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Are Soap, Paper Towel and Alcohol-based Disinfectants Easily Accessible in Intensive Care Units in Turkey?: Results of the Phokai Study

Türkiye'de Bulunan Yoğun Bakımlarda Sabun, Kağıt Havlu ve Alkol Bazlı El Dezenfektanı Yeterli mi?: Phokai Çalışması Sonuçları

Ayşe UYAN[1], Gül DURMUŞ[2], Nurbanu SEZAK[3], Burcu ÖZDEMİR[4], Türkkan KAYGUSUZ[5], Nefise ÖZTOPRAK[6], Kevser ÖZDEMİR[7], Firdevs AKSOY[8], Asu ÖZGÜLTEKİN[9], Meliha Meriç KOÇ[10], Ahsen ÖNCÜL[11], Sabahat ÇAĞAN AKTAŞ[12], Burcu IŞIK[13], Güven ÇELEBİ[14], Güliz EVİK[15], Selçuk ÖZGER[16], Rezan HARMAN[17], Emine Kübra DİNDAR DEMİRAY[18], Şebnem ÖZKÖREN ÇALIK[19], Sevil ALKAN ÇEVİKER[20], İlknur Esen YILDIZ[21], Mehmet Emirhan IŞIK[22], Güneş ŞENOL[23], Sema SARI[24], Mustafa DOĞAN[25], Kenan UĞURLU[26], Mustafa ARSLAN[27], Fethiye AKGÜL[28], Filiz KOÇ[29], Yeşim KÜREKÇİ[30], Derya ÇAĞLAYAN[31], Mehmet UÇAR[32], Ramazan GÖZÜKÜÇÜK[33], Habibe Tülin ELMASLAR MERT[34], Handan ALAY[35], Haluk ERDOĞAN[36], Aslıhan DEMİREL[37], Nilgün DOĞAN[38], Funda KOÇAK[39], Emre GÜVEN[40], Güleser ÜNSAL[41], Hilal SİPAHİ[42], Tansu YAMAZHAN[1], Bilgin ARDA[1], Sercan ULUSOY[1], Oğuz Reşat SİPAHİ[1]

[1]Ege University Faculty of Medicine, Department of Infectious Diseases and Clinical Microbiology, İzmir, Turkey
[2]Bursa Yüksek İhtisas Training and Research Hospital, Clinic of Infectious Diseases and Clinical Microbiology, Bursa, Turkey
[3]İzmir Katip Çelebi University, Atatürk Training and Research Hospital, Department of Infectious Diseases and Clinical Microbiology, İzmir, Turkey
[4]Ankara Numune Training and Research Hospital, Clinic of Infectious Diseases and Clinical Microbiology, Ankara, Turkey
[5]Elazığ Training and Research Hospital, Clinic of Infectious Diseases and Clinical Microbiology, Elazığ, Turkey
[6]Antalya Training and Research Hospital, Clinic of Infectious Diseases and Clinical Microbiology, Antalya, Turkey
[7]Pamukkale University Faculty of Medicine, Department of Infectious Diseases and Clinical Microbiology, Denizli, Turkey
[8]Karadeniz Technical University Facult of Medicine, Department of Infectious Diseases and Clinical Microbiology, Trabzon, Turkey
[9]Haydarpaşa Numune Training and Research Hospital, Clinic of Anesthesiology and Intensive Care, İstanbul, Turkey
[10]Kocaeli University Faculty of Medicine, Department of Infectious Diseases and Clinical Microbiology, Kocaeli, Turkey
[11]Şişli Etfal Training and Research Hospital, Clinic of Infectious Diseases and Clinical Microbiology, İstanbul, Turkey
[12]Dr. Lütfi Kırdar Kartal Training and Research Hospital, Clinic of Infectious Diseases and Clinical Microbiology, İstanbul, Turkey
[13]İstanbul Medeniyet University, Göztepe Training and Research Hospital, Department of Infectious Diseases and Clinical Microbiology, İstanbul, Turkey
[14]Bülent Ecevit University Faculty of Medicine, Department of Infectious Diseases and Clinical Microbiology, Zonguldak, Turkey
[15]Mersin University Faculty of Medicine, Department of Infectious Diseases and Clinical Microbiology, Mersin, Turkey
[16]Dr. Ersin Arslan Training and Research Hospital, Clinic of Infectious Diseases and Clinical Microbiology, Gaziantep, Turkey
[17]Private Sani Konukoğlu Hospital, Clinic of Infectious Diseases and Clinical Microbiology, Gaziantep, Turkey
[18]Celal Bayar University Faculty of Medicine, Department of Infectious Diseases and Clinical Microbiology, Manisa, Turkey
[19]İzmir Bozyaka Training and Research Hospital, Clinic of Infectious Diseases and Clinical Microbiology, İzmir, Turkey
[20]Balıkesir State Hospital, Clinic of Infectious Diseases and Clinical Microbiology, Balıkesir, Turkey
[21]Recep Tayyip Erdoğan University Faculty of Medicine, Department of Infectious Diseases and Clinical Microbiology, Rize, Turkey

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Address for Correspondence/Yazışma Adresi: Ayşe Uyan Önal MD, Ege University Faculty of Medicine, Department of Infectious Diseases and Clinical Microbiology, İzmir, Turkey
Phone: +90 232 390 33 09 **E-mail:** a_uyan48@hotmail.com **ORCID:** orcid.org/0000-0001-6615-2662
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[22]Kartal Koşuyolu Training and Research Hospital, Clinic of Infectious Diseases and Clinical Microbiology, İstanbul, Turkey
[23]Dr. Suat Seren Chest Diseases and Chest Surgery Training and Research Hospital, Clinic of Infectious Diseases and Clinical Microbiology, İzmir, Turkey
[24]Türkiye Yüksek İhtisas Hospital, Clinic of Intensive Care, Ankara, Turkey
[25]Çorlu State Hospital, Clinic of Infectious Diseases and Clinical Microbiology, Tekirdağ, Turkey
[26]25 Aralık State Hospital, Clinic of Infectious Diseases and Clinical Microbiology, Gaziantep, Turkey
[27]Amasya University Sabuncuoğlu Şerefeddin Training and Research Hospital, Clinic of Infectious Diseases and Clinical Microbiology, Amasya, Turkey
[28]Batman State Hospital, Clinic of Infectious Diseases and Clinical Microbiology, Batman, Turkey
[29]Keçiören Training and Research Hospital, Clinic of Infectious Diseases and Clinical Microbiology, Ankara, Turkey
[30]Arnavutköy State Hospital, Clinic of Infectious Diseases and Clinical Microbiology, İstanbul, Turkey
[31]Torbalı State Hospital, Clinic of Infectious Diseases and Clinical Microbiology, İzmir, Turkey
[32]Uşak Medical Park Hospital, Clinic of Infectious Diseases and Clinical Microbiology, Uşak, Turkey
[33]Private Hisar Intercontinental Hospital, Clinic of Infectious Diseases and Clinical Microbiology, İstanbul, Turkey
[34]Ardahan State Hospital, Clinic of Infectious Diseases and Clinical Microbiology, Ardahan, Turkey
[35]Nenehatun Obstetrics and Gynecology Hospital, Clinic of Infectious Diseases and Clinical Microbiology, Erzurum, Turkey
[36]Başkent University, Alanya Medical and Research Center, Department of Infectious Diseases and Clinical Microbiology, Antalya, Turkey
[37]İstanbul Bilim University Faculty of Medicine, Department of Infectious Diseases and Clinical Microbiology, İstanbul, Turkey
[38]TOBB University of Economics and Technology Hospital, Hospital Infection Control Committee, Ankara, Turkey
[39]Başakşehir State Hospital, Clinic of Infectious Diseases and Clinical Microbiology, İstanbul, Turkey
[40]Beytepe Murat Erdi Eker State Hospital, Clinic of Infectious Diseases and Clinical Microbiology, Ankara, Turkey
[41]Bozok University Faculty of Medicine, Hospital Infection Control Committee, Yozgat, Turkey
[42]Bornova Public Health Center, İzmir, Turkey

Abstract

Introduction: Hand hygiene is one of the most effective infection control measures to prevent the spread of healthcare-associated infections (HCAI). Water, soap, paper towel and hand disinfectant must be available and adequate in terms of effective hand hygiene. The adequacy of hand hygiene products or keeping water-soap and paper towel is still a problem for many developing countries like Turkey. In this multicenter study, we analyzed the adequacy in number and availability of hand hygiene products.
Materials and Methods: This study was performed in all intensive care units (ICUs) of 41 hospitals (27 tertiary-care educational, 10 state and four private hospitals) from 22 cities located in seven geographical regions of Turkey. We analyzed water, soap, paper towel and alcohol-based hand disinfectant adequacy on four different days, two of which were in summer during the vacation time (August, 27th and 31st 2016) and two in autumn (October, 12th and 15th 2016).
Results: The total number of ICUs and intensive care beds in 41 participating centers were 214 and 2357, respectively. Overall, there was no soap in 3-11% of sinks and no paper towel in 10-18% of sinks while there was no alcohol-based hand disinfectant in 1-4.7% of hand disinfectant units on the observation days. When we compared the number of sinks with soap and/or paper towel on weekdays vs. weekends, there was no significant difference in summer. However, on autumn weekdays, the number of sinks with soap and paper towel was significantly lower on weekend days ($p<0.0001$, $p<0.0001$) while the number of hand disinfectant units with alcohol-based disinfectant was significantly higher ($p<0.0001$).
Conclusion: There should be adequate and accessible hand hygiene materials for effective hand hygiene. In this study, we found that soap and paper towels were inadequate on the observation days in 3-11% and 10-18% of units, respectively. Attention should be paid on soap and paper towel supply at weekends as well.
Keywords: Soap, paper towel, alcohol based disinfectants, intensive care units, nosocomial infections

Öz

Giriş: El hijyeni hastane enfeksiyonlarını önlemede en etkin enfeksiyon kontrol yöntemlerinden biridir. Etkili el hijyeni gerçekleştirmek için su, sabun, kağıt havlu ve el dezenfektanlarının ulaşılabilir ve yeterli olması gereklidir. El hijyeni malzemelerinin yeterliliği ya da su, sabun ve kağıt havlunun birlikteliği Türkiye gibi gelişmekte olan ülkeler için hala sorun teşkil edebilmektedir. Bu çok merkezli çalışmada el hijyeni malzemelerinin yeterliliği ve bir arada bulunabilirliği araştırılmıştır.
Gereç ve Yöntem: Çalışmaya Türkiye'deki yedi coğrafi bölgedeki, 22 şehirden yoğun bakım ünitesi (YBÜ) bulunan 41 merkez (27 üçüncü basamak eğitim hastanesi, 10 devlet hastanesi, dört özel hastane) katıldı. Su, sabun, kağıt havlu ve alkol bazlı el dezenfektanlarının yeterliliği dört farklı günde; ikisi yaz izin döneminde (27 ve 31 Ağustos 2016), ikisi sonbaharda (12 ve 15 Ekim 2016) değerlendirildi.
Bulgular: Katılan 41 merkezin toplam YBÜ ve yoğun bakım yatak sayıları sırasıyla 214 ve 2357 idi. Gözlem günlerinde lavaboların %3-11'inde sabun, %10-18'inde kağıt havlu yoktu. El dezenfektanı ünitelerinin ise %1-4,7'sinde de alkol bazlı el dezenfektanı mevcut değildi. Hafta içi ve hafta sonu günlerde sabun ve/veya kağıt havlu bulunan lavaboların sayısını karşılaştırdığımızda, yaz mevsiminde anlamlı fark yok iken; sonbahar hafta sonu günlerinde, sabun ve kağıt havlulu lavabolar hafta içi günlere göre anlamlı olarak daha az ($p=0,0001$, $p<0,0001$), alkol bazlı dezenfektan içeren ünite sayısı ise anlamlı olarak daha fazla idi ($p<0,0001$).

Sonuç: Etkili el hijyeni için el hijyeni materyallarinin yeterli ve ulaşılabilir olması gereklidir. Bu çalışmada sabun ve kağıt havlu sırasıyla %3-11 ve %10-18 yetersizdi. Özellikle hafta sonları sabun ve kağıt havlu teminine dikkat edilmelidir.
Anahtar Kelimeler: Sabun, el havlusu, alkol bazlı dezenfektanlar, yoğun bakım ünitesi, nozokomiyal enfeksiyonlar

Introduction

In spite of developments in infection control and intensive care, nosocomial or healthcare-associated infections (HCAI) are still associated with significant mortality and morbidity in many countries as well as Turkey. One of the pioneers who showed the importance of hand hygiene was Semmelweis in 1846. Semmelweis noticed that the high birth rate fever was caused by the cadaver material in the hands of medical students coming directly to the obstetric clinic from the autopsy room. Hand washing with chlorinated solution prior to maternal contact reduced maternal mortality[1,2]. Hand hygiene is the most important and cost-effective element of infection control policy. One of the pioneer studies regarding effect of hand hygiene over hospital-acquired infections was performed by Pittet et al.[3] Hand hygiene compliance rates increased from 48% in 1994 to 66% in 1997 after implementing a hospital-wide program for promoting hand hygiene. With the increase in hand hygiene compliance rates, overall nosocomial infection rates (prevalence of 16.9% in 1994 to 9.9% in 1998; p=0.04) and MRSA transmission rates decreased (2.16 to 0.93 episodes per 10000 patient-days; p<0.001) significantly.

The frequency of hand washing or alcohol-based hand disinfectant use is affected by the availability of hand hygiene products[2,4-6]. Water, soap, paper towel and hand disinfectants must be available and adequate for effective hand hygiene. The adequacy of hand hygiene products and/or keeping adequate water, soap and paper towel is still a problem for developing countries like Turkey. In this multicenter study, it was aimed to analyze the adequacy and availability of hand hygiene products in intensive care units (ICUs) in Turkey.

Materials and Methods

This study was performed in all ICUs of 41 hospitals (27 tertiary-care educational hospitals, 10 state hospitals and four private hospitals) from 22 cities located in seven regions of Turkey.

The total number of ICUs and intensive care beds were 214 and 2377, respectively. Medical ICUs were the majority of the ICUs in the participating centers (number of medical ICUs: 142, number of surgical ICUs: 49 and general (non-spesific) ICUs: 23).

The planned study was announced in the Infectious Diseases and Clinical Microbiology Specialty Society of Turkey mail communication group and all sites that accepted the invitation were included in the study. Study contributors from each site collected the data in a standard form by visits to ICUs in their center on the study dates. We analyzed via these forms the adequacy of water, soap, paper towel and alcohol-based hand disinfectant on four different days [two of which were in summer during the vacation time (August 27 and 31, 2016) and two others in autumn (October 12 and 15, 2016)]. All participants sent their data on Excel and Word formatted forms via e-mail.

Statistical Analysis

There was no need for patient consent or approval of the ethics committee since no personal or medical information about the patients was used.

Statistical analysis was performed via SPSS 24.0 package program. A chi-square test was used for comparison of the number of sinks with water and/or paper towel on week days vs. weekends in summer and autumn. A p value of less than 0.05 was considered statistically significant.

Results

Overall, there was no soap in 3-11% of sinks and no paper towel in 10-18% of sinks while there was no alcohol-based hand disinfectant in 1-4.7% of hand disinfectant units on the study observation days.

When we compared the number of sinks with soap and/or paper towel on weekdays vs. weekends, there was no significant difference in summer (Table 1). However, on autumn weekdays, the number of sinks with soap and paper towel was significantly lower on weekend days (p<0.0001, p<0.0001). There was no significant difference in the number of units with alcohol-based disinfectant between summer weekdays vs. weekend. However, the number of units with alcohol-based hand disinfectant was significantly higher (p<0.0001) on weekend days in autumn (Table 1, 2).

Discussion

Hand hygiene is the simplest and the most cost-effective way to prevent HCAI. Hand hygiene materials must be adequate and accessible for optimum hand hygiene compliance. Wet hands may create more suitable environment for HCAI and increase the spread of HCAI-associated microorganisms[7,8]. Thus, the proper hand drying is an integral part of routine hand hygiene and washing. In our multicenter study, we demonstrated that soap and paper towels supply was inadequate in 3-11% and 10-

Table 1. Number of hand hygiene associated sink with water, paper towel and units with alcohol based hand disinfectant on study dates in summer

	Summer, weekday (August, 27th 2016)	Summer, weekend (August, 31st 2016)	p
Sink with soap (n)	1045 (94.8%)	1034 (93.8%)	0.35
Sink (water)	1102	1102	
Sink with paper towel	951 (86.2%)	950 (86.2%)	1
Sink (water)	1102	1102	
Alcohol-based hand disinfectant number (n)	2522 (98.4%)	2524 (99%)	0.07
Alcohol-based hand disinfectant unit number	2562	2549	

Table 2. Number of hand hygiene associated sink with water, paper towel and units with alcohol based hand disinfectant on study dates in autumn

	Autumn, weekday (October, 12th 2016)	Autumn, weekend (October,15th 2016)	p
Sink with soap (n)	1040 (97.1%)	962 (89.9%)	<0.0001
Sink (water)	1070	1070	
Sink with paper towel	971 (90.7%)	863 (82.9%)	<0.0001
Sink (water)	1070	1070	
Alcohol-based hand disinfectant number (n)	2377 (95.3%)	2242 (98.9%)	<0.0001
Alcohol-based hand disinfectant unit number	2493	2265	

18% of the study ICUs, respectively.

In a study performed at Ege University Hospital in 2004, hand hygiene compliance rates in nurses and doctors were 3.9% and 3.2%, respectively[9]. Studies suggest that hand hygiene compliance rates increased during the last decade. In another study from a tertiary-care university hospital in Istanbul, the rate of hand hygiene compliance was 37% (nurses, 41.4%, and doctors, 31.9%) in 2013[10]. Hand hygiene observation is being performed mandatorily by the enforcement of the Turkish Ministry of Health since 2014. In 2016, hand hygiene compliance rates were 70% and 48.6% for nurses and doctors, respectively in Ege University ICUs[11]. In an educational research hospital, between 2012 and 2015, the rate of compliance with hand hygiene increased from 45.3% to 60% for doctors and from 53.5% to 68.5% for nurses[12]. Nevertheless, despite these increased compliance with hand hygiene during nearly one decade of time, hand hygiene compliance could still not be achieved in about 20-50% of healthcare personnel.

The causes of non-compliance with hand hygiene were investigated in several studies; lack of soap, paper towels, hand washing materials, accessible alcohol-based hand rubs and sinks that are inconveniently located or shortage of sinks were the most common reasons[2,4-6,13]. Karabey et al.[13] also reported that lack of alcohol-based antiseptics and/or paper towels, inadequate hand washing technique, reduced hand hygiene when wearing gloves, lack of foot pedal bins, inappropriate nursing technique, and unnecessary contact with the patient's environment were among the causes of poor hand hygiene compliance. In a study investigating the factors affecting hand hygiene compliance in Ege University Hospital among 214 healthcare workers (129 nurses, 26 medical doctors and 59 auxiliary healthcare workers), the most common causes of non compliance were reported to be irritation from alcohol-based hand disinfectants and liquid soap (63.1%) followed by lack of paper towel (53.3%)[5]. As an evidence of the above studies, in our study; soap and paper towels were absent in 2.9-17.1% of the overall sample while soap and paper towels were less available particularly at the weekends. The relatively less availability of paper towels at the weekends suggests possible problems in provision.

In their study performed in Rwanda, a Sub-Saharan African country, Holmen et al.[14] reported that a 32.1% decrease was observed in hand hygiene compliance between 2015 and 2016 while availability of alcohol-based disinfectants in patient rooms also decreased from 100% in 2015 to 79.5% in 2016 ($p<0.01$). The reduction in alcohol-based hand disinfectants was found to be associated with lower hand hygiene compliance rates. In a multi-center study in the United States, it was reported that increased sinks-to-bed ratio had no effect on improved hand hygiene rates in all units. Hand hygiene rates were slightly increased in the ICUs, but this increase was not statistically significant[15]. In a study by Kaplan and McGuckin[16], nurses' hand hygiene rates were better in ICUs with a higher ratio of sinks-to-beds (1:1) than in those with a lower ratio (1:4) (76% vs. 51%). However, in our study, we did not analyze the distribution of sinks and alcohol-based disinfectant dispensers per ICU bed.

Our study has several limitations. Although this study included data from 41 centers from all the seven regions of Turkey, it does not represent the whole country. We could not analyze the association of the adequacy and availability of hand hygiene products with hand hygiene compliance as well as patient outcomes (HCAI or mortality rates)[17]. Despite these disadvantages, to our knowledge, this is the largest detailed dataset related to the problem.

Conclusion

In conclusion, the adequacy of hand hygiene materials in developing countries like Turkey continues to be a problem.

Solving this problem may increase hand hygiene compliance and reduce HCAI rates.

Ethics

Ethics Committee Approval and Informed Consent: There was no need for patient consent or approval of the ethics committee since no personal or medical information about the patients was used.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: A.U., Concept: All authors, Design: All authors, Data Collection or Processing: All authors, Analysis or Interpretation: All authors, Literature Search: All authors, Writing: All authors.

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