

Hand Hygiene Adverse Events among the Health Care Givers

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Abstract: Skin hygiene, particularly of hands, is a primary mechanism for reducing contact transmission of infectious agents. Widespread use of antimicrobial products has prompted concern about emergence of resistance to antiseptics and damage of skin barrier as associated with frequent hand washing. This study was focused on the hand hygiene (HH) practices and its adverse events (AEs) on skin integrity. As well as highlight for the urgency recommendations regarding the HH and skin care protocol to minimize or prevent its resulting AEs. In addition, choices of hygienic skin care products have never been more numerous, and the public has increasing access to health-care givers and product related information. This study was assessed the relationship between HH practices, the most frequent skin AEs, as well as drawing the urgent recommendations for proper skin care practices. This study is prospective type based on our experience during working in different health care setting, and the poor compliance of caregivers to hand hygiene. Thus, we must be focused on what the most frequent (HH) AEs among (HCGs) as well as understanding their frustrations or non-compliance causes related to (HH) policy. We hope that, this study can help to answer the main question regarding the cause of non compliance to (HH) policy and identify the most frequent (AEs) that usually facing the HCG's as well as its negative impact on the quality of care. **Subject:** - A convenient sample of 90 nurses, both sex, their ages were ranged from 18- 50 years, and approved to be included in the current study, with different educational level and at least they have one year experience working in the field of nursing. The study was conducted in the all units at the Ebn – Elhythm hospital in Jordon for period of 8 months. They selected randomly and were appreciate to participate in the study. Assessment sheet was developed by researcher and utilized for data collection about the most frequent adverse events of HH practices among (HCGs) in selecting areas. The tool was comprised 10 items regarding the causes of non-compliance as misconception, lack of knowledge, time or resources as well as AEs which affecting their compliance for hand hygiene practices; As well as checking the presence of any skin events as dryness, burning, erythematic, scaling, fissuring, and the subjective sensation of roughness or any allergic reaction or skin irritation of the hands as eczemas. This study revealed that, the ages of subjwere ranged from 18 to 50 years old. The majority of them were females 75% & one quarter were males and 50% were achieved a university level of education and 76% were working in wards. As regards the hand AEs it was noticed that dryness, irritation or burning sensations and eczema among (61%, 30%&1%) respectively. Furthermore, there is a highly statistical significance correlation was detected between the work areas and AEs of hand hygiene with **Fisher's Exact Test=23.689 & P value=.000*** So that, (HCGs) must be alert about the seriousness of non- compliance for HH and importance of the instructional guide about how they can improve the HH practices with minimizing the skin events which facing them. As evidenced there is urgency for training the staff about the proper ways of HH. Thus the presences of dermatologist as a system for periodic examination of HCGs to detect any events exist.

[Soheir Abu Elfadl Abd El-AAI, Aida El -Gamile and Snaa Alaa Eldein. **Hand Hygiene Adverse Events among the Health Care Givers.** *Life Sci J* 2013; 10(4): 2510-8] (ISSN: 1097-8135). <http://www.lifesciencesite.com>. 335

Keywords: adverse events, alcoholic base rub dermatologic complaints, skin erythematic reaction, denaturation of stratum corneum proteins, allergic reactions, OSHA.

Introduction

While HH is the most important procedures in the prevention of cross infection and the cornerstone for effective infection control precautions it is still omitted or non compliance from the HCGs. The causes of non compliance may be attributed to lack of facilities, lack of knowledge, work load, misconception about the importance of HH or its adverse events (AEs) among them^{1, 2}. The adverse events of HH what-ever the methods used as soap and water washing or alcoholic base rub consider as main barrier for compliance to HH protocol³. These AEs

are depending on the type selected for HH method. However, the frequent and repeated use of HH agents can cause a variety of dermatologic complaints(AEs), including dryness or erythematic reaction of the skin, scaling, fissuring, and the subjective sensation of roughness or burning,. Furthermore, the developed allergic reaction or irritation of the skin events among the health care givers (HCGs).⁴

An adverse event (AEs) is any adverse change in health or "side-effect" that occurs in a person who participates in field of health, while the patient is receiving the treatment as (medication, application of

certain procedures, etc.)⁶ or within a pre-specified period after their treatment has been completed. These AEs may be occurred for patients or health care givers. However, many studies mentioned that, when the people do not wash their hands frequently or adequately enough; it may be due to skin hand AEs¹. As evidenced hand (AEs) as irritant contact dermatitis is extremely common among HCGs, ranging in prevalence surveys from 25% to 55%, and as many as 85% relate a history of having skin AEs⁷. Frequent and repeated use of HH products, particularly soaps and other detergents, is an important cause of chronic irritant contact dermatitis events among HCGs.⁸

Based on the literature review the negative impacts of HH products are damaging the skin as by (AEs). These (AEs) usually due to denaturation of stratum corneum proteins, alters the intercellular lipids (either by depletion or by reorganization of lipid moieties), decreased corneocyte cohesion and decreased stratum corneum water-binding capacity². In which, the main concern is the depletion of the lipid barrier that may be consequent to contact with lipid-emulsifying detergents and lipid-dissolving alcohols.⁵– Otherwise, with more frequent HH the progressive depletion of surface lipids is resulting in deeper reaction of detergents into the superficial skin layers. Moreover, in dry seasons the individuals with dry skin, the lipid depletion occurs more quickly. By the fact, skin damage as altered skin flora, resulting in colonization that is more frequent by staphylococci and Gram-negative bacilli.⁹

On the other hand, although alcohols are faster and safer than detergents it can cause serious skin (AEs) as dryness and irritation⁵. Furthermore, lipid-dissolving effect of alcohols is inversely related to its concentration.⁸

Additionally to allergic reactions, events due to products applied to the skin (contact allergy events) may present as delayed type AEs (allergic contact dermatitis) or less commonly as immediate AEs (contact urticaria events). The most common causes of contact allergies AEs are fragrances and preservatives, with emulsifiers being less common.^{8,11} Liquid soaps, hand lotion, ointments or creams used by HCGs may contain ingredients that cause contact allergies AEs¹². Finally we can summarize the resultant AEs among HCGs or recipient of care as skin AEs which sophisticated by serious infectious events. As reported¹³ by WHO, the health care-associated infections rank as major killers of patients from all of ages categories, particularly among the most vulnerable members of the population. The more sick the patient, the higher risk of acquiring a health care-associated infection and finally dying. Thus, there is a strong urgency for identifying the most frequent AEs among HCGs to help them to follow the standard

precautions of infection control safely. As well as the HCGs must be examined by dermatologist periodically for applying effective protocol of safe HH.

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Aim of the study

- Assess the AEs of hand hygiene among HCGs in all approved units in Ebn-Elhythym hospital in Jordan.
- Identify the most frequently AEs among HCGs in mentioned setting.
- Developing instructional guide to overcome the AEs of hand hygiene among HCGs.

2. Material and Methods

Setting:

The study was conducted in the all approved units at the Ebn – Elhythym hospital in Jordon.

Subjects:

A convenient sample of 90 nurses, both sex, their ages were ranged from 18- 50 years, and approved to be included in the current study, with different educational level and at least they have one year of experience in field of nursing and selected randomly from mentioned setting in the hospital.

Excluded criteria

Individuals with therapeutic regimen as NSAID or antiallrgic agents

Individuals with hand skin problems or exposed to it least at since 6 month ago.

Individuals refused to complete the participation in the current study.

Tools:

The tool that be used for data collection in the current study was included:

- Assessment sheet about compliance of HCGs to hand hygiene practices.
- Observation sheet to assess the adverse events of hand hygiene among HCGs.

A- Part one

The assessment sheet developed by the researcher for collect the personal & socio-demographic data such as age, sex, area of residence, educational level, work units, marital status, occupational title, as well as years of experience.

B- Part two:

- The assessment sheet was developed to-
 - Assess the compliance of HCGs to hand, hygiene and methods utilized as soap and water or alcohol base rub.
 - Identify the causes of non-compliance as lack of knowledge, misconception, lack of time or resources as well as skin adverse events which affecting their compliance for hand hygiene practices.
 - Assess the objective most frequent adverse events (AEs) of hand hygiene as dryness or itching, erythematic, scaling, fissuring, and subjective sensation of burning or roughness as well as allergic reaction and irritation of skin hands.

The questionnaire consisted of 10 items about the use of alcohol hand bas rub or other detergent and any previous or current skin problems (AEs). Demographic items include questions about recent and current skin problems (AEs) and their options for selection of items. These included dry skin, skin fissures, scaling, painful lesions, bleeding, skin infections, new-onset eczema and recurrent eczema flare-ups. As well as, the assessment of the subjective data were included the following as regular use of alcohol or soap as consider the cause of the skin AEs among them. If they can stop the utilization of the HH, agents to prevent of the resulting skin AEs. As well, as if, they can avoid the use of any cleansing agents to protect their skin, or if, they use the hand moisturizer or drying it for alleviating their discomfort due to skin AEs.

Methods

- Permission to conduct the study was obtained from the authorized persons at mentioned setting as ethical committee approval also.
- Nurses' consent obtained to be included in the study. As well as oral approval to sharing in current study and their right to refuse to complete his participation assured.
- The nurses selected was 90 and during data collection 3 nurses left the hospital and 7 refused to complete the participation (response percentage = 88.9%).
- Training of the assistant was done for assurance the accuracy of the data collection in the night shift.

Pilot study applied on nine subjects to ensure the applicability and not included in the final studied subject.

-The sheet was evaluated by the expertise in the field of nursing, microbiology, dermatology and the infection control committee in the hospitals as well as correction was done based on the recommendations.

-The sheet tested by reliability coefficient and alpha achieved more than 70%. As regards the statistical analysis, it was done by SPSS version 16.

Data collected by:

The researcher utilized the assessment sheet during the working shifts of the nurses individualized except some night shifts the data were collected by the trained nurses as mentioned before.

The interview of data collection were ranged from (15-30) minute according to the nurse's workload or desire.

The assessments of some nurses were done after two sessions for the data collection by interviewing with the researcher due to their nature of work setting as ICU or workload of their setting.

3. Results:

The of the current study was included 80 subjects from nursing staff, table one was revealed that, the ages of the studied subjects were ranged from >29 to 40≤ years, with Means & SD± = 27.23 & 4.75 years old respectively. The (75%) of them were females & one quarter were males as well as around half of them were married (48%). As regards the years of experience it was noticed that (50%) of the subjects their years of experiences were ranged from 3 to >5 years. On the other hand, nearly half of the total subjects their experiences were ranged from 10≤ years and only small percentage their years of experience were ranged between 5-10 years (5%)

Table (1) Distribution of sample according to personal data

Variable	Frequency N=80	Percentage 100%
Age		
>- 29	56	70
30-39	22	27.5
40≤	2	2.5
Sex		
Male	20	25
female	60	75
Marital status		
single	24	30
married	38	48
others	18	22
Educational level		
secondary	20	25
Technical	20	25
University or higher	40	50
Years of experience		
3-5 >	40	50
5-10	4	5
10≤	36	45
Total	80	100

Regarding the distribution of the studied subjects based on their working areas figure (1) was revealed that, the most of studied subjects from the general wards (76%) and around ¼ of from ICU or CCU (21%) as well as 3% only from dialysis unit. In relation to the incidence of the skin, hand AEs In relation to the distribution of the studied subjects based on their working areas figure (one) was revealed that more than ¾ of the subjects from general wards. While, 21% of them were detected working in

ICU or CCU. Otherwise only 3% were working in hemodialysis unit. As well, as figure (2), reflected that, the most apparent skin hand AEs was skin dryness as noticed among 61% from the total subjects. However, one third from total subjects were detected with AEs, inform of skin irritation (30%). Otherwise the AEs as fissures, cracking or bleeding were noticed among 3%. While, eczema was detected among 1% only.

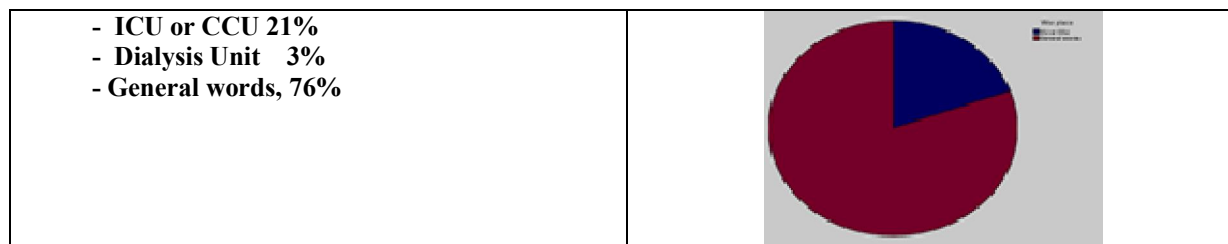


Figure (1) Distribution of Work Place

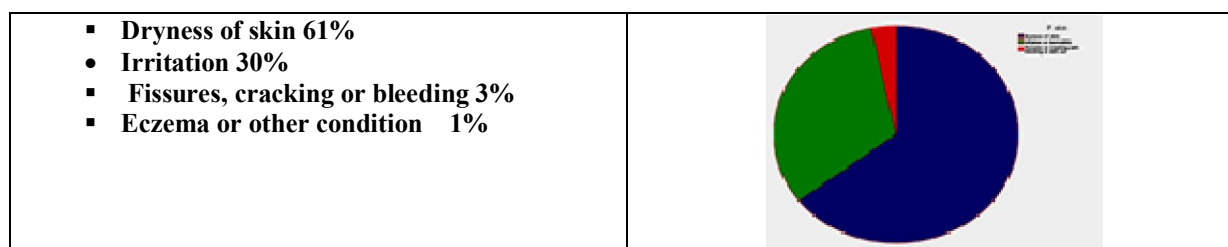


Figure (2) Distribution of Skin Problems (AEs)

As regards the correlations between hand skin, (AEs) with subjects' sex, years of experience, HH practices and action taken for skin (AEs). table (2), was shown that, the AEs of the hand in relation to sex as 50% of male subjects were detected with (AEs) inform of dry skin and irritation among 30% & 20 respectively. On the other hand these events were detected among female subjects among more than 50% (51.67%) as dry skin and irritation among 40% & 10 respectively. Otherwise, fissure, cracking or bleeding were noticed among 3.33% only with **fisher Exact Test (F)** as well as *P value* = 0.8927 & 0.790 respectively and no statistical significance correlation was detected. Otherwise there is a pperant statistical significance correlation was noticed in relation to years of experiences and hand skin AEs with $F=10.599$ & *P value*=.010*. Additionally, this table was revealed that, the subjects with years of experience between $\geq 3-5 >$ years were more suffering from skin AEs and it was observed inform of skin dryness, irritation and fissure, cracking or bleeding were noticed among 55%, 40% & 5% respectively. In spite of the vast majority of those subjects with years of experience equable ≤ 10 years it was detected that, AEs among (91.67%) as (50%) with dryness and (41.67%) were suffering from skin irritation. In relation to AEs with the HH practice the results of the current study reflected that, 17.5% from total subjects were suffering from skin dryness events as well as they stopped the HH practices totally. On the opposite side, it was noticed that 60% from total subjects their HH practices were wrong or they were rinsing their hands with water only. However those 60% were distributed as (32.5%, 25.5% & 2.5%) dryness, irritation and fissure, cracking or bleeding. As well as the $F=4.996$ & *P value*=.081 with little a

statistical significance correlation. Furthermore, the correlation between AEs with the action taken from the HCGs, it was noticed that there is a statistical significance correlation was detected in this area with $F=14.499$ & *P value*=.000***. Furthermore, the results of current study revealed that, 62.5% from total subjects were suffering from AEs and were depending on their HH practices and they sometimes were applying a hand cream. This finding was noticed among (50%, 10% & 2.5%) as dryness, irritation or dermatitis and fissure, cracking or bleeding respectively. As well as this table also reflecting that, there is a highly statistical correlation was observed between the AEs and utilization of suds with $F=8.508$ & *P value*=.006*. However, it was noticed that, (62.5 %) from total subjects were neglecting the utilization of the suds totally while, (15%) were applying little amount of suds during the HH practices.

The table (3), was shows that, there is a highly statistical significance correlation was detected between HH practices and application of hand lotion with $F. test=23.689$ & *P value*=.000*. As well as, it was noticed that HH practices were omitted among (62.5%) from the studied subjects and the application of lotion or cream was divided as 37.5% & 25% in the form of unavailability of the hand lotion and cream or application of acceptable amount of lotion respectively. Moreover, there is a highly statistical significance correlation was noticed also between the working areas and application of hand lotion or cream with $F. test=23.689$ & *P value*=.000*. However, (62.5%), from total subjects were working in general words and were distributed as (25%) as applying acceptable hand lotion, while (37.5%) were

mentioned that, the lotion was present but there is no any recommendations for its application.

4. Discussion

Skin that is usually damage by repeated exposure to detergents might be more susceptible to irritation events by all types of hand antiseptics formulations, including alcohol-based preparations.⁵ Talaat ;et al reported that low rates of cutaneous adverse reactions to an alcohol-based hand rub (alcohol 70%) formulation containing chlorhexidine

(0.5%) with emollient.⁸ However, this is contradicting with the finding of many studies as confirmed that, the alcohol-based formulations are well tolerated and often associated with better acceptability and tolerance than others associate HH products. Since alcohols are rapid acting, are broad spectrum, and require no washing or drying, damage caused by detergents and mechanical friction from toweling is avoided.¹⁰

Table (2): Correlation between skin (AE) sex, Years of experience, hand hygien practices & action taken for skin (AE)

Variables	Skin AEs			Total N =80 (%)	Sign. F& P
	-Dry skin N (%)	Dermatitis N (%)	fissures, cracking or bleeding N (%)		
1-SEX					
-Males n =20	6 (30%)	4 (20%)	-	10 (50%)	F =.892 & P=.790
-Femalesn =60	24 (40%)	6 (10%)	2 (3.33%)	31 (51.67%)	
Total	30 (37.5%)	10 (8%)	2 (2.5%)	42 (52.5%)	
2-Year of experience					
≥3-5>years n =20	22 (55%)	16 (40%)	2 (5%)	40 (100)	F =.10.599 & P=.010*
5-10> years n =4	-	4 (100%)	-	4 (100)	
≤ 10 years n=36	18 (5 0%)	15 (41.67%)	-	33 (91.67%)	
Total	40 (50%)	35(43.75%)	2 (2.5%)	77 (96.25%)	
3-HH practices					
not done	14 17.5%	-	-	14 17.5%	F =4.996 & P=.081
wrong or use water only	26 (32.5%)	20 (25%)	2 (2.5%)	48 (60%)	
Total	40 (50%)	20 (25%)	2 (2.5%)	62 (77.5%)	
4-Action taken					
-Drying or some times applying lotion	40 (50%)	8 (10%) 8	2 (2.5%)	50 (62.5 %)	F =.14.499 & P=.000**
-Nothing	8 (10%)	4 (5%)	-	12 (15%)	
Total	48 (60%)	12 (15%)	2 (2.5%)	62 (77.5%)	
5-Suds utilization					
-Omitted	38 (48%)	12 (15%)	0 -	50 (62.5 %)	F =8.508 & P=.006*
-less amount	2 (2.5%)	8 (10%)	2(2.5%)	12 (15%)	
Total	40 (50%)	20 (25%)	2(2.5%)	62 (77.5%)	

Table (3): The correlation between the application of lotion with hand hygiene practices and Work place

Variables	Lotion application			Total % = 80 %	Sig. (F. Test)& P value
	Unavailable	Acceptable lotion utilization	resent but no re commended for using		
1-Hand hygiene practices					
-Not done at all	30 37.5%	20 25%	-	50 62.5%	F. test=23.689 P value=.000*
-Wrong	-	-	12 15%	12 15 %	
Total	30 37.5%	20 25%	12 15%	62 77.5%	
2- Work place					
-ICU or CCU	12 15 %	-	-	12 15 %	F. test= 23.689 P value=.000*
-General words	-	20 25%	30 37.5%	50 62.5%	
Total	12 15 %	20 25%	30 37.5%	62 77.5	

Erasmus, *et al.* mentioned that, low rates of cutaneous adverse reactions to an alcohol-based hand rub (alcohol 70%) formulation containing chlorhexidine (0.5%) with emollient.¹¹ However, this

is contradicting with the finding of many studies as confirmed that, the alcohol-based formulations are well tolerated and often associated with better acceptability and tolerance than others associate HH

products. Since alcohols are rapid acting, are broad spectrum, and require no washing or drying, damage caused by detergents and mechanical friction from towelings is avoided.⁸

The cutaneous AEs were infrequent among HCGs. They may expose to alcohol-based preparation containing chlorhexidine, gluconate and skin emollient or other detergents during a HH practices. However the changing of the skin surfaces culture, multimodal program,⁵ it represented one cutaneous adverse event among HCGs. The potential of detergents to cause skin irritation AEs varies considerably. However, AEs of HH as irritation was noticed in the current study with high percentage. This is, lined with the documentations of many studies. They were reported that, the irritation associated with antimicrobial soaps might be attributable to the agent itself or to other ingredients of the formulation.⁷ As evidenced, the AEs of HH among HCGs often is detected inform of a feeling of dryness, burning or "roughness", and erythema, scaling or fissures.^{8,10} This was matching with the result of the current study. So that, the hand skin self-assessment tool must be developed and applied periodically for all HCGs. In addition, to the urgency for assessment protocols to skin tolerance as well as product acceptability by HCGs after utilizing of an alcohol-based hand rub or other detergent. Moreover, they are in need for modified HH protocol.¹⁵ This protocol of care must be based on: 1) objective evaluation of dermal tolerance by the investigator using a validated scale; 2) subjective evaluation by the HCGs for their skin conditions and the product characteristics. The simpler protocol must be design for assessing a single product in the short term (3–5 days after use) and in the longer term (1 month after use); it is easy to implement under super vision of OSHA.^{3,16} In general, irritant contact dermatitis is more commonly reported. Other antiseptic agents that may cause irritant contact dermatitis, in order of decreasing its frequency, include chlorhexidine and alcohol-based products.

However, the data regarding the irritancy potential events of commercially prepared HH products, which is often determined by measuring the transepidermal water loss of persons using these preparations, must be available from the manufacturer. Other factors that may contribute to dermatitis associated AEs are frequent hand cleansing include using hot water for hand washing, low relative humidity (most common in winter months), failure to use supplementary hand lotion or cream, and perhaps the quality of paper towels.^{4,17} Otherwise, the shearing forces which associated with wearing or removing gloves and allergy to latex proteins¹⁸ may also contribute to the presence of dermatitis events of the HCGs hands and leads to avoidance the HH

practices or rinsing their hand with water only as detected in the current study. However, in recent study conducted among ICU HCWs, it was noticed that, the short-term skin tolerability and acceptability as WHO-recommended alcohol-based formulations were significantly high¹¹.

As regards skin barrier properties, and effect of HH practices the review of the literature mentioned that, the average adult has a skin area of about 1.75 m². The superficial part of the skin, the epidermis, has five layers. The stratum corneum, the outermost layer, is composed of flattened dead cells (corneocytes or squames) attached to each other to form a tough, horny layer of keratin mixed with several lipids, which help maintain the hydration, pliability, and barrier effectiveness of the skin. This horny layer has been compared to a wall of bricks (corneocytes) and mortar (lipids) and serves as the primary protective barrier⁽²⁰⁾.

However, approximately 15 layers make up the stratum corneum, which is completely replaced every weeks; a new layer is formed approximately daily⁽²¹⁾. From healthy skin, and nearby 107 particles are disseminated into the air each day, as well as 10% of these skin squames contain viable bacteria⁽⁴⁵⁾. The dispersal of organisms is greater in males than in females' and varies between persons using the same hygienic regimen by as much as five fold⁽²⁰⁾. Water content, humidity, pH, intracellular lipids, and rates of shedding help retain the protective barrier properties of the skin. When the barrier is compromised (e.g., by hand hygiene practices such as scrubbing), skin dryness, irritation, cracking, and other AEs may result. Although the palmar surface of the hand has twice as many cell layers and the cells are >30 times thicker than on the rest of the skin⁽²¹⁾, palms are quite permeable to water⁽²²⁾ and dryness AEs was excepted as observed in the results of the current study.

Long-term a change in skin pH is usually associated with hand washing may pose a concern since some of the antibacterial characteristics of skin are associated with its normally acidic pH⁽¹⁹⁾. In one report, pH increased 0.6 to 1.8 units after hand washing with plain all soap for 1 to 2 min and then gradually declined to baseline levels over a period of 45 min to 2 hr⁽²⁰⁾. Some soap can be associated with long standing changes in skin pH, reduction in fatty acids, and subsequent changes in resident flora such as propionibacter⁽²¹⁾.

In an investigation of the effect on skin of repeated use of two washing agents, all skin function tests (stratum corneum capacitance resistance, lipids, transepidermal water loss, pH, laser Doppler flow, and skin reddening) were markedly changed after a single wash, and after 1 week further damage was noted⁽²²⁾. In a study of irritant skin reactions induced by three

surfactants, damage lasted for several days; complete skin repair was not achieved for 17 days⁽²²⁾. However, some studies mentioned that soaps and detergents are considered as the most damaging agents of all substances routinely applied to skin⁽²⁰⁾.

As reported anionic and cationic detergents are more harmful than nonionic detergents⁽²⁴⁾ and increased concentrations of surfactant result in more rapid and severe damage⁽²⁵⁾. Each time the skin is washed; it undergoes profound changes, most of them transient. As evidenced, persons in occupations such as health care settings in which the frequent hand washing is required, long-term changes in the skin can take place and chronic damage, irritant contact dermatitis and eczema, as well as concomitant changes in the skin flora are detected. Irritant contact dermatitis events, usually associated with frequent hand washing, are an occupational risk among HCGs, with a prevalence of 10% to 45%⁽¹⁶⁻²⁶⁾. In addition, this lined with the results of the current study.

However there is another study reported that, the prevalence of damaged skin on the hands of 410 nurses were detected to be 25.9% in one survey, as 85.6% of nurses were reported that, they were having these problems at some time. Skin damage usually correlated with frequency of glove use as well as hand washing⁽²⁶⁾. Otherwise, the washing with plain soap may actually increase the potential for microbial transmission because of a 17-fold increase in the dispersal of bacterial colonies from the skin of the hands⁽²⁶⁾. By the fact skin, condition clearly plays a major role in risk for transmission of infections. Thus¹⁹ the risk factors associated with skin AEs among the HH must be investigated. As well as the management of these factors are urgent to maintain the safe practices HH for both the HCGs and their patients.

Conclusions & Recommendations

From the safety of health perspective, more frequent use of current hygiene practices may not necessarily be better (i.e., perhaps sometimes clean is "too clean"), and the same recommendations cannot be applied to all users or situations. Future investigation is likely to improve understanding of the interaction between skin physiology, microbiology, and ecology as well as the role of non-intact skin in the transmission of infectious diseases. Intact skin is a first line defense mechanism against infection. Damaged skin cannot only lead to infection in the host, but can also harbor higher numbers of microorganisms than intact skin and hence the development of adverse events by increases the risk of transmission to others. Damaged skin among the HCGs is an important AEs issues and needed to be seriously address. However, there are two major AEs usually associated with hand hygiene. Irritant contact dermatitis; which includes symptoms that can vary

from mild to debilitating as dryness, irritation, itching, and even cracking and bleeding. The second, one is allergic contact dermatitis, which rare and represents as allergy to some ingredient of HH products. The most serious form allergic contact dermatitis events may be associated with symptoms of anaphylaxis.

Therefore, the health care agency must be focusing their attention for the causative agents or misconception about the following:

- Factors that may contribute to hand care adverse events include:
- Fragrances and preservatives, commonly the cause of contact allergies; these should be kept to a minimum or eliminated when selecting the needed products.
- Washing hands regularly with soap and water immediately before or after using an ABHR is not only unnecessary, but may lead to dermatitis
- Donning gloves while hands are still wet from either hand washing or applying ABHR increase the risk of skin irritation
- Using hot water for hand washing
- Failure to use supplementary moisturizers
- Quality of paper towels may be one of cause of adverse events.

The role of emollients and moisturizers in improving skin health and reducing microbial spread is an area for further studies.

To improve the skin condition of the HCGs and reduce their chances of harboring and shedding microorganisms from the skin, the following measures are recommended:

- 1) For damaged skin, mild, non-antimicrobial skin cleansing products may be used to remove dirt and debris. If antimicrobial action is needed (e.g., before invasive procedures or handling of highly susceptible patients) a waterless, alcohol-based product may be used.
- 2) In clinical areas such as the operating room and neonatal or transplant units, shorter, less traumatic washing regimens may be used instead of lengthy scrub protocols with brushes or other harsh mechanical action.
- 3) Effective skin emollients or barrier creams may be used in skin-care regimens and procedures for staff (and possibly patients as well).
- 4) Skin moisturizing products should be carefully assessed for compatibility with any topical antimicrobial products being used and for physiologic effects on the skin⁽⁸¹⁾.

Use of HH products that contain skin emollient to minimize the risk of skin irritation and drying

Educating the management of hand hygiene adverse events associated with the use of HH –

Educating staff on the correct use of HH products requires early recognition and a systematic approach to ensure success. Strategies for minimizing occupational hand adverse events include:

Educating staff on caring for their hands, as the regular use of skin moisturizers both at work and at home as well as the moisturizing skin-care products need to be compatible with ABHR

Providing a supportive attitude towards staff with skin problems

Developing of routine for dermatological examination as a policy of the prevention of occupational hand adverse events

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