



Knowledge Transfer Mobile Application For Nurses: Requirement Validation

Melati Fajarini¹, Muhammad Hadi¹, Miciko Umeda¹, Nurhayati¹, Sri Rahayu²

¹ Faculty of Nursing, Universitas Muhammadiyah Jakarta. DKI Jakarta, Indonesia

² Jayakarta Health and Technology Insitute. DKI Jakarta, Indonesia

Email : melatifajarini@umj.ac.id

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Abstract

The development of a knowledge transfer mobile application for nurses requires validity of its requirements. This study aims to validate the mobile application's content and system flow requirements to meet the user's needs. This mixed-method study was conducted to 12 participants comprises of three authors, six nurse managers, and three nurses. They were asked to examine the validity and provide suggestions to the content and the system flow of the mobile application.

The content consisted of a translated article abstract and an article resume of systematic reviews articles. The data were analyzed using the Content Validity Index (CVI), while opinions and suggestions were analyzed thematically. The CVI of the article is excellent with item CVI (I-CVI) 0.89 and above while the average scale CVI (S-CVI/Ave) is 0.96. The I-CVI for the article resume is 0.89 and above except for one item, while the S-CVI/Ave is 0.92. Two themes emerged from opinion and suggestion on the contents are about simplicity and ambiguity. Although the participants understand the contents, they suggested to simplify the content, show more important features of the articles, and have a better translation. The system flow shows appropriate pathways. The translated article and the article resume are valid content of the mobile application. The system's flow also meets the requirement of the application; thus it can be used as a prototype of the mobile application. Further study is needed to develop the mobile application, examine its usefulness, and the content's readability to the users.

Keywords: evidence-based practice; knowledge translation; mobile applications; nurse

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Introduction

The quality of health service supports evidence-based practice (EBP) to improve health outcomes. Poor quality of care, especially in low-middle income countries (LMICs), causes deaths and inefficient health expenditure (World Health Organization, 2020). EBP with its advantage (Moreno-Poyato, Casanova-Garrigos, Roldán-Merino, Rodríguez-Nogueira, & group, 2020; Rushmer, Ward, Nguyen, & Kuchenmüller, 2019; World Health Organization, 2015) may prevent poor quality of care. Knowledge transfer (KT) or synthesis, transfer, and implementation of knowledge is a part of EBP. It plays an important role to ensure the implementation of EBP. Nevertheless, its practice faced several difficulties.

A growing body of evidence indicates that there are barriers to the implementation of EBP and KT among nurses worldwide. LMICs in particular, nurses identified common barriers such as the inability to obtain, synthesize, transfer, and implement evidence. Difficulties in obtaining evidence were detailed as limited computer literacy, lack of evidence sources, and time to search and read the evidence. The evidence was also scant and disperse. Problems in synthesizing evidence were reported as overwhelming information, inability to understand research terms, English language, and the research results (Shayan, Kiwanuka, & Nakaye, 2019). Although their efforts to facilitate KT, such as the provision of electronic databases, there is still a limitation in transferring the knowledge (Malla, Aylward, & Ward, 2018).

Mobile technology offers solution to this problem. Dal Mas et al. (2020) listed methods of KT and the utilization of technology-related methods is more apparent than others. It strengthens service delivery (Orton, Agarwal, Muhoza, Vasudevan, & Vu, 2018). Several mobile applications such as PubMed4Hh provides abstracts and the bottom-line (TBL) summaries and other activities. These evidence has been proven to help both clinician and students in evidence synthesis and clinical decision (Gartrell et al., 2018).

A potential path for introducing EBP through effective KT in Indonesia is through the use of mobile technology. Over 70% of Indonesian are using the internet, and the number continues to rise (Asosiasi penyelenggara Jasa Internet Indonesia, 2020). Fajarini et al. (2021) in Indonesia found that young nurses and those with higher degrees perceived EBP and Information and Communication Technology (ICT) positively. ICT provides efficient knowledge sharing and workload reduction (Radaelli, Lettieri, Mura, & Spiller, 2014), and offers evidence transfer in a timely and cost-effective manner. Nurses in urban cities have sufficient capacity in mobile technology and express their needs for evidence transfer through mobile technology (Fajarini & Rahayu, 2021).

A mobile application for knowledge translation is undergoing development. It aims to enable nurses to the synthesis of best evidence. Some of the best evidence are research summaries and



systematic review (Jordan, Lockwood, Munn, & Aromataris, 2018). There's a scant of mobile application for this purpose. The PubMed4Hh mobile application is one of the few mobile application that provides article abstracts and TBLs (National Library of Medicine, 2016), however it is in English language. There has not been similar application in Indonesia. This mobile application will present best evidence in brief which are translated abstracts and article resumes in Bahasa Indonesia. A prior study has made these two contents and also the system flow. However, the user's understanding about these requirements needs to be explored. This study aims to validate the contents and the system's flow. The results will provide suggestions to ensure the synthesis of best evidence and to develop a user-friendly mobile application.

Methods

This study is a mixed-method study. The descriptive study was used for the quantitative study, and open-ended surveys were applied for the qualitative study. The population in this study are nurses from healthcare services, nursing students, and lecturers from nursing education institutions in Indonesia.

Recruitment of participants was carried out by distributing invitation registration forms to become research participants via WhatsApp (WA) alumni and student groups from several. Lynn (Lynn, 1986) and Polit and Beck (Polit & Beck, 2006) determine a minimum of three experts to validate the content of an instrument. As well, Boddy (2016) suggested one up to 12 samples for a qualitative study. A total of 15 respondents registered to participate in this study. For content validity, nine participants comprised of six nurse managers (NM), and three authors took part as experts. These experts, and another six nurses participated in the open-ended surveys although only four nurses return the survey.

The inclusion criteria for participants are NMs who have working experience as a clinical instructor or head of the unit or team leader for at least five years. They work at government, private, and military hospitals in several cities. The authors who participated in this study have published an article using the systematic review/meta-analysis/randomized-control trial (SR/MA/RCT) method. They worked in public or private universities. The nurses have clinical working experience for at least one year.

In our previous research, two types of content were created, namely articles and resume articles. The article referred to in this study is an abstract translation of an SR/MA/RCT article which contained an introduction, method, result, and conclusion. Reference and link were also added. The abstract was chosen as it provides a piece of brief but comprehensive information that the nurses may need for their clinical practice. The example given is an article with the title The



Effectiveness of Auricular Acupressure for Acute Postoperative After Surgery: Systematic Review (systematic review) and Meta-Analysis (Zhong et al., 2019). In this example article, the information is conveyed in text form.

The resume article is a summary of the results of several SR/MA/RCT. The example given is an article resume with a topic about the Prevalence of Covid-19 Symptoms of Adults, summarized from four SR articles (Chen et al., 2021; Cheung et al., 2020; Grant et al., 2020; Lovato & de Filippis, 2020). In this article resume, the results from those four SR articles is presented in the form of text and diagrams. The experts were asked to score the Content Validity Index (CVI) by rating the level of relevance with a Likert ranged 1 (not relevant) to 4 (highly relevant) (Yusoff, 2019). The experts and the nurses were asked about their opinion and suggestion on the items using open-ended questions.

The system flow is a system framework that illustrated the activities occur in the application. The activities described were the process of how a user can search, obtain, and discuss the article in the mobile application involving an editor, operator, and the system. The editor flow showed how an editor received article requests from users, send them to the operator, and also engage in the discussion forum. The diagram also explained the way the articles are stored in the database and shared to the users. It was presented in a diagram, followed by an explanation, and questions in a Microsoft Word file. Questions about the flow consist of four open-ended questions which are asking about the suitability of the flow.

The nurses, nurse managers, and authors attended research explanation activities via zoom online in separate group sessions. The study was explained to the participants and they may ask questions. After the meeting, the researchers sent informed consent, the meeting's recording, and research instruments via email to the participants. The participants sent back the completed instruments to the researchers.

The nurse managers and authors were asked to judge the validity of the translated article and article resume. The CVI is measured by items (I-CVI) and average scale (S-CVI/Ave) using Microsoft Excel. The relevance scale of three to four is recorded as one (relevant), and below three is marked as zero. I-CVI is determined by the agreed item divided by the number of experts, while S-CVI is determined by the average of the I-CVI scores. The experts', and the nurses' opinions on the content were summarized thematically. It is also applied to the system flow opinion and suggestion. Ethical approval of this study was obtained from the Faculty of Nursing, Universitas Indonesia number KET-142/UN2.F12.D1.2.1/PPM.00.02/2022.



Results

The nurse managers' average age is 43.83 ± 4.71 years old, with an average of 14.00 ± 4.38 years of experience, and all of them hold a bachelor degree. The nurses' average age is 39.75 ± 2.99 years old, with an average of 16.50 ± 2.65 years of experience, and most of them hold a bachelor degree. The nurses and nurse managers are all females and work at hospitals in several cities. The authors work in public and private universities in Indonesia and have published at least one systematic review. The Content Validity Index (CVI) for the article is presented in Table 1.

Table 1 – Content Validity Index (CVI) Article.

Items	E1	E2	E3	E4	E5	E6	E7	E8	E9	Agreement	I-CVI
Background	4	4	4	3	4	4	4	4	3	9	1.00
Method	4	2	4	4	4	4	3	4	3	8	0.89
Result	4	4	4	4	4	4	4	4	3	9	1.00
Conclusion	4	4	4	4	4	4	2	3	3	8	0.89
Reference & Link	4	4	4	4	4	4	4	4	3	9	1.00
	1.00	0.80	1.00	1.00	1.00	1.00	0.80	1.00	1.00	S-CVI/Ave	0.96
	Average proportion of items judged as relevance across the 9 experts										0.96

Both the translated article and article resume, validated for content by six nurse managers and three authors. For the translated article (Table 1), the I-CVI of the items are 0.89 and above. The S-CVI/Ave based on I-CVI and proportion relevance are 0.96. Table 2 shows the Content Validity Index (CVI) for the article resume.

Table 2 – Content Validity Index (CVI) Article Resume.

Items	E1	E2	E3	E4	E5	E6	E7	E8	E9	Agreement	I-CVI
Common symptoms	3	3	4	4	4	4	2	4	4	8	0.89
Upper respiratory tract symptoms	3	3	3	4	4	4	2	4	4	8	0.89
Neurological symptoms	4	4	4	4	4	4	2	4	4	8	0.89



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Gastrointestinal symptoms	1	2	4	4	4	4	1	4	4	6	0.67
Recommendation	4	3	3	4	4	4	4	4	4	9	1.00
Article information	3	4	4	4	4	4	4	4	4	9	1.00
References	4	4	4	4	4	3	4	4	4	9	1.00
Links	4	4	4	4	4	4	4	4	4	9	1.00
	0.88	0.88	1.00	1.00	1.00	1.00	0.50	1.00	1.00	S-CVI/Ave	0.92
Average proportion of items judged as relevance across the 9 experts											0.92

For the article resume (Table 2), the I-CVI for most items are 0.89 and above but 0.67 for the gastrointestinal symptoms item. The S-CVI/Ave based on I-CVI and proportion relevance are 0.92.

The opinions or suggestions reported by nurses, nurse managers, and authors were summarized thematically. The themes that emerged from the data are simplicity and ambiguity. For the translated article, the nurses and nurse managers commented on the simplicity of the content while the authors have more comments on the ambiguity of the translation.

Some nurses expressed that they have problems in understanding the article:

"I do not understand the percentage and CI..." (nurse, female).

"Too many numbers..." (nurse, female).

However, the authors have less say in the simplicity, and are more focused on its ambiguity:

"The meaning of the translated article differs from its origin..." (author, female).

"All time-point meta-analysis should not be translated..." (author, male).

"The sentences should be modified to be more understandable..." (author, female).

For the article resume, a similar opinion was reported. However, in this instrument, all participants commented on both simplicity and ambiguity.

"The diagram provides clear information about the Covid-19 common symptoms, but there is additional narrative information that is confusing...." (nurse, female).

"..there should be sub-headings for other information..." (author, male).

Most participants agree with the system flow. They also suggest several improvements to the flow. For the editor flow, there should be editors' validation, and article upload by the operator. For the user flow, the participant suggested that there should be article request activity provided



in the app if the articles are unavailable. Sharing, sorting, and article information activities were also suggested. However, the forum is overlapped with the discussion. So, one of them should be deleted. The comments are as follows:

“The flow is correct.” (nurse, female).

“If the article is unavailable, there should be a window to request it. So, the author can start the search based on the inquiry...” (author, female)

Discussion

This study was conducted to validate the content and the system's flow requirement. It is important to confirm the requirements to ensure knowledge synthesis. We think that this study provides content validation and insight of desired content as well as the system flow from the user's point of view.

The CVI for the article is excellent. The article has met Lynn's minimum criteria of I-CVI's 0.78 and S-CVI/Ave 0.90 for excellent (Polit & Beck, 2006). It implies the content is highly relevant as readable knowledge for the nurses. As for the article resume, the I-CVI for the gastrointestinal symptoms did not reach 0.78 although the S-CVI/Ave is acceptable. The nurses express their difficulties in reading this item. It is due to the ambiguity of the article itself, which did not explain the result clearly. This item has to be discarded.

Important suggestions for improvement are noted. For the theme ambiguity, the translation of the content should consider the accuracy of the translation, to make sure the meaning does not alter. Theme simplicity emerged implies the article and article resume also needs to be simpler. The use of numbers should be limited to the important features of the result considering the knowledge needs of the nurses. Visuals are also helpful but need more explanation. Research summary, and systematic reviews, as some of the best evidence should be brief and practical (Jordan et al., 2018; Jordan, Lockwood, Munn, & Aromataris, 2019; Rushmer et al., 2019). The author should be more selective of the article choice and put more effort into providing a readable article for the nurses to synthesize knowledge in future activities.

This result confirms that evidence presented in brief is acceptable. Gartrell, Brennan (2018) in their study evaluating the PubMed4Hh mobile application contents, found that abstracts and TBLs are useful to help with decision making. Abstracts are more favorable than TBLs among clinicians and students. Similarly, this study noted higher validity of abstract compared to article resume. This study has not reached the evaluation stage of a mobile application development, but will take into account the Gartrell, Brenna (2018) findings.



The system flow requirements were explored by the participants. Overall, it has met the users' needs. Some additional features were asked by the participants. Any errors that occurred in this process should be corrected (Sommerville, 2016). These suggestions should be taken into consideration to design the mobile application. Thus, continuous improvement of the mobile application can be achieved.

Conclusion and Recommendation

The use of mobile technology to overcome barriers of evidence-based practice and to enhance knowledge transfer is emerging. Our prior study has shown the needs of mobile application for knowledge transfer and has made its requirements. This study examined the validity of the requirements which are the mobile application's content, surveying their opinion and suggestion on the content and the system flow. It is found that the translated abstract and article resume are valid although there is a need to simplify and increase the clarity of the contents. The system's flow also meets the requirement of the application; thus it can be used as a prototype of the mobile application. Further study is needed to develop the mobile application, examine its usefulness, and the content's readability to the users. The translated article and the article resume are valid contents of the mobile application even though there is a need for simplifying them. As well, the system's flow has meet the system requirement; thus it can be used as a prototype of the mobile application. Further study is needed to develop the mobile application, examine its usefulness, and the content's readability to the users.



References

- Asosiasi penyelenggara Jasa Internet Indonesia. (2020). Laporan survey internet APJII 2019-2020 (Q2). Retrieved from <https://apjii.or.id/survei>
- Boddy, C. R. (2016). Sample size for qualitative research. *Qualitative Market Research: An International Journal*, 19(4), 426-432. doi:10.1108/QMR-06-2016-0053
- Chen, X., Laurent, S., Onur, O. A., Kleineberg, N. N., Fink, G. R., Schweitzer, F., & Warnke, C. (2021). A systematic review of neurological symptoms and complications of COVID-19. *Journal of Neurology*, 268(2), 392-402. doi:10.1007/s00415-020-10067-3
- Cheung, K. S., Hung, I. F. N., Chan, P. P. Y., Lung, K. C., Tso, E., Liu, R., . . . Leung, W. K. (2020). Gastrointestinal Manifestations of SARS-CoV-2 Infection and Virus Load in Fecal Samples From a Hong Kong Cohort: Systematic Review and Meta-analysis. *Gastroenterology*, 159(1), 81-95. doi:<https://doi.org/10.1053/j.gastro.2020.03.065>
- Dal Mas, F., Garcia-Perez, A., Sousa, M. J., da Costa, R. L., & Cobiañchi, L. J. E. J. O. K. M. (2020). Knowledge translation in the healthcare sector: A structured literature review. *The Electronic Journal of Knowledge Management*, 18(3), 198-211. doi:10.34190/EJKM.18.03.001
- Fajarini, M., & Rahayu, S. (2021). *Knowledge transfer through mobile application needs: A survey of nurses as end users*. Paper presented at the 4th International Virtual Conference, Jawa Barat. <https://knepublishing.com/index.php/KnE-Life/article/view/8621>
- Fajarini, M., Rahayu, S., Felemban, E. M., & Setiawan, A. (2021). Factors related to doctors' and nurses' perceptions of Evidence-Based Practice (EBP) and Information and Communication Technology (ICT). *Jurnal Keperawatan Indonesia*, 24(1), 9-16. doi:DOI:10.7454/jki.v24i1.1086
- Gartrell, K., Brennan, C. W., Wallen, G. R., Liu, F., Smith, K. G., & Fontelo, P. (2018). Clinicians' perceptions of usefulness of the pubmed4hh mobile device application for clinical decision making at the point of care: A pilot study. *BMC medical informatics decision making*, 18(1), 1-11. doi:<https://doi.org/10.1186/s12911-018-0607-9>
- Grant, M. C., Geoghegan, L., Arbyn, M., Mohammed, Z., McGuinness, L., Clarke, E. L., & Wade, R. G. (2020). The prevalence of symptoms in 24,410 adults infected by the novel



- coronavirus (SARS-CoV-2; COVID-19): A systematic review and meta-analysis of 148 studies from 9 countries. *PloS one*, 15(6), e0234765. doi:10.1371/journal.pone.0234765
- Jordan, Z., Lockwood, C., Munn, Z., & Aromataris, E. (2018). Redeveloping the JBI Model of Evidence Based Healthcare. *Int J Evid Based Healthc*, 16(4), 227-241. doi:10.1097/xeb.0000000000000139
- Jordan, Z., Lockwood, C., Munn, Z., & Aromataris, E. (2019). The updated Joanna Briggs Institute Model of Evidence-Based Healthcare. *Int J Evid Based Healthc*, 17(1), 58-71. doi:10.1097/xeb.0000000000000155
- Lovato, A., & de Filippis, C. (2020). Clinical Presentation of COVID-19: A Systematic Review Focusing on Upper Airway Symptoms. *Ear, Nose & Throat Journal*, 99(9), 569-576. doi:10.1177/0145561320920762
- Lynn, M. R. (1986). Determination and quantification of content validity. *Nurs Res*, 35(6), 382-385.
- Malla, C., Aylward, P., & Ward, P. (2018). Knowledge translation for public health in low- and middle- income countries: A critical interpretive synthesis. *Global Health Research and Policy*, 3(1), 1-12. doi:10.1186/s41256-018-0084-9
- Moreno-Poyato, A. R., Casanova-Garrigos, G., Roldán-Merino, J. F., Rodríguez-Nogueira, Ó., & group, M. C. w. (2020). Examining the association between evidence-based practice and the nurse-patient therapeutic relationship in mental health units: A cross-sectional study. *Journal of Advance Nursing*, 0(0), 1-10. doi:<https://doi.org/10.1111/jan.14715>
- PubMed4Hh (Pubmed for Handhelds). (2016). National Library of Medicine [Mobile application software]. Retrieved from <https://pubmedhh.nlm.nih.gov/>
- Orton, M., Agarwal, S., Muhoza, P., Vasudevan, L., & Vu, A. (2018). Strengthening Delivery of Health Services Using Digital Devices. *Global health, science and practice*, 6(Suppl 1), S61-S71. doi:10.9745/GHSP-D-18-00229
- Polit, D. F., & Beck, C. T. (2006). The content validity index: Are you sure you know what's being reported? critique and recommendations. *Research in Nursing & Health*, 29(5), 489-497. doi:10.1002/nur.20147
- Radaelli, G., Lettieri, E., Mura, M., & Spiller, N. (2014). Knowledge sharing and innovative work behaviour in healthcare: A micro - level investigation of direct and indirect effects. *Creativity and Innovation Management*, 23(4), 400-414.



- Rushmer, R., Ward, V., Nguyen, T., & Kuchenmüller, T. (2019). Knowledge translation: Key concepts, terms and activities. In *Population health monitoring* (pp. 127-150): Springer.
- Shayan, S. J., Kiwanuka, F., & Nakaye, Z. (2019). Barriers associated with evidence-based practice among nurses in low- and middle-income countries: A systematic review. *World views on Evidence-based Nursing*, 16(1), 12-20. doi:10.1111/wvn.12337
- Sommerville, I. (2016). *Software engineering* (10th ed.). Global Edition: Pearson Education Limited.
- World Health Organization. (2015). *EVIPNet Europe Strategic Plan 2013–17*. Denmark: Regional Office for Europe Retrieved from https://www.euro.who.int/_data/assets/pdf_file/0009/291636/EVIPNet-Europe-strategic-plan-2013-17-en.pdf
- World Health Organization. (2020). Quality health services. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/quality-health-services#:~:text=Quality%20of%20care%20is%20the,with%20evidence%2Dbased%20professional%20knowledge.>
- Yusoff, M. S. B. (2019). ABC of content validation and content validity index calculation. *Education in Medicine Journal*, 11(2), 49-54. doi: <https://doi.org/10.21315/eimj2019.11.2.6>
- Zhong, Q., Wang, D., Bai, Y.-m., Du, S.-z., Song, Y.-l., & Zhu, J. (2019). Effectiveness of auricular acupressure for acute postoperative pain after surgery: A systematic review and meta-analysis. *Chinese Journal of Integrative Medicine*, 25(3), 225-232. doi:10.1007/s11655-019-3063-1