ORİJİNAL MAKALE / ORIGINAL ARTICLE

Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balikesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1084361

The Effect of Health Belief in Health Practices: An Example of Hand Hygiene in Nurses

Feyza TURAN[1], Zehra ESKİMEZ[2]

[1] Adana City Training and Research Hospital, Department of Cardiovascular Surgery
[2] Çukurova University, Faculty of Health Sciences, Department of Nursing

Geliş Tarihi / Received: *07.03.2022,* ***Kabul Tarihi / Accepted:*** *04.02.2023*

ABSTRACT

Objective: This research was carried out to examine the effect of nurses' beliefs on hand hygiene on hand hygiene practices. **Materials and Methods:** This descriptive and cross-sectional study was conducted with 529 nurses working at the City Training and Research Hospital in a province in the south of Turkey between March and June 2019. The research data were collected by face-to-face survey method using personal information form, Hand Hygiene Belief Scale (HHBS) and Hand Hygiene Practice Inventory (HHPI). The analysis of the research data was performed with SPSS version 24.0 package program. Frequency tables, descriptive statistics, independent-samples t-test, analysis of variance (ANOVA) test, Mann–Whitney U test and Kruskal-Wallis H test were used to evaluate the research findings. **Results:** HHBS score mean was 83.64±9.14 and HHPI score mean was 65.88±5.66. A positive, very weak and statistically significant correlation was found between the HHBS and the HHPI scores (r=0.196; p=0.000). It was found that HHBS scores were affected only by gender, while HHPI scores were affected by having children, the unit where the nurses work, the number of patients in the unit and their professional satisfaction. **Conclusion:** The research shows that as hand hygiene belief scale scores increase, hand hygiene practice inventory scores also increase positively.
Keywords: Hand Hygiene, Belief, Practice, Nurse.

Sağlık Uygulamalarında Sağlık İnancının Etkisi: Hemşirelerde El Hijyeni Örneği

ÖZ

Amaç: Bu araştırma, hemşirelerin el hijyenine ilişkin inançlarının el hijyeni uygulamalarına etkisini incelemek amacıyla yapılmıştır. **Gereç ve Yöntem:** Tanımlayıcı ve kesitsel nitelikteki bu araştırma, Mart-Haziran 2019 tarihleri arasında Türkiye'nin güneyinde bulunan bir ildeki Şehir Eğitim ve Araştırma hastanesinde çalışan 529 hemşire ile yapılmıştır. Araştırma verileri, kişisel bilgi formu, El Hijyeni İnanç Ölçeği (HHBS) ve El Hijyeni Uygulama Envanteri (HHPI)kullanılarak yüz yüze anket yöntemiyle toplanmıştır. Araştırma verilerinin analizi SPSS versiyon 24.0 paket programı ile yapılmıştır. Araştırma bulgularının değerlendirilmesinde frekans tabloları, tanımlayıcı istatistikler, independent-samples t-test, Analysis of Variance (ANOVA) test, Mann–Whitney U test ve Kruskal–Wallis H test kullanılmıştır. **Bulgular:** HHBS puan ortalaması 83.64±9.14, HHPI puan ortalaması 65.88±5.66 idi. HHBS ve HHPI puanları arasında pozitif yönde, çok zayıf derecede ve istatistiksel olarak anlamlı bir ilişki bulundu (r=0.196; p=0.000). HHBS puanlarının sadece cinsiyetten etkilendiği, HHPI puanlarının ise çocuk sahibi olma, hemşirelerin çalıştığı birim, birimdeki hasta sayısı ve mesleki memnuniyetlerinden etkilendiği bulundu. **Sonuç:** Araştırma, el hijyeni inanç ölçeği puanları arttıkça, el hijyeni uygulama envanteri puanlarının da pozitif yönde arttığını göstermektedir.
Anahtar Kelimeler: El Hijyeni, İnanç, Uygulama, Hemşire.

Sorumlu Yazar / Corresponding Author: Zehra ESKİMEZ, Çukurova University, Faculty of Health Sciences, Department of Nursing, Adana, Turkey
E-mail: zehraeskimez@yahoo.com

Bu makaleye atıf yapmak için / Cite this article: Turan, F., & Eskimez, Z. (2023). The effect of health belief in health practices: An example of hand hygiene in nurse. *BAUN Health Sci J, 12(1): 1-7.* https://doi.org/10.53424/balikesirsbd.1084361

INTRODUCTION

Healthcare-associated infections are an important cause of morbidity and mortality. Hand hygiene is accepted as an effective protective prevention (Gould et al., 2017). Findings establishing that infectious diseases can be prevented by washing hands were introduced in modern medicine with the practices of Louis Pasteur and Joseph Lister in the middle of the XIX century. Around the same time, Ignaz Semmelweis (1847) showed that patients could be contaminated by microorganisms from the hands of healthcare workers, which further increased the importance of hand hygiene (Riberio & Lima, 2020). The COVID-19 pandemic has once again revealed the importance of hand hygiene in reducing cross contamination and the spread of the disease-causing severe acute respiratory syndrome-coronavirus 2 (WHO, 2020). Even in the 1860s, Nightingale emphasised that nurses should frequently wash their hands and faces during the day (Juthamanee, 2020). Accordingly, hand hygiene has been recommended as an important strategy to help prevent the spread of COVID-19 in hospitals (Moore, 2021).

Hand hygiene prevents harmful microorganisms from spreading to other individuals by eliminating them from the hands. It is a general term that includes washing hands with water and antiseptics or surgical antisepsis of the hands (Hillier, 2020; Sundal 2017; Türkmen & Bakır, 2017). According to the latest reports from the Center for Disease Control and Prevention, washing hands with soap and water for at least 20 seconds or using alcohol-based hand sanitizers when soap and water are not available is the first line of defense in stopping the spread of infection (CDC, 2020). Handwashing among healthcare professionals has been an important area for improvement since years ago. Various initiatives, campaigns, and efforts have been made to increase hand hygiene compliance among healthcare professionals worldwide, 61% of healthcare professionals still do not follow best practice recommendations for hand hygiene (WHO, 2016).

Proper hand hygiene beliefs, attitudes and behaviours among nurses, who have the most contact with patients, is very important (Hammerschmidt & Manser, 2019). True information forms the basis of true behavior in ensuring compliance. It is necessary to provide healthcare professionals with consistency; that is, behaviours based on real knowledge and attitude instead of behaviours that are acquired as a result of a stimulus-reaction approach. The Health Belief Model is the most well-known model of health behaviours. This model emphasises that health behaviours will be affected by beliefs, values and attitudes (Gaube et al., 2021).

Behaviour includes everything that can be done or experienced by individuals. Factors affecting behaviours encompass individual factors such as knowledge, attitudes, practices, beliefs and perceptions, and identifying them will improve hand hygiene practice behaviour. Hand hygiene behaviour compliance also indicates that individual factors may play a role in determining behaviour. Individual factors such as social, cognitive and psychological determinants (knowledge, attitude, intention, beliefs and perceptions) provide additional information about hand hygiene behaviours (Karadağ et al., 2016). Identifying beliefs that play a critical role in decisions that constitute health practices can guide targeted health promotion strategies (Maria et al., 2018).

This study was conducted in a large hospital with high patient circulation and it was thought that examining nurses' hand hygiene beliefs and behaviors would contribute to the scientific literature. In this context, the factors affecting the practice of hand hygiene should be examined comprehensively. It is important for nurses to be informed about their knowledge and behaviors about hand hygiene.

MATERIALS AND METHODS

Study design

The study was carried out with a descriptive and cross-sectional design to examine the effect hand hygiene beliefs on the hand hygiene practices of nurses.

Participants and setting

This research was carried out with nurses working at the City Training and Research Hospital in a province in the south of Turkey in March-June 2019. This hospital is a health institution with a high patient and nurse capacity in Turkey. At the time of the research, there were 960 registered nurses in the hospital. Participants in the study were reached by simple random sampling method. It aimed to reach all nurses, and the nurses who agreed to participate in the study formed the sample of the research. During the period of the study, 207 nurses were excluded from the study because they were on leave (maternity leave, sick leave, annual leave, etc.). The population of the research consisted of 753 nurses. Two hundred twenty-four nurses refused to participate in the study. The research was completed with 529 nurses who consented to participate in the study (the participation rate was 70.2 %).

Data collection

Before the data collection forms were given to the nurses, nurses were enlightened and informed about the purpose, method, scope, application period, ethical issues, data collection forms and content of the research by the researcher. Verbal and written consent was obtained from nurses prior to give data collection forms. It took 15 minutes to fill out the data collection forms. The nurses who did not have the appropriate time to fill out the data collection forms were interviewed again to determining the appropriate time period.

Data collection tools

Personal information form: The "Personal Information Form" prepared by the researcher consisted of eight questions on the nurses' socio-demographic, working, and professional characteristics.

Hand Hygiene Beliefs Scale (HHBS): The Turkish validity and reliability study of the HHBS, which Van De Mortel developed in 2009, was carried out by Karadağ et al., 2016 (Karadağ et al., 2016; Van De Mortel, 2009; Van De Mortel et al., 2010). The scale consists of 22 items. The total score ranges from 22 to 110; the higher the score, the higher the positive belief about hand hygiene. In the Turkish validity and reliability study of the European Health Interview Survey (EHIS), Cronbach's alpha value was 0.76. In the present study, Cronbach's alpha value of the scale was found to be 0.80.

Hand Hygiene Practices Inventory (HHPE): The Turkish validity and reliability study of the HHPE, which Van De Mortel developed in 2009, was carried out by Karadağ et al. in 2016 (Van De Mortel, 2009; Van De Mortel et al., 2010; Karadağ et al., 2016). The scale consists of 14 items. The total score ranges from 14 to 70, and high scores indicate that hand hygiene practices are always performed. Cronbach's alpha value was 0.85 in the Turkish validity and reliability study of HHPE. In the present study, Cronbach's alpha value was 0.86.

Statistical analysis

IBM SPSS Statistics 24 programme was used for statistical analysis. The data were evaluated using arithmetic mean, percentage, standard deviation, independent-samples t-test, analysis of variance (ANOVA) test, Mann–Whitney U test, and Kruskal–Wallis H test.

Ethical considerations

The study was approved by the university's Institutional Review Board (No:79/06.07.2018). institutional permission was obtained from the Provincial Health Directorate, and written consent for the use of the scale was obtained from the authors who conducted the Turkish validity and reliability study of HHBS and HHPE. The study was carried out by the Declaration of Helsinki Principles regarding ethical rules.

RESULTS

The mean age of the nurses was 33.87±8.08 years; 44.2% were in the 26–35 age group, 84.3% were women, 63.1% were married, and 59.9% had children. Furthermore, 38.4% of the nurses worked in intensive care, 30.4% had ≥16 years of professional experience, 33.6% cared for 18-24 patients daily in the clinic they worked in, and 50.4% were partially satisfied with their profession (Table 1).

It was determined that the female nurses had more positive beliefs about hand hygiene than their male counterparts (t=2.731; p=0.007). Nurses with children and those working in intensive care units adopted more hand hygiene practices than those without children and those working in surgical clinics (Z=-2.522; p=0.012; $\chi2$=14.551; p=0.024). Nurses providing care for 11–17 and 18–24 patients in the unit where they worked and nurses who were partially satisfied or dissatisfied with their profession were found to adopt less hand hygiene practices compared to those providing care for 4–10 patients and those who were satisfied with their profession ($\chi2$=14.596; p=0.006; $\chi2$=11.830; p=0.003) (Table 1).

The mean HHBS score was 83.64±9.14, and the mean HHPE score was 65.88±5.66. It was determined that the nurses had moderate hand hygiene beliefs and that their hand hygiene practices were at a reasonable level (Table 2).

A positive, very weak, and statistically significant correlation was found between the HHBS and the HHPE scores (r=0.196; p=0.000). As the HHBS score increased, the HHPI score increased (Table 3).

Table 1. Comparison of HHBS and HHPE scores according to individual and professional characteristics of nurses (n=529).

Variables	n	%	HHBS		HHPE	
			X̄ ± SD	**Median [IQR]**	**X̄ ± SD**	**Median [IQR]**
Age [X±SD -> 33.87±8.08]						
≤25	81	15.3	84.79±9.36	86.0 [13.5]	65.33±5.57	67.0 [7.0]
26-35	234	44.2	82.85±9.29	82.5 [12.0]	65.95±5.81	68.0 [6.0]
36-45	169	31.9	84.33±8.73	85.0 [12.0]	68.82±5.44	68.0 [6.0]
≥46	45	8.6	83.11±9.34	83.0 [12.0]	66.76±5.91	70.0 [4.0]
Test value			F=1.379		$\chi2$=6.405	
p			p=0.248		p=0.093	
Gender						
Female	446	84.3	84.11±9.12	84.0 [12.3]	65.90±5.69	68.0 [6.0]
Male	83	15.7	81.14±8.87	81.0 [9.0]	65.78±5.54	68.0 [7.0]
Test value			t=2.731		Z=-0.155	
p			**p=0.007**		p=0.877	

t=independent-samples t-test, **F**=analysis of variance; **Z**=Mann–Whitney U test, **$\chi2$**=Kruskal-Wallis H test.

Table 1 (Continue). Comparison of HHBS and HHPE scores according to individual and professional characteristics of nurses (n=529).

Variables	n	%	HHBS Ẋ ± SD	HHPE Median [IQR]	Ẋ ± SD	Median [IQR]
Marital status						
Married	334	63.1	83.07±9.38	83.0 [12.0]	65.97±5.88	68.0 [6.0]
Single	195	36.9	84.63±8.84	85.0 [13.0]	65.73±5.28	67.0 [7.0]
Test value			t=-1.901		Z=-1.180	
p			**p=0.058**		p=0.238	
Presence of children						
Yes	317	59.9	83.87±9.02	84.0 [12.0]	66.19±5.80	69.0 [5.5]
No	212	40.1	83.31±9.31	83.0 [13.0]	65.42±5.43	67.0 [7.0]
Analysis			t=0.695		Z =-2.522	
Significance level			p=0.487		**p=0.012**	
Working unit						
Internal medicine clinics (1)	85	16.1	84.09±8.85	85.0 [12.5]	65.71±5.01	67.5 [6.5]
Surgical clinics (2)	101	19.1	82.80±8.95	83.0 [10.5]	64.24±7.46	67.0 [9.0]
Intensive care (3)	203	38.4	84.24±9.59	84.0 [13.0]	66.35±5.09	70.0 [6.0]
Emergency (4)	36	6.8	84.78±8.64	84.5 [12.8]	65.44±6.02	67.5 [7.8]
Operating room (5)	7	1.3	81.57±7.89	79.0 [14.0]	68.86±2.04	69.0 [3.0]
Outpatient clinics (6)	7	1.3	82.71±9.48	83.0 [14.0]	67.86±4.18	69.0 [4.0]
Others (7)	90	17.0	82.60±8.89	83.0 [11.3]	66.61±4.93	69.0 [6.3]
Test value			$\chi2$=2.877		$\chi2$=14.551	
p			p=0.824		**p=0.024** [2-3]	
Professional satisfaction						
Satisfied (1)	149	28.2	83.94±9.42	84.0 [12.0]	66.98±4.85	70.0 [4.0]
Partially Satisfied (2)	267	50.4	83.57±9.21	84.0 [13.0]	65.58±5.87	67.0 [7.0]
Not Satisfied (3)	113	21.4	83.43±8.64	83.0 [12.5]	65.15±5.99	67.0 [7.0]
Test value			F=0.116		$\chi2$=11.830	
p			p=0.890		**p=0.003** [1-2,3]	
Professional experience						
0–11 months	36	6.8	85.67±9.64	84.0 [16.0]	65.36 ± 5.15	67.5 [9.8]
1–5 years	122	23.1	83.03±9.52	83.5 [12.0]	65.37 ± 5.87	67.0 [7.0]
6–10 years	138	26.1	83.02±9.37	83.5 [13.0]	66.07 ± 6.02	68.0 [5.0]
11–15 years	72	13.6	84.21±8.80	83.5 [12.0]	65.47 ± 6.23	67.5 [7.0]
≥16 years	161	30.4	83.94±8.68	84.0 [12.0]	66.41 ± 5.01	69.0 [6.0]
Test value			F=0.847		$\chi2$=2.054	
p			p=0.496		p=0.561	
Number of unit patients						
4–10 patients (1)	134	25.4	84.08±9.82	84.0 [13.0]	66.82±4.92	70.0 [4.0]
11–17 patients (2)	111	21.0	82.94±9.66	82.0 [13.0]	65.43±6.21	67.0 [7.0]
18–24 patients (3)	178	33.6	83.98±8.90	84.0 [12.0]	65.13±5.87	67.0 [7.3]
25–31 patients (4)	23	4.3	82.65±10.28	83.0 [16.0]	67.52±3.80	69.0 [4.0]
≥32 (5)	83	15.7	83.42±7.70	83.0 [7.7]	66.00±5.83	68.0 [6.0]
Test value			$\chi2$=2.050		$\chi2$=14.596	
p			p=0.727		**p=0.006** [1-2,3]	

t=independent-samples t-test, **F=**analysis of variance; **Z=**Mann–Whitney U test, **$\chi2$=**Kruskal–Wallis H test.

Table 2. Mean HHBS and hand HHPE scores of the nurses (n=529).

Scales (n = 529)	Mean	Standard Deviation	Median	Min–Max
Mean Hand Hygiene Beliefs Scale	83.64	9.14	84.0	50.0-109.0
Hand Hygiene Practices Inventory	65.88	5.66	68.0	28.0-70.0

Table 3. Examination of the correlation between HHBS and HHPE scores (n=529).

Correlation * (n=529)	Hand Hygiene Practice Inventory
Hand Hygiene Belief Scale	r=0.196 **p=0.000**

* Spearman correlation coefficient.

DISCUSSION

Hand hygiene is one of the most important measures to prevent infections both in the hospital and in social life in today's conditions. It is easy to apply, simple and fast, but it has an immense impact on protecting against all infections. The data obtained from this study were discussed with the contribution of the relevant scientific literature.

The present study determined that the female nurses had more positive beliefs about hand hygiene than their male colleagues (p=0.007). The under-representation of males can explain this result since most nurses are women. In the literature, similar studies have shown that female students have more developed beliefs than male students and have better hand hygiene compliance, female healthcare workers have higher hand hygiene knowledge scores than men and men cause more hospital infections than women and are less careful about hand hygiene (Brosio et al., 2017; Dikiş et al., 2020; Elkhawaga & El-Masry, 2017). Women's high level of compliance may be associated with their tendency to practice socially acceptable behavior. These findings suggest that future studies should address gender differences in hand hygiene practice, and training should be revised accordingly. It was determined that women nurses with children performed more hand hygiene practices (p=0.012). In the relevant literature, no study was found on this finding. This result implies that women nurses with children have high compliance with hand hygiene in terms of developing hygiene habits in their children, instilling behavior and being a role model. It was found that nurses working in intensive care units adhere more to hand hygiene practices (p=0.024). Patients in intensive care units who are mostly followed up with mechanical ventilators are at a higher risk for associated with healthcare infections, and it is an expected result that nurses working with these patients have high hand hygiene compliance. The fact that intensive care nurses had good hand hygiene practices despite their working conditions suggested that they internalized the importance of hand hygiene. In similar studies, it has been documented that nurse working in intensive care units had a high level of knowledge on hand hygiene and nurses had about three times more hand hygiene compliance than physicians (Suen, So, Yeung, Lo & Lam, 2019) and there was a decrease in nosocomial infections in intensive care units with increased hand hygiene compliance (Musu et al., 2017). Contrary to our findings, there is study indicating low hand hygiene compliance of healthcare professionals and nurses working in intensive care units (Dickens et al., 2020). This may suggest that hand hygiene is overlooked due to the nurses' workload and lack of personnel in intensive care units and their efforts to train many things. It was determined that as the professional satisfaction of the nurses increased, the rate of hand hygiene practices increased ($p<0.05$). Therefore, it is thought that ensuring job satisfaction among the nurses, one of the most critical healthcare team members will enhance hand hygiene practices and the quality of care. In the present study, as the number of patients per nurse increased, the hand hygiene practice scores of the nurses decreased significantly ($p<0.05$). In a similar study, nurses stated high workload as one of the reasons that reduced the frequency of hand washing (Rios & Aguilera, 2017; Zhang et al., 2019). In the literature, it has been stated that hand hygiene compliance is also affected by workload, high stress work environment, lack of information and type and transportation of hand hygiene materials (Ay et al., 2019). These results suggest that a policy of addressing more efficient and effective workload allocation for nurses may have potential impact and get larger the effectiveness of suitable hand hygiene practice to covenant the safety of patients. In this study, it was determined that nurses' hand hygiene compliance was at a good level. There are other studies reporting similar results in the literature (Ahmed et al., 2020). As the positive beliefs of the nurses about hand hygiene increased, their hand hygiene practice scores also increased ($p<0.05$). Results of other studies also support our findings, and it has been opined that poor compliance with hand hygiene was due to weak hand hygiene beliefs, inadequacy of hand antiseptics and sinks and irritation caused by hand antiseptics (Dickens et al., 2020; Elkhawaga & El-Masry, 2017; Lambe et al., 2020). In another study, the presence of sinks/hygiene products was stated as a factor that facilitated hand hygiene practices among the nurses (White et al., 2015). These results support the notion that individual beliefs are among the factors that affect behaviours.

CONCLUSION

It was found that the HHBS scores were affected only by gender, whereas the HHPE scores were affected by having children, the unit where the nurses worked, the number of patients in the unit and their professional satisfaction. There was a positive correlation between the HHBS and HHPE scores. As the HHBS score increased, the HHPI score also increased. Based on these results, it is recommended to implement training strategies to put the nurses' beliefs about hand hygiene into practice. It is also suggested that training, practice and research be structured by taking into account the characteristics such as gender, unit of work, professional satisfaction and the number of patients per nurse.

Beliefs are the source of the constant network of emotions and individual principles created by individuals' perceptions and definitions of the world. It is the beliefs that guide behavior and attitudes in a person. Human health is significantly related to attitudes and beliefs. Therefore, nurses who evaluate people with their psychological and bio-physiological dimensions and provide care services must be aware of their beliefs about their professional practices. It is thought that this study can enable nurses to be aware of their own beliefs that may or may affect their practices. At the same time, it is believed that nurses' awareness of their own beliefs that are effective in their practices and behaviors will increase the quality of care.

Limitations of study

Due to the cross-sectional nature of the study, the intense working hours of the nurses, and the high number of nurses on leave and report, the total number of nurses could not be reached. At the same time, the limitation of the study is that hand hygiene beliefs are only investigated in nurses, excluding other health care team members.

Acknowledgement

The authors would like to thank all of the nurses who participated in the study.

Conflict of Interest

The authors report no actual or potential conflicts of interest.

Author Contributions

Plan, design: EZ, TF; **Material, methods and data collection:** TF; **Data analysis and comments:** EZ, **Writing and corrections:** EZ, TF.

REFERENCES

Ahmed, J., Malik, F., Memon, Z.A., Arif, T.B., Ali, A., Nasim, S., et al. (2020). "Complianceand knowledge of healthcare workers regarding hand hygiene and use of disinfectants: a study based in karachi". *Cureus, 12*(2): e7036. https://doi.org/10.7759/cureus.7036.

Ay, P., Teker, A.G., Hidiroglu, S., Tepe, P., Surmen, A., Sili, U., et al. (2019). "A qualitative study of hand hygiene compliance among health care workers in intensive care units". *Journal of İnfection in Develeoping Countries, 13* (2), 111-117. https://doi.org/10.3855/jidc.10926.

Brosio, F., Kuhdari, P., Stefanati, A., Sulcaj, N., Lupi, S., Guidi, E., et al. (2017). "Knowledge and behaviour of nursing students on the prevention of healthcare associated infections". *Journal of Preventive Medicine and Hygiene, 58*(2) E99-E104. PMID: 28900349.

Centers for Disease Control and Prevention (CDC) (2020). "Coronavirus disease 2019 (covid-19): FAQ on hand hygiene". Retrived from: https://www.cdc.gov/coron aviru s/2019-ncov/infec tion-contr ol/hcp-hand-hygiene-faq.html (Retrived date: 10.05.2021).

Dickens, G.L., Goko, C., Ryan, E. (2020). "Nurses' attitudes and perceptions towards hand hygiene in mental health and medical inpatient settings: comparative, cross-sectional study". *Issues in Mental Health Nursing, 41*(11), 1011-1018. https://doi.org/10.1080/01612840.2020.1757796.

Dikiş, D., Şimşek, S., Kepeli, N., Küçükler, N.D., Ulusoy, B., Korkmaz, N.B., et al. (2020). "Evaluation of hygiene compliance rates among health care workers in a university hospital: A prospective study". *Ege Journal of Medicine, 59*(2), 91- 96.

Elkhawaga, G., El-Masry, R. (2017). "Knowledge, beliefs and self-reported practices of hand hygiene among egyptian medical students: Does gender difference play a role?". *Journal of Public Health in Devoloping Countries, 3*(2), 418-425.

Gould, D. J., Moralejo, D., Drey, N., Chudleigh, J. H., & Taljaard, M. (2017). Interventions to improve hand hygiene compliance in patient care. Cochrane database of systematic reviews, (9). https://doi.org/10.1002/14651858.CD005186.pub4.

Hammerschmidt, J., Manser, T. (2019). "Nurses' knowledge, behaviour and compliance concerning hand hygiene in nursing homes: a cross-sectional mixedmethods study". *BMC Health Services Research, 19*, 547. https://doi.org/10.1186/s12913-019-4347-z.

Hillier, M.D. (2020). "Using effective hand hygiene practice to prevent and control infection". *Nursing Standard, 35*(5), 45-50. https://doi.org/10.7748/ns.2020.e11552.

Juthamanee, S. (2020). "'Wash your hand!': the old message from florence nightingale to battle covid-19*". Belitung Nursing Journal, 6*(2), 62. doi: https://doi.org/10.33546/bnj.1097.

Karadağ, M., Yıldırım, N., İşeri, Ö.P. (2016). "The validity and reliability study of hand hygiene belief scale and hand hygiene practices ınventory*". Cukurova Medical Journal, 41*(2), 271-284. https://doi.org/ 10.17826/cutf.206317.

Koşucu, S.N., Baltacı, G.S., Yıldız, T. (2015). "The rate of compliance of healthcare personnel to hand hygiene*". MÜSBED, 5*(2), 105- 108. https://doi.org/10.5455/musbed.20150327042901.

Lambe, K., Lydon, S., Madden, C., McSharry, J., Marshall, R., Boylan, R., et al. (2020). "Understanding hand hygiene behaviour in the intensive care unit to inform interventions: an interview study". *BMC Health Services Research, 20*, 353. https://doi.org/10.1186/s12913-020-05215-4.

Maria, H.S.Y., Ivan, W.Y.Y.I., Samson, Y.W.S., Amy, Y.K.A., Cherry, N.C.Y. (2018). "Knowledge, practices, compliance and beliefs of university nursing students' toward hand hygiene: A cross-sectional survey". *Journal of Nursing and Health Care, 5*(1). doi: 10.5176/2345-7198_5.1.21.

Moore, L.D., Robbins, G., Quinn, J., Arbogast, J.W. (2021). "The impact of COVID-19 pandemic on hand hygiene performance in hospitals". *American Journal of Infection Control, 49*, 30-33. https://doi.org/10.1016/j.ajic.2020.08.021.

Musu, M., Lai, A., Mereu, N.M., Galletta, M., Campagna, M., Tidore, M, et al. (2017). "Assessing hand hygiene compliance among healthcare workers in six Intensive Care Units". *Journal of Preventive Medicine and Hygiene, 58*(3), E231-E237. PMID: 29123370.

Nasution, S. L. R., Suyono, T., Khu, A., Simarmata, H. P., & Happy, H. (2023). Health Belief Model Effect on Nurses Hand Hygiene Adherence. *International Journal of Health and Pharmaceutical (IJHP), 3*(2), 225-231. https://doi.org/10.51601/ijhp.v3i2.118.

Riberio, C.T.D.A, Lima. M.M. (2020). "A morning with Louis Pasteur: a short history of the clean hands". *Cadernos de. Saúde Pública, 36*(6), e00068619. https://doi.org/10.1590/0102-311X00068619.

Rios, R.S., Aguilera, G. (2017). "Nurses' perceptions of reasons for persistent low rates in hand hygiene compliance". Intensive and Critical *Care Nursing, 42*, 17-21. http://dx.doi.org/10.1016/j.iccn.2017.02.005.

Stahmeyer, J.T., Lutze, B., Lengerke, T.V., Chaberny, I.F., Krauth, C. (2017). "Hand hygiene in intensive care units: a matter of time?". *Journal of Hospital Infection, 95*, 338-343. http://dx.doi.org/10.1016/j.jhin.2017.01.011.

Suen, L..KP., So, Z.Y.Y., Yeung, S.K.W., Lo, K.Y.K., Lam, S.C. (2019). "Epidemiological investigation on hand hygiene knowledge and behaviour: a cross-sectional study on gender disparity". *BMC Public Health, 19*, 401. https://doi.org/10.1186/s12889-019-6705-5.

Sundal, J.S., Aune, A.G., Storvig, E., Aasland, J.K., Fjeldsæter, K.L., Torjuul, K. (2017). "The hand hygiene compliance of student nurses during clinical placements". *Journal of Clinical Nursing, 26*, 4646–4653. https://doi.org/10.1111/jocn.13811.

Türkmen, L., Bakır, B. (2017). "Evaluation of knowledge, attitude and practices of hand hygiene (routine/hand washing) of health technician candidates". *Gümüşhane University Journal of Health Sciences, 6*(3), 122-127.