) a frequent and compromising symptom for patients with advanced or end-stage renal disease (ESRD, uremic pruritus in hemodialysis patients can be effectively reduced by acupressure and Transcutaneous Electric Acupuncture point Stimulation (TEAS) at point LI-11. Aval (10) achieved the same outcomes that acupuncture or acupressure has been found to have in alleviating uremic pruritus. Skilled individuals perform self-acupressure without the assistance of practitioners or healthcare professionals (11). Self-acupressure has been used extensively to treat the symptoms of many medical conditions, but it has not been used much in Indonesia for pruritus. Patients can learn about self-acupressure by using learning resources. Because there are so many different types of teaching materials, including print, audio, audio-visual, and interactive ones, the development of teaching materials is quite diverse. Teaching resources in the form of

modules are one of the materials that have evolved since earlier; the modules were originally in the form of printed materials. However, they can now take the shape of electronic (e-modules) or non-printed materials that can be included in various media, including audio, video, and multimedia (12), which makes the module interactive. Suwatra et al. (13) showed that the packaging of educational resources might take the shape of printed books or digital modules. Electronic module innovations can be created interactively, and with the inclusion of future technology that integrates video, animation, simulation, and other elements in a seamless manner, the contents of the interactive electronic module become more diverse.

The effectiveness of interactive modules on self-care and powerlessness in hemodialysis patients showed positive results. Participants in the intervention group felt more in control of their life, had higher knowledge of self-care, and engage in self-care practices than those in the control group. This is an example of the advantages of interactive multimedia CDs (14). Results show that utilizing the interactive multimedia CD with elderly patients in HD and nursing practice education may be beneficial.

Research on the impact of acupressure on pruritus has been carried out in Indonesia. However, interactive modules as a learning resource for self-acupressure for pruritus have never been studied. Therefore, researchers are interested in the effectiveness of using interactive modules as a learning resource for self-acupressure in alleviating pruritus complaints.

METHODS

This quasi-experimental research methodology employs pre-post analysis with a control group. The study was carried out at the hemodialysis unit in East Jakarta. The head of the hospital gave his approval after this study passed the research Ethics Committee's test for ethics. Respondents in this study were divided into two groups: the control group and the intervention group. Standard therapy was given to the control group, while standard therapy plus interactive self-acupressure modules was given to the intervention group. The researcher chose respondents based on the established inclusion criteria before beginning the study. The total number of respondents who met the eligibility requirements was 58. These respondents were divided into two groups: the intervention group had 29 respondents, and the control group had 29 respondents. There were 28 respondents in the intervention group after one of the respondents in the intervention group passed away during the research.

Instrument

The respondent characteristic questionnaire, pruritus characteristic questionnaires, and Visual Analog Scale (VAS) for pruritus were employed as data-gathering tools. The respondent characteristic questionnaire includes information about the respondent's gender, education level, occupation, marital status, age, and HD length. The pruritus characteristic questionnaire includes the following parameters: pruritus location (local or systemic), pruritus time (the day before HD, during HD, constantly, and the day after HD), and pruritus state (intermittent, persistent, and severe pruritus). The severity of uremic pruritus was scored using a Visual Analog Scale (VAS) for pruritus, which uses a 10-point scale with 0 representing no pruritus and 10 representing severe pruritus, was utilized to translate non-numerical results into numerical ones (15). At baseline and after the intervention, VAS was used to gauge the severity of pruritus.

Procedures

Following the completion of the required number of research samples, the researcher informs participants of the study's objectives and methodology of the study before being asked to sign consent forms and complete questionnaires about their demographics, pruritus characteristic, and Visual Analog Scale (VAS) for pruritus. The first pruritus score was measured at the start of the study, and the final measurement was done a month later. An interactive module was used to educate the intervention group. They received individualized teaching using the interactive module for four weeks after being shown how

to use it. In addition, the researcher explained to the respondents how to use interactive modules to teach them about pruritus and acupressure and self-acupressure videos. According to the study, before the hemodialysis session started, the respondents performed self-acupressure for 6 minutes twice a week at the Li-11 point using an interactive module as a reference (9,16). Respondents utilize the interactive self-acupressure module as a reference when carrying out interventions. Respondents documented their self-acupressure by filling out the daily journal in interactive modules. They would be notified by researchers via WhatsApp video call each time a patient performed hemodialysis.

Module description

This interactive module was created by researchers using suggestions and learnings from the literature, clinical experience, and research goals. An acupressure expert, a head nurse, and renal nursing assessed the information and approved it as accurate. The self-acupressure interactive module was set up to function with the website — interactive media, such as video, text, images, and questionnaires, present content and activities. The content of interactive modules are the definition, incidence, causes, and symptoms of pruritus, as well as the understanding, purposes, and advantages of acupressure and the acupressure points that can be used to relieve pruritus were all covered in the educational material. An example of self-acupressure for pruritus at the Li-11 point may be seen in the video. Participants may pick the material that most appeals to them and view it at their own pace with no time constraints. Throughout the hemodialysis process, subjects may use the interactive module and perform self-acupressure.

The patient then completed a pruritus characteristic questionnaire form, which asked about the patient's experience with pruritus in terms of its location, frequency, severity, and usage of antihistamines. The visual analog scale for pruritus was used to calculate the pruritus score. Before initiating the intervention, the pruritus and pruritus scores were assessed. In the activity section, participants were instructed to use a self-acupressure interactive module as a learning resource and perform self-acupressure at point LI-11 each time before they had hemodialysis for four weeks. Each patient undergoing hemodialysis fills up a self-acupressure logbook, which is used for recording. The interactive module's final step is to record the respondent's pruritus score following four weeks of self-acupressure. The average time to finish a module consisting of text, images, videos, and a questionnaire is about 20 minutes. As for the activity sheet, the respondent can fill it out when they perform self-acupressure. After using the interactive module, the respondent filled out a module evaluation questionnaire regarding the suitability of the module content to the patient's needs and applicability.

Statistical analysis

The pre-intervention score data for pruritus and the post-intervention score were subjected to a data normality test. The Wilcoxon test and Mann-Whitney test were employed as the bivariate test since the results of the data normality test using the Kolmogorov-Smirnov demonstrate that the distribution is not normal with a p-value < 0.05.

RESULTS

Table 1 indicates that most respondents (61.4 %) are male, have a bachelor's or higher degree (42.2 %), are not employed right now (56.1 %), and are married (82.5 %). The respondents average age was 56.23 years, and they had hemodialysis for an average of 47.82 months or around four years (Table 2).

According to Table 3, most survey participants reported having pruritus all over their bodies (52.6 %), having it the day following HD (45.6 %), having persistent pruritus (42.1 %), and not using antihistamines (70.2 %).

Most the respondents suggested that educational activity meets its goals, is beneficial and applicable, increases their knowledge, and helps them understand hemodialysis patient pruritus. Instructional activity impact how to handle pruritus with self-acupressure. According to the average pre-intervention scores between the control group and the intervention group

Table 1. Respondent Characteristic (N=57)

Variable	Control group		Intervention group		Total	
	n	%	n	%	n	%
Gender						
Male	16	55.2	19	67.9	35	61.4
Female	13	44.8	9	32.1	22	38.6
Education level						
Elementary school	5	17.2	1	3.6	6	10.5
Junior high school	0	0	5	17.9	5	8.8
Senior high school	8	27.6	14	50.0	22	38.6
College	16	55.1	8	28.6	24	42.2
Employment						
Unemployed	15	51.7	17	60.7	32	56.1
Employed	14	48.3	11	39.3	25	43.9
Marital status						
Not married	2	6.9	0	0	2	3.5
Married	25	86.2	22	78.6	47	82.5
Divorce	2	6.9	6	21.4	8	14.0

Age (M= 56.23, SD= 12.52, min-max= 30-82 years)
Length of hemodialysis (month) (M= 47.82, SD= 53.91, min-max= 3-314 month

Noted: n= frequency, %= percentage, M= mean, SD= Standard Deviation

Table 2. Pruritus Score (N=57)

Variable	Mean	Median	SD	Minimal- Maximal	95 % CI
Pruritus scores pre-intervention	5.81	6.00	1.98	2-10	5.28-6.33
Pruritus scores post-intervention	3.49	3.00	2.04	0-9	2.95-4.03

Table 3. Pruritus Characteristics (N=57)

Variable	Control group		Intervention group		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Pruritus Area						
Local	20	69.0	7	25.0	27	47.4
Systemic	9	31.0	21	75.0	30	52.6
Pruritus time						
In the day when HD	1	3.4	3	10.7	4	7.0
In the afternoon, before the HD	3	10.3	6	21.4	9	15.8
All the time	2	6.9	16	57.1	18	31.6
The day after HD	23	79.3	3	10.7	26	45.6
Pruritus status						
Intermittent	14	48.3	9	32.1	23	40.4
Insistent	14	48.3	10	35.7	24	42.1
Severe pruritus	1	3.4	9	32.1	10	17.5
Use of antihistamines						
Using antihistamines	10	34.5	7	25.0	17	29.8
Do not use antihistamines	19	65.5	21	75.0	40	70.2

did not change significantly ($p > 0.05$). The post-interventions score between the control and intervention groups differed significantly ($p < 0.05$). The difference in the average pruritus score in the intervention group was 2.86, as opposed to the difference of 1.25 in the average pruritus score in the control group (Table 5).

Table 4. Modules evaluation (N=28)

No	Statement	Yes	No
1	Educational activity meets its goals	25 (89.29 %)	3 (10.71 %)
2	The educational activity is simple, beneficial, and applicable	25 (89.29 %)	3 (10.71 %)
3	Educational activity increases knowledge and helps understand hemodialysis patient pruritus	26 (92.86 %)	2 (7.14 %)
4	Instructional activity impact how to handle pruritus in hemodialysis patients	26 (92.86 %)	2 (7.14 %)

Table 5. Pruritus scores pre- and post-intervention (N=57)

Pruritus score	Group		p-Value[a]
	Control (N=29) Mean ± SD	Intervention (N=28) Mean ± SD	
Pre-intervention	5.59 ± 1.476	6.04 ± 2.396	0.579
Post-intervention	4.24 ± 1.76	3.18 ± 2.001	0.040*
p-value[b]	0.0001*	0.0001*	

*significant < 0.05
[a] Mann-Whitney test
[b] Wilcoxon test

DISCUSSION

Most respondents in this survey were male, enrolled in a college, were married, and did not have a job. The findings of this study contrast with the other study, which found that most respondents are women and had only an elementary education or none at all (9). The findings of this survey are consistent with previous studies (17,18) in which was found that most respondents were unemployed. The study's participants had an average age of 56.23 years, and they had been receiving hemodialysis for an average of 47.82 months or around four years. In a previous study participants in the acupressure group had an average age of 55.24 years (9), this study replicates that finding (17), the median period spent receiving hemodialysis was 49.9 months, and the respondents' average age was 47.5 years.

The majority of responders reported having pruritus all over their bodies. The findings of this study are in agreement with that of Kılıç and Taşcı (9), and Panma et al. (16). However, they differ from other studies in which most respondents reported having localized pruritus, with the feet, neck, and fistula areas being the most commonly affected (17). In this study, the majority of participants reported having insistent pruritus. The findings of this study differ from those of earlier research by Panma

et al. (16) who reported that most respondents have intermittent pruritus. While it was found that most respondents in the intervention group had severe pruritus that led to excoriation, the majority of respondents in the control group had intermittent pruritus (17). Most participants in the control and intervention groups in the study reported having significant pruritus, excoriation, and irritation. In this study, the majority of respondents did not use antihistamines, similarly to the other studies (9,17).

Most participants in this study reported having severe pruritus the day following hemodialysis. In his study, Kiliç et al. (17) also noted that acute pruritus occurred while taking HD in the intervention group occurred the day after HD in the control group. The majority of respondents in the other study reported having severe pruritus both on the day following HD and on the day the patient did not receive HD (9).

The usage of digital technology is expanding quickly as we approach the COVID-19 pandemic, especially in the field of education. Numerous models of learning media have been developed to aid the teaching and learning process. An information technology-based learning method that can be utilized to deliver information without being constrained by time or geography is e-learning. The study by Novia et al. (19) demonstrated that interactive learning sometimes referred to as learning that incorporates multimedia engagement, can inspire students to learn whenever and wherever they want. Learning through collaboration, interaction, experiential learning, and problem-based learning are just a few pedagogical benefits of interactive learning modules.

Interactive modules in this study consist of information about pruritus and acupressure and how to do self-acupressure for pruritus. Respondents used the interactive module to perform self-acupressure when they had hemodialysis. As a result, the mean pre-intervention VAS for pruritus scores of this study's control and intervention groups did not differ significantly ($p>0.05$). The control and intervention groups' post-intervention VAS for pruritus scores differed significantly ($p<0.05$). These results align with the other study about the acupressure effect in pruritus (9,17). This study's control group's average pruritus score differed by 1.25 points, whereas the intervention group's average pruritus score differed by 2.86 points. The other study showed that the difference in the average pruritus score at week four between the acupressure group, the TEAS group, and the control group was 3.54, 4.25, and 1.84, respectively (9). In contrast, the difference between the mean pruritus scores at week 6 in the intervention group and the control group was 5.58 and 1.1, respectively (17).

The positive results obtained in using interactive modules in this study align with several studies using interactive modules. A study about the infusion therapy interactive modules found that they can boost nursing students' knowledge and self-confidence (20). Another study also found that a computerized education module enhances patient knowledge and attitudes (21). An interactive instructional kiosk enhanced understanding of antibiotics and Acute Respiratory Infections (ARIs). There was a correlation between learning and changes in the individual's preference for antibiotics. Interactive educational computer technology may reduce the improper use of antibiotics for ARIs by diminishing the urge for antibiotics (21,22).

E-learning modules have a favorable effect. In this study, most respondents suggested that the module matched the participants' expectations, simple, beneficial, and applicable. Simple and beneficial because they can access any time on their own, less expensive, and applicable because it contains helpful in enhancing their knowledge and alleviate pruritus complaint. In interactive modules in health education, patients are taught healthcare ideas and techniques in their surroundings through blending characters, video, speech, and imagery. Compared to teaching patients in a formal medical or educational setting, this strategy is far more practical and much less expensive (14).

Limitations

In this study, the interaction between respondents and researchers is essential. When participants utilized interactive modules and performed self-acupressure, researchers could not see them in person; instead, they could only

watch them via video chats. Therefore, self-acupressure techniques cannot be evaluated correctly. Self-acupressure intervention might be affected by the precision of the acupressure sites and the pressure used by respondents.

CONCLUSION

This study hypothesized that a self-acupressure interactive module could help improve patient knowledge of managing pruritus, but the evidence needs to be included, and more research is needed.

Acknowledgment

The authors much appreciated the colleague's assistance and support. We are grateful to all the reviewers who contributed their insightful comments to the article and helped us finish the work.

Conflict of Interests

The authors have no declared conflicts of interest.

Funding

We appreciate the funding provided by the Indonesian Ministry of Education, Culture, Research, and Technology for this study.

REFERENCES

1. Kavurmaci M. Prevalence of uremic itching in patients undergoing hemodialysis. J Hemodial Int. 2015;19(4):531-535.
2. Indonesian Renal Registry. 11th Report Of Indonesian Renal Registry 2018. Jakarta; IRR, 2018.
3. Gobo OM, Pigari VG, Ogata MSP, Miot HA, Ponce D, Abbade LPF. Factors associated with uremic pruritus. Int J Arch Med. 2017;10(1):1-8.
4. Aramwit P, Supasyndh O. Uremic pruritus; its prevalence, pathophysiology and management. In: Suzuki H, editor. Update in Hemodialysis. J Intech. 2015.p.19-41.
5. Orasan OH, Muresan F, Mot A, Sitar TA, Minciuna I, Coste SC, et al. Hemodialysis patients with pruritus and insomnia have increased risk of death. J Blood Purif. 2020;49(4):419-425.
6. Araujo SMHA, De Bruin VMS, Daher EF, Almeida GH, Medeiros CAM, De Bruin PFC. Risk factors for depressive symptoms in a large population on chronic hemodialysis. Int Urol Nephrol. 2012;44(4):1229-1235.
7. Goh ZS, Griva K. Anxiety and depression in patients with end-stage renal disease: Impact and management challenges – A narrative review. Int J Nephrol Renovasc Dis. 2018;11(3):93-102.
8. Rehman IU, Munib S, Ramadas A, Khan TM. Prevalence of chronic kidney disease-associated pruritus, and association with sleep quality among hemodialysis patients in Pakistan. PLoS One. 2018;13(11):1-18.
9. Kılıç AN, Taşcı S. Acupressure and transcutaneous electrical acupoint stimulation for improving uremic pruritus: A randomized, controlled trial. Altern Ther Health Med. 2016;22(3):18-24.
10. Aval SB. A systematic review and meta-analysis of using acupuncture and acupressure for uremic pruritus. Iran J Kidney Dis. 2018;12(2):78-83.
11. Song HJ, Seo HJ, Lee H, Son H, Choi SM, Lee S. Effect of self-acupressure for symptom management: A systematic review. Complement Ther Med. 2015;23(1):68-78.
12. Darmawan D. Mobile learning an application of learning technology. Jakarta: PT Raja Grafindo Persada; 2016.
13. Suwatra W, Suyatna A, Rosidin U. Development of Interactive E-Module for Global Warming to Grow of Critical Thinking Skills. IJAEMS. 2018;4(7):543-549.
14. Wang L, Chiou C. Effectiveness of Interactive Multimedia CD on Self-Care and Powerlessness in Hemodialysis Patients. J Nurs Res. 2011;19(2):102-1.
15. Phan NQ, Blome C, Fritz F, Gerss J, Reich A, Ebata T, et al. Assessment of pruritus intensity: Prospective study on validity and reliability of the visual analogue scale, numerical rating scale and verbal rating scale in 471 patients with chronic pruritus. Acta Derm Venereol. 2012;92(5):502-507.
16. Panma Y, Yetti K, Sukmarini L. Application of acupressure in reducing pruritus scale in hemodialysis patients. KnE Life Sci. 2021;202(1):371-372.
17. Kiliç Akça N, Taşçi S, Karataş N. Effect of acupressure on patients in Turkey receiving hemodialysis treatment for uremic pruritus. Altern Ther Health Med. 2013;19(5):12-18.
18. Panma Y, Yona S, Maria R. Relationship between hypertension with quality of life of hemodialysis patients. Enferm Clin. 2019;29(8):207-213.

19. Novia Y, Zaim M, Rozimela Y. Interactive learning using e-learning module in learning English for senior high school: A review of related articles. J JELITA. 2022;1(2):125-134.
20. Ray SR, Taylor E, Sherrill KJ, Steinheiser MM, Berndt DL. Effect of infusion therapy interactive modules on nursing student's knowledge and self-confidence. Teach Learn Nurs J. 2022;17(1):109-112.
21. Price EL, Mackenzie TD, Metlay JP, Camargo CA, Gonzales R. A computerized education module improves patient knowledge and attitudes about appropriate antibiotic use for acute respiratory tract infections. J Patient Educ Couns. 2011;85(3):493-498.
22. Muchlis N, Amir H, Cahyani DD, Alam RI, Landu N, Mikawati M, et al. The cooperative behavior and intention to stay of nursing personnel in healthcare management. J Med Life. 2022;15(10):1311-1317.