

KAP Study about use of Hand Disinfectant with Alcohol Based Hand Rubs (ABHRs) among Health Care Staff of ESI Model Hospital, Basaidarapur, New Delhi, India

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Abstract

Background: Healthcare associated infections (HAIs) are a significant cause for patients' long term disability, overall increase in morbidity, mortality and financial burden. A major cause for HAIs is hands of healthcare workers (HCWs) [1]. Both WHO and CDC recommends appropriate hand hygiene (HH) practice in the form alcohol based hand rubs (ABHRs) as an important, critical and cost effective tool.

Aims and Objectives: To conduct a questionnaire based knowledge, attitude and practise based study to evaluate the different aspects related to the use of alcohol based hand rubs as a hand hygiene method in health care workers of tertiary care hospital.

Materials and Method: The questionnaire was first distributed to 30 health care workers as a part of pilot project so as to validate the proforma. After validation the study was continued with the questionnaire being distributed among the 300 health care workers of ESICPGIMSR and Model Hospital Basaidarapur, New Delhi. Among them, 274 participants responded and completed the questionnaire.

Results: Total 54.74% of responders said they practice hand hygiene almost 100% of times. 215 study participants among 274 agreed that they use HH both before and after coming in contact with patients. One hundred and five among 274 felt alcohol-based hand rubs (ABHR) was superior to hand washing.

Discussion: The WHO has recognized alcohol based hand rub (ABHR) as a gold standard for hand hygiene in apparently perceived clean hands but the use of soap and water is still recommended for visibly soiled hands [8]. Alcoholic hand rubs are able to significantly reduce the skin colony count immediately after use. Alcohol-based hand rubs cause less skin irritation than hand washing, and are therefore preferred for hand hygiene from the dermatological point of view.

Key Message

In view of the above observations it can be inferred that although overall level of KAP regarding various aspects of HH and use of ABHR is better than that seen in many other studies, there are gross inadequacies in certain specific areas which if not corrected and implemented may compromise safety of patients as well as HCWs in the long run. There is need for regular CME programs which educates all HCWs on these aspects and should be mandatory for all HCWs to attend. It goes without saying that adequate knowledge of ABHR is desirable in all workers of different health sectors. Moreover the proper usage of ABHR as an important tool for hand hygiene is very much essential to ensure safety and best interest of the health of an individual and of community at large.

Keywords: Healthcare Associated Infections; Healthcare Workers; Hand Hygiene; Alcohol Based Hand Rub; World Health Organisation; Centre for Disease Control

Abbreviations

HAI: Healthcare Associated Infections; HCWs: Healthcare Workers; HH: Hand Hygiene; ABHR: Alcohol Based Hand Rub; WHO: World Health Organisation; CDC: Centre for Disease Control

Introduction

Healthcare associated infections (HAIs) are a significant cause for patients' long term disability, overall increase in morbidity, mortality and financial burden. Incidences of HAIs are reported to be higher in low and middle income countries than in high income countries [1,2].

Eco system of the skin provides transient as well as permanent inhabitanancies to different microbial organisms, it primarily includes beneficial flora which prevents colonization of different pathogenic microorganisms. Typical health care setting offers an opportunity for colonization of pathogens not only in the health care environment, objects but also on the skin of health care providers [3]. This is equally harmful for patients as well as HCWs and thus plays a pivotal role in nosocomial infections. Thus major cause for HAIs is hands of HCWs [4].

Studies have shown that appropriate hand hygiene (HH) practice is the most important critical and cost effective means to prevent and reduce transmission of HAIs [5]. Despite its relative simplicity, HH compliance rates vary and may still be very poor [5].

The WHO as well CDC have recognized alcohol based hand rub (ABHR) [5,6] as a gold standard for hand hygiene for apparently perceived clean hands, whereas for visibly soiled hands the use of soap and water is recommended.

The various advantages which are offered by an alcohol-based hand sanitizer (ABHR) over soap and water are as follows [6]:

- It is more effective at killing potentially deadly pathogen on hands than soap
- Requires less time
- Is more accessible than hand washing sinks
- Produces reduced bacterial counts on hands, and
- Improves skin condition with less irritation and dryness than soap and water.

There are few areas which are most often missed by healthcare providers when using alcohol-based hand sanitizer especially thumbs, fingertips and inter-trigenous finger web space areas; so special attention must be paid to it [5,6].

The CDC guidelines [6] provides detailed recommendations on different aspects of HH practices in health care settings; such as choice of the most appropriate agents for hand hygiene in terms of efficacy and dermal tolerance. The guidelines also act as a backbone for improving the compliance of HH practices and methods for reducing adverse effects of these agents.

Based on all these important considerations we felt the need to conduct a study in order to evaluate the different aspects related to the knowledge, attitude and practice of alcohol based hand rubs as a hand hygiene method among health care workers of tertiary care hospital setting.

Materials and Method

A knowledge attitude and practice based open labelled, cross sectional, questionnaire based study was conducted during March 2017 to June 2017 at ESIC hospital, Basaidarapur, New Delhi.

A questionnaire was prepared in order to ascertain the knowledge attitude and practices of hospital staff (doctors, nurses, laboratory personals and paramedical staff) towards hand hygiene method using alcohol based hand rubs. The ABHR product containing ethanol 70%, chlorhexidine gluconate 0.5% w/v with emollient and moisturiser that has been provided by hospital authorities and is used routinely in the hospital.

The questionnaire was first distributed to 30 health care workers as a part of pilot project so as to validate the proforma. Necessary modifications in the same were done after evaluating results of the pilot study.

After validation of questionnaire the study was further continued by distributing the questionnaire among the health care workers of ESI PGIMSR Model Hospital Basaidarapur, New Delhi. After explaining the purpose of the study, written and informed consent was obtained from all the study participants. Participants unwilling to give consent or participate in the study were excluded.

The questionnaire was aimed at evaluating the awareness, self-perception and attitude in day to day practice of health care workers towards hand hygiene compliance and assessing the perceived barriers to the use of appropriate hand hygiene measures. The questionnaire comprised of 16 questions; answers of these questions were multiple choices / "yes" or "no".

The researchers themselves handed each of the questionnaires to the personnel targeted and collected them back immediately. This was to ensure that health care personnel were not influenced by other personnel.

The total number of responses were collected, and data was processed and analysed using SPSS (statistical package for social sciences, version10).

Observation and Results

Total of 300 healthcare personnel were approached and the questionnaire distributed. Amongst 274 participants who gave consent or filled and returned the filled questionnaire, 180 were doctors and 94 were nurses and laboratory staff (n = 274). The details of questions prepared and the responses elicited are listed below:

Q1) How often do you practice hand hygiene on day to day patient care basis during hospital hours?

a) Rarely b) Few of the times c) Most of times d) Always

ANS: Total 54.74% (n = 150) of responders answered that they always (almost 100% times) practice HH on day to day patient care basis during hospital hours. 28.46% (n = 78) said that they follow HH most of the time but not always. 14 and 32 responders said they do it rarely and few of times respectively.

Q2) Do you practice hand hygiene both before and after coming in contact with a patient?

a) Both before and after b) Only before c) Only after d) None of the above)

ANS: 200 (72.99%) responders said they practice HH methods both before and after coming in contact with a patient. But 15 of them said, they do it only before and 46 said they do it only after coming in contact with the patient. 13 responders said none of the above one.

Q3) i) Do you practice hand hygiene after touching bed side articles/furniture/linen of the patient (but without actually touching the patient)?

a) Yes b) No

ii) If yes how often – a) < 25% b) 26 - 50% c) 51 - 75% d) 76 - 100% times

ANS: 215 (78.47%) answered yes when they were asked, whether do they practice hand hygiene after touching bed side articles / furniture/linen of the patient (but without actually touching the patient). Rest 59 (27.44%) answered in the negative.

Frequency of this practice among those who answered yes is mentioned in table 1 and depicted in figure 1.

Frequency of HH practice	No of responders (n)	Relative percentage $n \times 100/215$
a) < 25%	17	07.91%
b) 26 - 50%	45	20.93%
c) 51 - 75%	75	34.88 %
d) 76 - 100%	78	36.28%

Table 1: Frequency among those who practice HH.

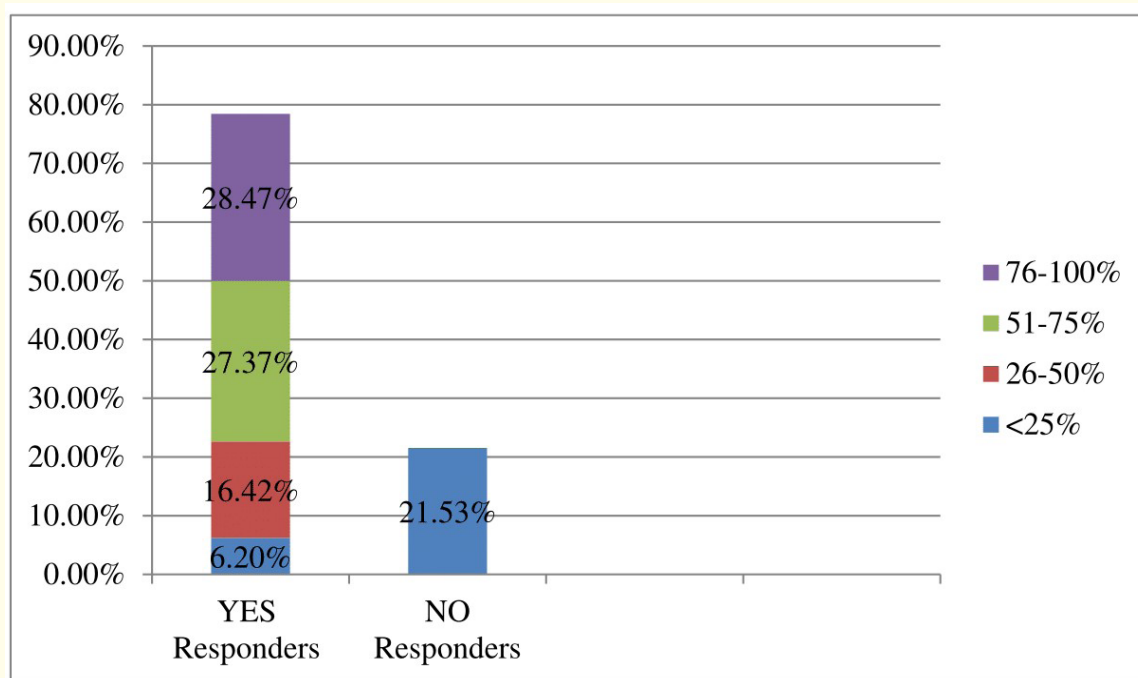


Figure 1: Frequency of practising HH before and after touching patient's surrounding.

Q4) i) Do you practice hand hygiene after removing gloves? a) Yes b) No
ii) If yes how often -a) < 25% b) 26 - 50% c) 51 - 75% d) 76 - 100% times

ANS: 221 (80.66%) responders accepted that they practice hand hygiene even after removing gloves. Rest 53 responders said no. Frequency of practising HH after gloves removal is shown in table 2 and figure 2.

Frequency of HH practice after gloves usage	No of responders (n)	Relative percentage $n \times 100/215$
a) < 25%	15	06.79%
b) 26 - 50%	41	18.55%
c) 51 - 75%	95	42.97 %
d) 76 - 100%	70	31.67%

Table 2: Frequency of practicing HH after gloves removal.

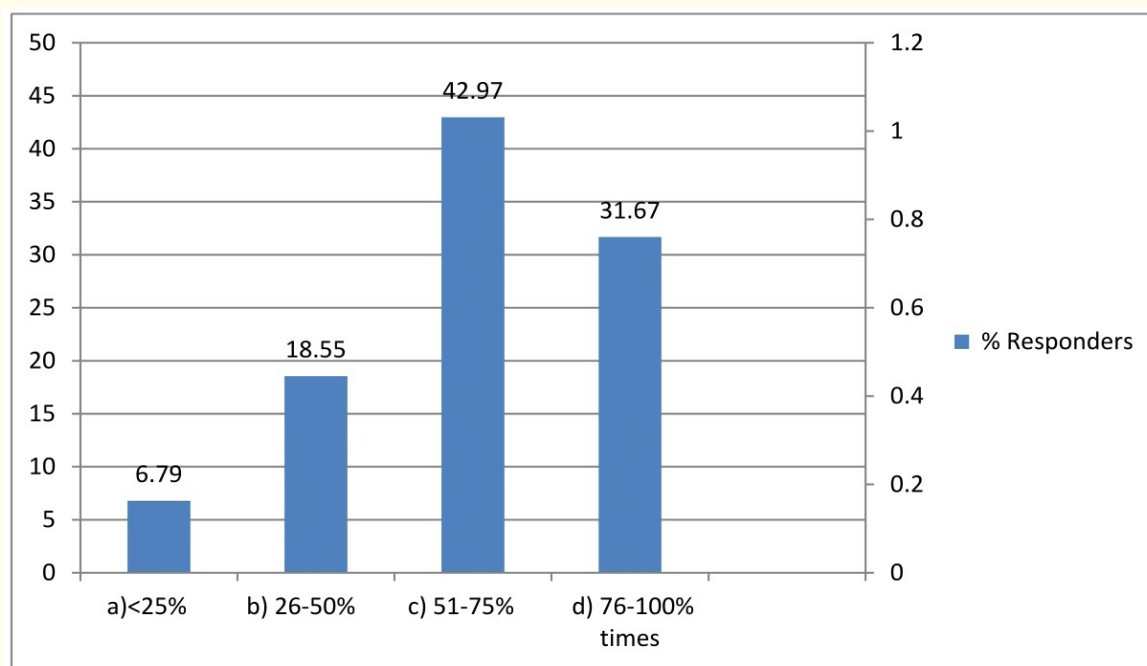


Figure 2: Frequency of practicing HH after gloves removal.

Q5) Which hand hygiene method is more effective in killing bacteria?

- a) Alcohol-based hand rubs (ABHR) b) washing hands with soap and water c) Others

ANS: Washing hands with soap and water was more effective hand hygiene method in killing bacteria according to 145 responders. One hundred and five among 274 felt alcohol-based hand rubs (ABHR) was superior to hand washing and more bactericidal. Rest 24 said neither of them is effective.

Q6) What do you think is the main advantage of using ABHRs?

- a) No need to wear gloves b) Safe guard against all infective diseases
c) protects against most of the infective organisms d) none

ANS: The main advantage of using ABHRs according to study participants were as follows

- 48.18% (n = 132) felt ABHRs protects against most of the infective organisms
- 28.47%(n = 78) felt it is a safe guard against all infective diseases
- According to 23.36%(n = 64), there was no need to wear gloves

Q7) Can ABHR be used for mucosal surface disinfection?

a) Yes b) No

ANS: 36.86% (n = 101) responders replied ABHR can be used for mucosal surface disinfection but 63.13% believed it cannot be used as a mucosal disinfectant.

Q8) Do you think ABHRs will prevent (provide protection) against infectious organisms including HIV, Tuberculosis etc.? a) Yes b) No

b) No

ANS: One hundred and ten (40.14%) study participants thought that ABHRs could provide protection against infectious organisms including HIV, Tuberculosis but rest 164 (59.85%) did not think so.

Q9) How much amount of ABHR is required on an average for single use?

a) 1 ml b) 3 ml c) 6 ml d) 10 ml

ANS: Responses obtained for the amount of ABHR required on an average for single use is depicted in figure 3.

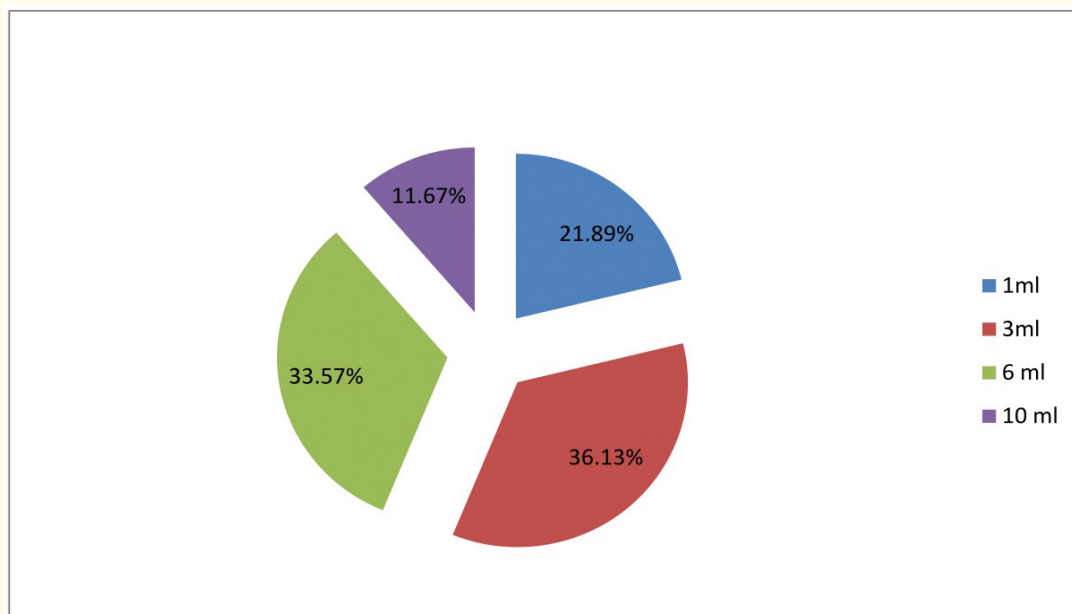


Figure 3: Amount of ABHR used in ml per event of HH.

Q10) How long should you rub your hands together after applying ABHR?

a) 15 sec b) 30 sec c) 1 min d) Till hands are dry

ANS: Only 33.21% (n = 91) study participants knew that one should rub their hands together till they get dry after applying ABHR whereas 40 (14.59%), 99 (36.13%) and 44 (16.05%) participants thought ABHRs should be applied for 15 second, 30 second and 1 minute respectively.

Q11). How many steps are in involved in application of ABHR?

a) 2 b) 4 c) 6 d) 1

ANS: Response to the number of steps which are in involved in application of ABHR was as follows

No. of steps	No. of responders	Percentage (%)
2	70	25.54
4	91	33.21
6	88	32.11
1	25	09.12

Table 3: Number (No.) of steps involved in application of ABHR.

Q12) Do you follow all prescribed steps laid down as per protocol of using ABHRs?

a) Yes b) No

ANS: 60.94% (n = 167) of responders said they follow all the prescribed steps laid down as per protocol of using ABHRs. Rest 34.05% (n = 107) said they fail to do so every time.

Q13) Do you feel ABHRs needs to be diluted with water prior to its use?

a) Yes b) No

ANS: Almost 67.51% (n = 185) of participants did not feel the need to dilute ABHRs with water prior to its use but rest 32.48% (n = 89) said they felt the need to mix ABHR with water.

Q14) Do you consider hand washing with soap and water before or after hand disinfection?

a) Yes b) No

ANS: 51.09% (n = 140) responders consider hand washing with soap and water before or after hand disinfection but rest 48.90% (n = 134) did not feel such need.

Q15) Do you experience irritation after use of hand rubs?

a) Yes b) No

ANS: 41.97% (n = 115) responders said that they experience some irritation of hand skin after use of ABHR but 58.02% (n = 159) said they didn't observe such feature on usage of ABHR.

Q16) Do you feel the need to apply some protective cream (emollient or moisturiser after use of ABHRs on hands?

a) Yes b) No

ANS: 142 (51.82%) responders felt the need to apply some protective cream (emollient or moisturiser after use of ABHRs on hands, while the rest 119 (48.17%) did not feel so.

Discussion

The different aspects of the questionnaire helped the authors to assess the various key concepts associated with the knowledge, attitude and practice methods pertaining to the use of ABHR by health care workers in the health care setting of our tertiary care hospital.

It has been repeatedly stressed that hand hygiene plays a crucial role to curb the healthcare associated infections. Various multimodal and multidisciplinary strategies have been put forward by WHO and CDC along with different guidelines to improve the compliance of HH by workforce employed in healthcare sectors. Compliance rates for HH practices have been described in previous studies which vary between 16 and 81% [7], with an average of 40% [6]. In our study 54.74% of responders agreed that they follow HH practices almost all the times. This was more than average but still needs improvement.

The WHO has recognized alcohol based hand rub (ABHR) as a gold standard for hand hygiene in apparently perceived clean hands but the use of soap and water is still recommended for visibly soiled hands [8]. In our study 52% participants felt ABHRs is as an effective method for killing bacteria, whereas 38% felt washing with soap and water is more effective.

Dryness or irritation of skin, inadequate knowledge of HH practices, paucity of time, increase work load, high patient –staff ratio, forgetfulness, poor access to clean water, sinks or in-availability cleaning product and many more, are major factors contributing to poor compliance of HH [9]. ABHRs help in overcoming few of these barriers due to ease of application, availability and overall efficacy [5,6].

To address the problem of lack of compliance with hand hygiene, continuous efforts are being made to identify effective and sustainable strategies. One of such efforts is the introduction of an evidence-based concept of “My five moments for hand hygiene” by World Health Organization (WHO) [5]. These five moments that call for the use of hand hygiene includes:

1. The moment before touching a patient,
2. Before performing aseptic and clean procedures,
3. After being at risk of exposure to body fluids,
4. After touching a patient, and
5. After touching patient surroundings.

This concept has been aptly used to improve the understanding, training, monitoring, and reporting of hand hygiene among healthcare workers [5].

In our study 27% of responders failed to practice HH methods both before and after coming in contact with a patient. The same initiative also emphasizes on use of HH practices even after touching surroundings of patients. 78.47% of responders agreed about following this and almost 70% among them practiced it more than 50% of times.

In general hand washing is not recommended before or after hand disinfection as it moisten the skin, reduces protective sebum level thus predisposing to skin irritation, dryness and toxic skin reactions [9]. This in addition also washes the emollient or moisturiser added in some of the ABHRs, defeating its purpose of addition. But this basic knowledge was lacking in 51% of responders.

ABHRs should not be diluted with water as it will lower the alcohol concentration needed for the disinfection [15]. It was encouraging to know that 68% of responders were aware of this fact.

On an average, 3 ml of ABHR solution required per use and the HCWs are supposed to rub their hands till they get dry, after applying the ABHRs [5,6]. More than one third of study participants were unaware of the correct fact about method of application and amount of ABHR used by them was either excess or little. While applying ABHRs all the areas of hands are to be covered in the similar manner as washing the hands with soap and water in 6 recommended steps [5,6].

Alcohol is generally present in lower concentration in various mouth washes and beverages. A review article by Lachenmeier, *et al.* [11] has evaluated the effect of ethanol on skin and oral mucosa. The article denotes the detrimental mechanistic effect of ethanol based product on oral mucosa as it may lead to mucosal damage, increase cell regeneration, leukoplakia or cellular dysplasia leading to cancer

[12]. The risk is more with higher alcohol concentration which are generally present in products like ABHRs (30 - 95%). Almost 37% of responders in our study thought ABHRs could be used for mucosal disinfection, but practicing such a thing could be highly hazardous.

Application of alcohol based products on lacerated or injured skin possesses the risk of percutaneous absorption and subsequent irritation [13]. Thus it should be strictly avoided. The risk further increases many fold in immature skin of neonate [14].

Alcoholic hand rubs are able to significantly reduce the skin colony count immediately after use. The efficacy of alcohol-based hand formulation is influenced primarily by (a) the type, concentration, and volume of alcohol used, (b) duration of application, and (c) other disinfectant or auxiliary agent [15].

The various alcohols generally used in ABHR are Ethanol, Isopropanol and Propanol. Among them ethanol has a strong, immediate, broad spectrum antimicrobial activity (cidal for bacteria, viruses, fungi and spores) and its efficacy increases from 30 - 95% of concentration and varies with different exposure time [10]. It is effective against various bacteria like *Staphylococcus aureus*, *E. faecium*, *Pseudomonas aeruginosa*, *Mycobacterium tuberculosis* [16], *Mycobacterium smegmatis*, *Mycobacterium bovis*. The virucidal activity of ethanol is more pronounced at higher concentration (80 - 95%). Its spectrum of virucidal activity includes activity against poliovirus, astroviruses, feline calicivirus, rotaviruses and echoviruses, vaccinia virus, influenza A virus, togaviruses, human immune deficiency virus [17], hepatitis B Virus [18] and herpes simplex viruses. In our study almost 60% denied the efficacy of ABHR against HIV virus and tuberculous bacillus. 42% of study participants experienced skin irritation due to repeated application of ABHRs. Almost 52 of responders felt the need to apply some protective barrier cream in the form of emollient or moisturiser after ABHR use.

Alcohols are one of the safest nontoxic available antiseptics [19] but with repeated dermal exposure it can lead to dryness, irritation. In order to combat this problem ABHRs are generally added with 1 to 3% glycerol, humectants, emollients, or other skin-conditioning agents which can reduce or eliminate the drying effects of alcohol without compromising the product safety efficacy [20]. But in comparison to hand washing (with soap and water) ABHRs cause less skin irritation than, and thus they are the preferred for hand hygiene from the dermatological point of view [21]. The repetitive use of different alcohol-based hand rubs was shown to not significantly change transepidermal water loss, sebum or water content of the skin [22].

In view of the above observations it can be inferred that although overall level of KAP regarding various aspects of HH and use of ABHR is better than that seen in many other studies, there are gross inadequacies in certain specific areas which if not corrected and implemented may compromise safety of patients as well as HCWs in the long run. There is need for regular CME programs which educates all HCWs on these aspects and should be mandatory for all HCWs to attend. It goes without saying that adequate knowledge of ABHR is desirable in all workers of different health sectors. Moreover the proper usage of ABHR as an important tool for hand hygiene is very much essential to ensure safety and best interest of the health of an individual and of community at large.

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Nil.

Conflict of Interest

Nil.

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