Evaluation of an online learning package developed to support the COVID-19 response of nurses working in Regional and Atoll Hospitals in the Maldives

ASIYA IBRAHIM, *Dean of School of Nurising, The Maldives National University*

AMINATH SHAFIA, SIZNA MOHAMED, *The Maldives National University*

ABSTRACT   *In the global crisis of COVID-19 pandemic and the unparalleled health emergency, nurses are the largest healthcare professional group providing frontline care in hospitals as well as other areas such as quarantine and isolation facilities. Additionally, due to the nurses' vital role in the care and management of the COVID-19 patients it is important that lifesaving information is delivered to them as well as other health professionals. Hence, School of Nursing (SN), Maldives National University (MNU) developed a short online learning course on nursing care of COVID-19 patients as per the request of the Ministry of Health (MoH), Maldives. The aim of the research was to evaluate the online learning package developed in the Maldivian context for nurses with little or no previous knowledge and skills in the care of COVID-19 patients. A cross sectional online questionnaire survey was used to collect data and an exploratory analysis was conducted. The quantitative findings showed that majority of nurses found the learning package more than satisfactory in each aspect evaluated. The overall consensus of the qualitative findings were the participants found learning online very helpful and informative. Therefore, the findings of this study can be considered as a useful baseline for developing short term online courses to address learning needs in emergency situations such as pandemics.*

KEYWORDS   *Nursing education; nurse; online learning; learning package; evaluation*

World Health Organization (WHO) declared coronavirus disease 2019 (COVID-19) as a global pandemic on 11 March 2020 due to rapid spread, the severity of illness, and the continual escalation in the number of affected countries, cases and causalities (Harapan et al., 2020; Lai et al., 2020; Zhou et al., 2020). To date (29 May 2020), the COVID-19 has spread to 215 countries and territories with 5,925,267 laboratory-confirmed cases and 362,541 mortalities that is attributed to this deadly pathogen (Worldometer, 2020). The first COVID-19 case from the Maldives was reported on 7 March 2020 (MOH, 2020) and up to the 20th case all were imported cases. However, with the identification of a positive case from Male' flu clinic, community spread of COVID-19 in the Maldives was established on 15

April 2020 (MOH, 2020). The Maldives, a small island nation with a vulnerable geographical location for this pandemic and with a capital city known as one of the most densely populated cities in the world, is particularly at very high risk of rapid spread of the pandemic.

In this global crisis and unparalleled health emergency, nurses are the largest healthcare professional group providing frontline care in hospitals as well as other areas such as quarantine and isolation facilities. Of the estimated 43.5 million healthcare workers worldwide, it is estimated that 20.7 million are nurses (WHO, 2020). Nurses' vital role in the care and management of the COVID-19 patients have fallen in the year declared by WHO as the International Year of the Nurse (Paterson et al., 2020). Globally, healthcare systems and policy responses to COVID-19 were evolving rapidly. Prompt advances about the pathogen, how disease is caused, clinical characteristics, and various treatment options inclusive of associated complications are readily available in number of data bases since the COVID-19 outbreak (Al-Ani et al., 2020; Chung et al, 2020; Driggin et al, 2020; Orioli et al., 2020; Ozma et al., 2020; Ulrich, 2020; Zhao et al, 2020). However there was limited research specific to nursing care and nurse's role in the COVID-19 pandemic.

Frontline healthcare professionals such as physicians and nurses provided care to patients with COVID-19 in the initial phases of the outbreak of COVID-19 in Hubei, China (Shang et al., 2020). A descriptive, cross-sectional survey study done to investigate nursing intention among nurses caring for emerging infectious disease patients in Korea revealed providing an educational program on caring for patients with pandemic diseases would increase self-confidence and reduce concerns (Lee & Kang, 2019). Evidence shows knowledge establishes prevention beliefs, forming positive attitudes, and promoting positive behaviours, and attitudes towards diseases and their coping strategies to a certain extent (Zhang et al., 2020). A qualitative study to understand the experiences of health-care providers during the COVID-19 crisis in China, revealed many challenges such as working in a completely new context where the healthcare providers were overwhelmed and exhausted by the workload, wearing protective gear, uncertainty and fear of being infected and infecting others (Liu et al., 2020). During pandemic or stressful working conditions nurses can also develop broad range of mental and physical health disorders and efforts to mitigate these challenges must be directed to those under the greatest workload (Yifan et al., 2020). A high level of training and professional experience, resilience and social support were necessary for healthcare workers who are first taking part in public health emergency (Cai et al., 2020)

Roles that nurses have already placed in this pandemic include screening suspected patients, ensuring prevention and spread of infections in healthcare facilities (Zhang, 2020). However nurses can experience anxiety caused by lack of knowledge, environmental changes, and adjusting cognition rationally. Sometimes the pressure of the epidemic may prompt nurses to use their medical and psychological knowledge needed actively or passively to make psychological adjustments (Sun, 2020). Therefore the global efforts to manage the impact of COVID-19 pandemic, one of the prioritized strategies WHO issued to be undertaken by governments was to expand, train and deploy health-care workers (Djalante et al., 2020). However, the Open WHO platform offered courses to support the COVID-19 response as online learning packages addressing the global learning need through WHO's technical guidance in simple and accessible formats

(Utunen et al., 2020), there is need to address country-specific learning needs with no exception for Maldivian nurses who are working in remote and geographically dispersed islands.

Online learning

There is increasing attention to online learning as a convenient way of getting professional training (Reeves et al., 2017; Yokoyama, 2019), especially when there is a need for continuing education to maintain their qualifications and competency (Wu et al., 2018). There are various definitions of online and descriptions of the terms of reference with slight variations in emphasis and focus. According to Clark and Mayer (2016) online learning is defined as instruction delivered on a digital device that is intended to support learning. Other synonyms associated include internet-based learning, computer-assisted learning and web-based learning using a wide variety of instructional designs and formats, such as synchronous and asynchronous delivery (Lawn, 2017). Approach to teaching and learning is based on the use of electronic media and devices as tools for improving access to training, communication and interaction, and that facilitates the adoption of new ways of understanding and developing (Al-Shorbaji et al., 2015).

There are studies done to examine the critical factors for the success of online learning. According to Mayer (2019) research on online learning need to focus on current cognitive theories of online learning, instruction, and assessment. The study done by Im and Kang (2019) to identify determinants of learners' outcomes in online learning, individual factors such as achievement, goal orientation, self-regulated learning, test-anxiety, and self-efficacy represented learning satisfaction and learning achievement. Online learning increases the accessibility and flexibility of continuing education for nurses. Literature reveals nurses have generally positive perceptions (Xing et al., 2018). A study done on to investigate perceptions of the impact of online learning as a distance-based learning model on the professional practices of working nurses in northern Ontario learning revealed it was a valued option for educational experiences. Incorporating a short online program provided opportunities to use technology for nurses living and working in the geographically separated areas (Carter et al., 2016). Similarly in Australian context nurses in rural area have responded that online learning provides improved access, consistency of information, flexibility and cost saving (Riley & Schmidt, 2016). Additionally asynchronous mode of online is gaining momentum as there is flexibility and capacity to learn at self-pace, accommodate different learning styles, enable the learner to review as they need, and capacity to overcome resource issues such as time and travel costs (Lawn, 2017; Lew & Nordquist, 2016).

There are significant challenges offering online learning documented. These include lack of described issues related to technical requirements, broken or missing content links, and unclear direction for students, frustration timely access materials and which may have resultant negative impact on course engagement, retention, and satisfaction (Kohan et al., 2017; Wilbur, 2016). Likewise in an evaluation of experiences and perceptions of online continuing professional development among clinicians in sub-Saharan Africa revealed limited poor access to internet and computer as barrier to learning in this mode (Feldacker et al., 2017). There are also limitations in offering course with subject matter that includes

practical component. For example teaching critical nursing in the online format to Registered Nurses (RN)s, there may be detrimental effect due to decrease in actual interaction with critical care patients at the bedside, even though they are working nurses with an experiential foundation (Warren & Spiegel, 2019).

Many factors contribute to effective learning in an online setting. Hence when offering online courses there is essential need to identify positive influences as well as challenges in this mode of educational delivery (Jowsey et al., 2020). To ensure the effectiveness and success of online learning programs, it is essential to rigorously evaluate learning analytics, principles of designing digital learning materials, learning goals, and students' feedback and preferences (Pei & Wu, 2019; Toro-Troconis et al., 2019). Thus, the course evaluation and revision process allow to identify or provide opportunities to include new resources and provide additional support as necessary for participants' achievement of fulfilling the course objectives. (McDonald et al., 2017).

This research aims to evaluate the online learning package developed in the Maldivian context for nurses with little or no previous knowledge and skills in the care of COVID-19 patients. The package was developed by the School of Nursing (SN), Maldives National University (MNU) for nurses working in regional and atoll hospitals of Maldives. Therefore, the main objective of this study is to evaluate the online learning package which addressed the care of COVID-19 patients.

Methodology

A cross sectional online questionnaire survey was used to evaluate the online learning package. School of Nursing (SN), Maldives National University (MNU) developed a short online learning course on nursing care of COVID-19 patients as per the request of the Ministry of Health (MoH), Maldives. This training course was designed to update nurse's knowledge with emerging evidence of rapidly evolving information of nursing care of COVID-19 in the clinical context. SN sought the assistance of the Centre for Educational Technology and Excellence (CETE), MNU to design the course via the CANVAS online platform. The online modules were focused on comprehensive nursing care of COVID-19 patients, the use of personal protective equipment (PPE), collection of samples from COVID-19 patients, infection control measures, and handling of COVID-19 dead bodies. The delivery of the content was through video recorded presentation and reading materials. The assessment of the learning was through participation in forum discussion and submission of a reflective exercise.

Invitations for Regional/Atoll Hospitals from each Atoll of Maldives were sent to give names of a focal point to participate in the online course. Each focal point was requested to give names of 10 other participants from the same Atoll. The participants of the online course were nurses working in 5 regional and 15 atoll hospitals with a total of 120 nurses who enrolled in three batches. The duration of the online package was 7 days, and participants completed the learning activities and assessments to achieve the objectives. After completion of the online learning modules, the participants were asked to fill a Google Form to evaluate the online learning package which was shared as a link through Canvas page. The questionnaire was open for completion until all participants filled the form.

Instrument

The questionnaire consisted of 30 items to evaluate the course structure and content, quizzing and assignment, E-Learning pace and navigation, multimedia and overall experience of the participants. The first part had items relating to participant demographics and work experience. The second part had items to rate from a Likert scale ranging from 1 (very poor), 2 (poor), 3 (satisfactory), 4 (good) and 5 (excellent). It had additional items to evaluate the time spent on the course and open ended two survey questions 'overall effectiveness of the training' and "any suggestions for the improvement of the course". All the responses were kept anonymous.

Data analysis

After the data were retrieved, exploratory analysis was conducted to clean the data followed by descriptive analyses using IBM SPSS 23. Percentages and mean with standard deviations were used to describe the demographic data. The responses of the 5-point Likert scale was scored as 1 = very poor, 2 = poor, 3 = satisfactory, 4 = good and 5 = excellent. Descriptive statistics were generated including frequency counts and mean values with standard deviation related to individual statement responses. Positive (i.e. 'excellent', 'good' and 'satisfactory') and negative (i.e. 'poor' and 'very poor') responses were combined for the purpose of the analysis. Fisher's exact test was used to compare groups, with $p < 0.05$ considered as significant.

Qualitative analysis using content analysis was done for the last two items. The responses of the open-ended questions were coded and then converted into themes.

Ethical considerations

This research was carried out by SN to evaluate the online learning package designed to address nurses learning needs of caring for COVID-19 patients. Ethical approval was given by MNU to conduct the study (approval number is RE/2020/BS-01).

Participants were given full right to withdraw from the study at any time during data collection period. Proper instructions were also given about their right to prefer not to answer questions that makes them uncomfortable. The aim and significance of the study was explained and verbal consent was taken before the data collection. The anonymity and confidentiality of the participants were ensured.

The individual responses given by the participants were kept anonymous. Codes were used to identify the data collection forms with no link to the real identity of any of the participants

Analysis and Findings

Participant characteristics

The evaluation for this research was done from the participants of the first three

batches of the training program. A total of 120 participants responded, giving a response rate of 100%. Majority of the participants were; females (88.3%), with highest qualification as Diploma (59.2%) and working in Atoll Hospitals (67.5%). The mean number of years of working experience is 9.02 years. Additional participant details are summarized in Table 1.

Table 1
Demographic characteristics of participants.

Characteristic	n = 120	%
Gender		
Male	14	11.7
Female	106	88.3
Education		
Certificate	6	5.0
Diploma	71	59.2
Degree	41	34.2
Masters	2	1.7
Place of work		
Health Centre	11	9.2
Atoll Hospital	81	67.5
Regional Hospital	28	23.3
Experience (in years):	Mean (SD) = 9.02 (5.28)	

Participant ratings

Participants were asked to rate the given aspects of course structure and content, quizzing and assignment, E-Learning pace and navigation, multimedia and overall experience from a five-point Likert scale. From a score rating of 1-5 the mean scores ranged from the lowest for availability of technical support (3.92) to the highest for relevance of subject matter or course content (4.28). Very few participants scored negative responses to any of the items, therefore a high proportion of positive responses ranging from 96.5% - 100% to all the items were observed. (Table 2). Further details of percentage of ratings of different aspects learning package are summarized in Figure 1.

Table 2
Ratings of different aspects learning package

| Items (n=120)	Mean	Std. Deviation	Positive response (%)
1.Understanding of the course structure.	3.97	1.02	99.1%
2.Relevance of the subject matter or course content.	4.28	0.61	100%
3.Amount of material covered.	4.09	0.61	100%
4.Course workload.	4.09	0.70	99.2%
5.Relevance of assignments, quizzes, and tests.	4.06	0.72	98.2%
6.Quality of the questions asked in the quizzes.	4.05	0.71	98.3%
7.Ease of navigation.	4.05	0.72	97.4%
8.E-learning access setup.	4.18	0.68	100%
9.Amount of multimedia used in the course.	3.96	0.78	96.5%
10.Quality of multimedia used in the course.	4.07	0.78	96.7%
11.Voice and quality of the narration used in this course.	4.04	0.72	99.2%
12.Technical quality of the course materials.	4.05	0.75	98.3%
13.Availability of technical support.	3.92	0.74	97.5%
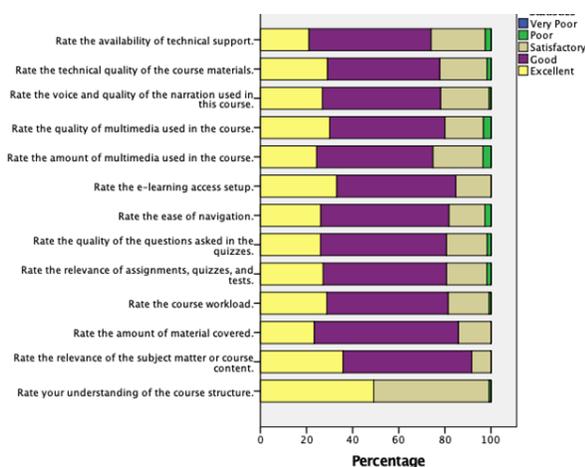
Figure 1: Percentage of ratings of different aspects learning package

In addition, the vast majority of participants stated that the time it took to

complete the course was appropriate (85.8%). The mean number of hours spent on the e-learning course was 7.99 ±12.97 and the mean number of hours spent on completing activities related to the course was 4.36 ±6.01.

Intergroup comparisons

Comparative analysis of participant groupings using Fisher's exact test demonstrated there is no significant differences in the ratings.

Qualitative Results

Qualitative data included a total of 120 free text responses to the final two survey questions. Overall effectiveness of the training' and "Any suggestions for the improvement of the course." The responses were coded and then converted into themes. The major theme was "Increased knowledge" and "Inclusion of more learning activities."

All the participants believed that the short training package for nurses on care of COIVD-19 patients helped them to gain more knowledge and understanding of the situation. They have learned additional information and got updated knowledge of the nurses' role in the pandemic situation. Almost all participants stated the training was helpful, especially relating to safety in COVID-19 pandemic.

"This is very helpful in the present situation to protect us and the society."

With the current context on lockdown facilitators were not able to travel to conduct face-to-face sessions, but the online training improved nurses' knowledge of guidelines associated with nursing care of COVID-19 patients. The respondents commented that training has helped to build confidence to deal with the present situation. The knowledge would help them to manage the current circumstance of the pandemic.

"The training was perfect in the pandemic situation and gave useful information."

Online training needs to have easy access to information and be understood by the participants. Learning online is an excellent platform to improve theoretical knowledge and get new information. Online learning can be useful for professionals with time constraints, especially in situations such as a pandemic.

"Online teaching helps to make time adjustments," and "in this situation, it is very helpful."

The video on donning and doffing of PPE and lessons on sample collection of COVID-19 patients, nursing care, and handling of dead bodies summarized all the required guidelines for following in the care of COVID-19 patients. Therefore, almost participants agree they increased their knowledge and received valuable information.

There were recommendations for the inclusion of more activities in the training package, such as the addition of tasks such as case studies, quizzes and forum sessions. There was an indication to cover the content in-depth and include more

detail about the disease condition.

"Add more details about treated cases (patients) and findings updates."

The overall consensus of the participants was learning online was very helpful and informative. There is a need to add more content and topics such as setting up of intensive care unit (ICU) and ventilation and ventilator care of patients. However, the ventilator management and ventilator care were beyond the scope of the training package.

Discussion

This study evaluated the online learning package developed in the Maldivian context for nurses with little or no previous knowledge and skills in the care of COVID-19 patients. The findings showed that majority of nurses found the learning package more than satisfactory and the time to complete the online course was appropriate. These findings can aid nursing educators and managers in the development and delivery of effective online learning courses designed to fulfil nurses' training needs in different healthcare settings.

Health professionals need continuing education to maintain their qualifications and competency (Xing, et al, 2018). Studies show that high workloads and lack of time, hinder nurses in their participation in continuing education (Kohan et al., 2017). Online learning increases the accessibility and flexibility of continuing education for nurses. The present study showed positive feedback from all categories of nurses for the online learning package. Carter et al. (2016) found that nurses consider online learning to be suitable for their working conditions and needs. Hence, nurses should be provided with online learning opportunities, regardless of working experience or place of work.

Hence, the findings can be considered as a useful baseline for developing short term online courses to address learning needs in emergency situations such as pandemics. Through the experience of this short survey analysis, MNU being the pioneer in higher education can collaborate with the related other healthcare institutions to cater to the learning needs of working nurses using online platforms.

Study limitations

This study has highlighted positive feedback for the online learning package developed for nurses to care for COVID-19 patients. Caution needs to be exercised with questionnaire surveys as data are self-reported and their accuracy cannot be checked. In addition, insignificant findings in the intergroup differences could be attributed to inadequate sample size. Hence, the results are not generalizable to nurses in Maldives as a whole.

Recommendations and Conclusions

The study shows that nurses found the learning experience positive and the time to complete the course appropriate. This study did not differentiate the preferences of nurses for online against face-to-face learning, an area that might be of interest to the educators. In addition, attitude of nurses for online learning need to be investigated so that the receptiveness of learning packages can be increased. However, the findings should be of interest to nursing educators and health service organizations involved in training nurses.

References

Al-Ani, A. H., Prentice, R. E., Rentsch, C. A., Johnson, D., Ardalan, Z., Heerasing, N., Garg, M., Campbell, S., Sasadeusz, J., Macrae, F. A., Ng, S. C., Rubin, D. T., & Christensen, B. (2020). Review article: prevention, diagnosis and management of COVID-19 in the IBD patient. *Alimentary Pharmacology & Therapeutics, 52*(1), 54–72. https://doi.org/10.1111/apt.15779

Al-Shorbaji, N., Atun, R., Car, J., Majeed, A., & Wheeler, E. (eds). *E-learning for undergraduate health professional education - a systematic review informing a radical transformation of health workforce development.* World Health Organization, Geneva, 2015. http://whoeducationguidelines.org/ content/e-learning-report.

Cai, W., Lian, B., Song, X., Hou, T., Deng, G., & Li, H. (2020). A cross-sectional study on mental health among healthcare workers during the outbreak of Corona Virus Disease 2019. *Asian Journal of Psychiatry, 51,* 102111. https://doi.org/10.1016/j.ajp.2020.102111

Carter, L. M., Hanna, M., & Warry, W. (2016). Perceptions of the Impact of Online Learning as a Distance-based Learning Model on the Professional Practices of Working Nurses in Northern Ontario. *Canadian Journal of Learning and Technology, 42*(3). , DOI: https://doi.org/10.21432/T2Q90M

Chung, H. S., Lee, D. E., Kim, J. K., Yeo, I. H., Kim, C., Park, J., Seo, K. S., Park, S. Y., Kim, J. H., Kim, G., Lee, S. H., Cheon, J. J., & Kim, Y. H. (2020). Revised Triage and Surveillance Protocols for Temporary Emergency Department Closures in Tertiary Hospitals as a Response to COVID-19 Crisis in Daegu Metropolitan City. *Journal of Korean Medical Science, 35*(19), e189. https://doi.org/10.3346/jkms.2020.35.e189

Clark, R. C., & Mayer, R. E. (2016). *E-learning and the science of instruction.* (4th ed.). Hoboken Wiley. https://doi.org/10.1002/9781119239086

Djalante, R., Lassa, J., Setiamarga, D., Sudjatma, A. Indrawan, M., Haryanto, B., Mahfud, C., Sinapoy, M.S., Djalante, S., Rafliana, I., Gunawan, L.A., Surtiari, G. A. K., & Warsilah, H. (2020). Review and analysis of current responses to COVID-19 in Indonesia: Period of January to March 2020, *Progress in Disaster Science, 6,* 100091, https://doi.org/10.1016/j.pdisas.2020.100091.

Driggin, E., Madhavan, M. V., Bikdeli, B., Chuich, T., Laracy, J., Biondi-Zoccai, G., Brown, T. S., Der Nigoghossian, C., Zidar, D. A., Haythe, J., Brodie, D., Beckman, J. A., Kirtane, A. J., Stone, G. W., Krumholz, H. M., & Parikh, S. A. (2020). Cardiovascular Considerations for Patients, healthcare Workers, and

Health Systems during the COVID-19 Pandemic. *Journal of the American College of Cardiology, 75*(18), 2352–2371. https://doi.org/10.1016/j.jacc.2020.03.031

Feldacker, C., Jacob, S., Chung, M.H. Nartker, A. & Kim, H. N. (2017). Experiences and perceptions of online continuing professional development among clinicians in sub-Saharan Africa. *Human Recourses for Health, 15*(1), 89. https://doi.org/10.1186/s12960-017-0266-4

Harapan, H., Itoh, N., Yufika, A., Winardi, W., Keam, S., Te, H., Megawati, D., Hayati, Z., Wagner, A. L., & Mudatsir, M. (2020). Coronavirus disease 2019 (COVID-19): A literature review. *Journal of Infection and Public Health, 13*(5), 667–673. https://doi.org/10.1016/j.jiph.2020.03.019

Im, T. & Kang, M. (2019). Structural relationship s of factors which impact on learner achievement of online learning environment. *International Review of Research in Open and Distance Learning, 20* (1), 111-124. DOI: https://doi.org/10.19173/irrodl.v20i1.4012

Jowsey, T., Foster, G., Cooper-Ioelu, P., & Jacobs, S. (2020). Blended learning via distance in pre-registration nursing education: A scoping review. *Nurse Education in Practice, 44,* 102775. https://doi.org/10.1016/j.nepr.2020.102775

Kohan, N., Soltani Arabshahi, K., Mojtahedzadeh, R., Abbaszadeh, A., Rakhshani, T. & Emami, A. (2017). Self- Directed Learning Barriers in a Virtual Environment: A Qualitative Study. *Journal of Advances in Medical Education & Professionalism, 5*(3), 116-123.

Lai, C. C., Shih, T. P., Ko, W. C., Tang, H. J., & Hsueh, P. R. (2020). Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease-2019 (COVID-19): The epidemic and the challenges. *International Journal of Antimicrobial Agents, 55*(3), 105924. https://doi.org/10.1016/j.ijantimicag.2020.105924

Lawn, S., Zhi, X. & Morello, A. (2017). An integrative review of e-learning in the delivery of self-management support training for health professionals. *BMC Medical Education, 17*(1), 183. doi.org/10.1186/s12909-017-1022-0

Lee, S. & Kang, S.J. (2019). Factors influencing nurses› intention to care for patients with emerging infectious diseases: Application of the theory of planned behavior. *Nursing & Health Sciences, 22*. 82-90. DOI: 10.1111/nhs.12652

Lew, E. K., & Nordquist, E. K. (2016). Asynchronous learning: student utilization out of sync with their preference. *Medical education online, 21,* 30587. https://doi.org/10.3402/meo.v21.30587

Liu, Q., Luo, D., Haase, J. E., Guo, Q., Wang, X. Q. Liu, S., Xia, L., Liu, Z., Yang, J., & Yang, B.X. (2020). The experiences of health-care providers during the COVID-19 crisis in China: a qualitative study. *Lancet Global Health, 8*(6). e790. doi: 10.1016/S2214-109X(20)30214-X.

Mayer, R.E. (2019). Thirty years of research on online learning. *Applied Cognitive Psychology, 33*, 152– 159. https://doi.org/10.1002/acp.3482

McDonald, P. L., Harwood, K.J., Butler, J.T., Schlumpf, K.S., Eschmann, C. W., & Drago, D. (2017). Design for success: Identifying a process for transitioning to an intensive online course delivery model in health professions education. *Medical Education Online, 7*(23), 1415617. https://Doi.Org/10.1080/10872981.2017.1415617

Ministry of Health. (2020). COVID-19 *Local updates.* Retrieved May 8, 2020. https://COVID-19.health.gov.mv/en/

Orioli, L., Hermans, M. P., Thissen, J. P., Maiter, D., Vandeleene, B., & Yombi, J. C. (2020). COVID-19 in diabetic patients: Related risks and specifics of management. *Annales d›endocrinologie, 81*(2-3), 101–109. https://doi.org/10.1016/j.ando.2020.05.001

Ozma, M. A., Maroufi, P., Khodadadi, E., Köse, S., Esposito, I., Ganbarov, K., Dao, S., Esposito, S., Dal., T., Zeinalzadeh., E., & Kafil, H.S. (2020). Clinical manifestation, diagnosis, prevention and control of SARS-CoV-2 (COVID-19) during the outbreak period. *Infez Med, 28*(2), 53-165.

Paterson, C., Gobel, B., Gosselin, T., Haylock, P.J., Papadopoulou, C., Slusser, K., Rodriguez, A. & Pituskin, E. (2020). Oncology Nursing During a Pandemic: Critical Reflections in the Context of COVID-19. *Seminars in Oncology Nursing, 23,* 151028. Doi: 10.1016/j.soncn.2020.151028

Pei, L., & Wu, H. (2019). Does online learning work better than offline learning in undergraduate medical education? A systematic review and meta-analysis. *Medical Education Online, 24*(1), 1666538. doi:10.1080/10872981.2019.1666538

Reeves, S., Fletcher, S., McLoughlin, C., Alastair Yim, A. & Patel, K. D. (2017). *BMJ Open, 7*(8), e016872. doi:10.1136/bmjopen-2017-016872.

Riley, K., & Schmidt, D. (2016). Does online learning click with rural nurses? A qualitative study. *The Australian Journal of Rural Health, 24*(4), 265–270. https://doi.org/10.1111/ajr.12263

Shang, Y., Pan, C., Yang, X., Zhong, M., Shang, X., Wu, Z., Yu, Z., Zhang, W., Zhong, Q., Zheng, X., Sang, L., Jiang, L., Zhang, J., Xiong, W., Liu, J., & Chen, D. (2020). Management of critically ill patients with COVID-19 in ICU: statement from front-line intensive care experts in Wuhan, China. *Annals of Intensive Care, 10*(1), 73. https://doi.org/10.1186/s13613-020-00689-1

Sun, N., Shi, S., Jiao, D. Song, R., Ma, L., Wang, H., Wang, C., Wang, Z., You, Y., Liu, S. & Wang, H. (2020). A Qualitative Study on the Psychological Experience of Caregivers of COVID-19 Patients. To appear in: AJIC: *American Journal of Infection Control.* PII: S0196-6553(20)30201-7. DOI: https://doi.org/10.1016/j.ajic.2020.03.018.

Toro-Troconis, M., Alexander, J. & Frutos-Perez, M. (2019). Assessing Student Engagement in Online Programmes: Using Learning Design and Learning Analytics. *International Journal of Higher Education, 8*(6), 171-183. DOI: https://doi.org/10.5430/ijhe.v8n6p171.

Ulrich, B., McNamara, L., Watnick, S., & Last, F. M. (2020). Caring for Nephrology Patients and Staff during the COVID-19 Pandemic: Experiences of the Northwest Kidney Centers. *Nephrology Nursing Journal: Journal of the American Nephrology Nurses› Association, 47*(2), 119–125.

Utunen, H., Ndiaye, N., Piroux, C., George, R., Attias, M. & Gamhewage, G. (2020). Global Reach of an Online COVID-19 Course in Multiple Languages on Open WHO in the First Quarter of 2020: Analysis of Platform Use Data. *Journal Medical Internet Research, 22*(4): e19076. doi: 10.2196/19076: 10.2196/19076

Warren, N. A., & Spiegel, H. L. (2019). Teaching *Critical Care Nursing Online for RNs. Critical care nursing quarterly, 42*(1), 53–63. https://doi.org/10.1097/CNQ.0000000000000238

Wilbur K. (2016). Evaluating the online platform of a blended-learning pharmacist continuing education degree program. *Medical education online, 21,* 31832. https://doi.org/10.3402/meo.v21.31832

Worldometer, (2020). COVID-19 Coronavirus Pandemic. In *Worldometer.* Retrieved May 8, 2020, https://www.worldometers.info/coronavirus/

World Health Organization. (2020). *State Of The World›s Nursing 2020: Investing in Education, Jobs and Leadership.* World Health Organization. ISBN 978-92-4-000327-9 (electronic version).

Wu, X. V., Chan, Y. S., Tan, K., & Wang, W. (2018). A systematic review of online learning programs for nurse preceptors. *Nurse Education Today, 60,* 11–22. https://doi.org/10.1016/j.nedt.2017.09.010

Xing, W., Ao, L., Xiao, H., Cheng, L., Liang, Y., & Wang, J. (2018). Nurses› Attitudes toward, and Needs for Online Learning: Differences between Rural and Urban Hospitals in Shanghai, East China. *International Journal of Environmental Research and Public Health, 15*(7), 1495. https://doi.org/10.3390/ijerph15071495

Yifan, T., Ying, L., Chunhong, G., Jing, S., Rong, W., Zhenyu, L., Zejuan, G., & Peihung, L. (2020). Symptom Cluster of ICU Nurses Treating COVID-19 Pneumonia Patients in Wuhan, China. *Journal of Pain and Symptom Management, 60*(1), e48–e53. https://doi.org/10.1016/j.jpainsymman.2020.03.039

Yokoyama, S. (2019). Academic Self-Efficacy and Academic Performance in Online Learning: A Mini Review. *Frontiers in Psychology, 9,* 2794. doi.org/10.3389/fpsyg.2018.02794

Zhang, Y. (2020). Strengthening the Power of Nurses in Combating COVID-19. *Journal of Nursing Management.*   doi: 10.1111/jonm.13023. Online ahead of print.

Zhang M., Zhou, M., Tang, F., Wang, Y., Nie, H., Zhang, L., & You, G. (2020). Knowledge, attitude, and practice regarding COVID-19 among healthcare workers in Henan, China. *The Journal of hospital infection, 105*(2), 183–187. https://doi.org/10.1016/j.jhin.2020.04.012

Zhao, N., Zhou, Z.L., Wu, L., Zhang, X. D. Han, S.B., Bao, H.J., Shu, Y., & Shu, X.G. (2020). An update on the status of COVID-19: a comprehensive review. *European Review for Medical and Pharmacological Sciences, 24*(8), 4597-4606. doi:10.26355/eurrev_202004_21046

Zhou, M., Tang, F., Wang, Y., Nie, H., Zhang, L., You, G. & Zhang, M. (2020). Knowledge, attitude and practice regarding COVID-19 among healthcare workers in Henan, China. *Journal of Hospital Infection,* https://doi.org/10.1016/j.jhin.2020.04.012.