Cross-Sectional Survey of Hand-Hygiene Compliance and Attitudes of Health Care Workers and Visitors in the Intensive Care Units at King Chulalongkorn Memorial Hospital

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Background: *Hand hygiene is the most important and effective measure to prevent cross-infection in hospitals. Hand-hygiene campaign must be implemented as a part of infection control program at King Chulalongkorn Memorial Hospital (KCMH). The behavior, attitudes, and beliefs of health care workers (HCWs) and visitors regarding hand-hygiene practices have never been studied in KCMH.*
Objectives: *To determine the baseline compliance and assess the attitudes and beliefs regarding hand hygiene of HCWs and visitors in intensive care units (ICUs) at KCMH.*
Material and Method: *We observed hand-hygiene compliance of HCWs and visitors in ICUs before patient contact for eight hours. A self-administered questionnaire was employed to measure attitudes and beliefs about hand hygiene for two-week period.*
Results: *Overall hand-hygiene compliance obtained from this observational study was less than 50% and differed markedly among various professional categories of HCWs and visitors. In questionnaire-based study, patient needs perceived as a priority (51.2%) was the most common reason for non-compliance, followed by forgetfulness (35.7%), and skin irritation by hand-hygiene agents (15.5%). Subjects believed to improve their compliance by multiple strategies including available low irritating hand-hygiene agents (53.4%), information of current nosocomial infection rate (49.1%), and easily accessed hand-hygiene supplies (46.3%). Almost all subjects (99.7%) claimed to know correct hand-hygiene techniques. Handwashing with medicated soap was perceived to be the best mean of hand decontamination (37.8%).*
Conclusion: *Hand-hygiene compliance of HCWs and visitors is unacceptably low. Their knowledge, behavior, attitudes, and beliefs toward hand hygiene need to be improved by the multimodal and multidisciplinary approach.*

Keywords: *Hand hygiene, Handwashing, Compliance, Attitudes, Nosocomial infection*

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Hand hygiene is considered to be the most crucial and least expensive measure to prevent cross-transmission of microorganisms [1,2]. To reduce the nosocomial infection rate at King Chulalongkorn Memorial Hospital (KCMH), hand hygiene should be implemented as a hospital policy. Multimodal and multidisciplinary strategies are required to enhance hand-hygiene compliance [3-5]. We attempted to promote hand hygiene by implementing a hospital-wide program, with special emphasis on bedside, alcohol-based hand rub.

The purpose of this study is to determine the prevalence of hand-hygiene compliance of HCWs and visitors, and their attitudes and beliefs regarding hand hygiene. The information obtained from the

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study will be used to develop appropriate strategies for the hand-hygiene campaign to promote compliance among HCWs and visitors in our hospital. This is a part of infection-control program to reduce hospital-acquired infection and improve the standard of care.

Material and Method

General hospital and ICU Setting

KCMH, one of the biggest university hospitals in Thailand, provides primary and tertiary medical care for residents of Bangkok and surrounding areas and patients referred from hospitals anywhere in the country. The observational survey was performed at two adult medical ICUs and one neurosurgical ICU. The questionnaires were distributed to two additional ICUs, which were one surgical ICU and one coronary care unit (CCU). There are six beds in CCU and eight beds in ICUs. The average nurse-to-patient ratio at daytime was 0.8, which was day-to-day variation because of the fluctuations in admission. Hand-hygiene facilities are located at the entrance area or nearby, providing one or two washing basins, unmedicated or aseptic soap, and paper towels or re-sterilized cloth towels. A bottle containing alcohol-based solution is available bedside.

Observational study of hand-hygiene compliance

The hand-hygiene compliance was observed unobtrusively by a nurse working at the ICUs. The observer watched and counted hand-washing of HCWs and visitors before patient contact. HCWs and visitors did not know the schedule of observation period. To obtain accurate data, one patient was randomly selected as a target for each observation period. The observation duration lasted for 8 hours. HCWs included in the survey were physicians, medical students, nurses, nursing students, and nursing assistants working at ICUs and also external HCWs if they directly contacted patients such as radiographers and physical therapists. Hand-hygiene compliance was defined as handwashing with soap and water or hand rubbing with alcohol-based solution before each episode of patient contact. Patient contact means touching the patients or any medical devices directly connected to the patients such as endotracheal tube, intravenous line, central venous catheter, arterial line, urinary catheter, chest drain, and electrocardiography (ECG) monitoring pad. The professional categories of HCWs and visitors who contacted the patients as well as the method of hand hygiene either with soap and water or alcohol-based hand rub were recorded.

Questionnaire-based study

A self-administered questionnaire containing a set of questions regarding hand-hygiene practices, attitudes, and beliefs was distributed to all HCWs working in the ICUs, and randomly selected visitors during the two-week period of the study. The questionnaire-based study was conducted about one month after the observational study of hand-washing compliance. Most nurses and nursing assistants except those who worked in the two additional ICUs in the questionnaire-based study were the same as those in the observational study. However, the physicians and visitors in this study were different from those of the observational study due to their rotation and new patient admission, respectively. The questionnaires were collected and then the data was analyzed.

Results

Observational study of hand-hygiene compliance

We observed a total of 378 episodes of patient contact, which included 352 episodes by HCWs (93.1%) and 26 episodes by visitors (6.9%) (Table 1). Overall adherence was 47.1%. Compliance rate of visitors (11.5%) was lower than that of the HCWs (46.3%). Adherence differed markedly depending on the types of personnel and professional categories. The best compliance was observed in nursing students with 100% adherence, which was better than that of the nurses (71.9%) and nursing assistants (63.9%). In contrast, the adherence of the physician group was poor (14.3%). Hand-hygiene rate of the medical students was the lowest (3.8%) among the resident and fellow group (16.9%) and the attending staffs (25%). Surprisingly, no radiographers washed their hands before patient contact. Both handwashing with soap and water or alcohol-based hand rub, were used by HCWs. However, visitors did not use alcohol-based solution for handwashing.

Questionnaire-based study

A total of 322 questionnaires were returned from HCWs and visitors after they completed the answers (Table 2). Most HCWs (94.8%) and visitors (88.6%) reported that they always or often washed their hands before patient contact. Most reasons for non-compliance were patient needs perceived as a priority (51.2%), forgetfulness (35.7%), and skin allergy, irritation or dryness caused by hand-hygiene agents (15.5%). Surprisingly, one attending staff and one nurse disagreed that hand hygiene can decrease nosocomial infection. HCWs and visitors believed that hand-

Table 1. Hand-hygiene compliance before patient contact of health care workers and visitors in intensive care units at King Chulalongkorn Memorial Hospital

Professional category	Total episodes of patient contact	Adherence to hand hygiene		Total n (%)
		Handwashing* n (%)	Alcohol-based hand rub n (%)	
Attending physician	4	0 (0)	1 (25)	1 (25)
Resident or fellow	89	7 (7.9)	8 (9.0)	15 (16.9)
Medical student	26	1 (3.8)	0 (0)	1 (3.8)
Nurse	139	44 (31.6)	56 (40.3)	100 (71.9)
Nursing student	5	5 (100)	0 (0)	5 (100)
Nursing assistant	83	34 (41.0)	19 (22.9)	53 (63.9)
Radiographer	6	0 (0)	0 (0)	0 (0)
Visitor	26	3 (11.5)	0 (0)	3 (11.5)
Total	378	94 (24.9)	84 (22.2)	178 (47.1)

* Handwashing with soap or aseptic agent and water

hygiene practices can be improved by multiple strategies such as providing low irritating hand-hygiene agents (53.4%), knowing current data of nosocomial infection rate in each ward (49.1%), easily accessed hand-hygiene supplies (46.3%), available re-sterilized cloth towels (42.9%) or paper towels (36.3%), written and oral reminders of hand-hygiene practice at the workplace (41.0% and 24.8%, respectively), and performance feedback (25.5%). Almost all subjects (99.7%) believed that they knew correct hand-washing techniques. Hand hygiene with medicated soap was believed to be the most effective measure of hand decontamination (37.8%), followed by alcohol-based hand rub (19.5%), unmedicated soap and water (18.8%), and aseptic agents and water (15.5%). Some respondents (6.2%) thought that water rinsing was necessary after alcohol-based hand rub, and was the best mean of hand-hygiene technique.

Discussion

To our knowledge, this is the first study on the compliance and attitudes regarding hand hygiene of HCWs and visitors at KCMH. Our aim was to determine the baseline compliance of hand hygiene before implementation of a hospital-wide program to promote hand hygiene. We categorized our subjects in the study so that we knew which target groups need to be focused on during the hand-hygiene campaign. Visitors were also included in our study since their inadequate hand hygiene may be the sources of contamination to patients. Like most previous studies, our observation study showed that the overall compliance of hand hygiene by HCWs was less than 50% [4,6,7]. However, compliance with hand-hygiene practice differed among different professional categories of HCWs. Compliance among the physician category was low, compared to nursing groups. In addition, compliance of the visitors was lower than that of HCWs. As a result, both HCWs and visitors will be our targets for hand-hygiene campaign, with special emphasis on the groups with low compliance including radiographers, medical students, visitors, residents, and attending physicians.

We used a self-administered questionnaire to determine behavior, attitudes, and beliefs regarding hand hygiene among HCWs and visitors. The results will lead us to select the appropriate strategies to improve hand hygiene. The category of physician (at all levels from attending physicians to medical students), radiographer, and visitor greatly over-rated their compliance. The discrepancy of compliance obtained from the observation and questionnaire-based studies varies among different categories, especially the physician and visitor. The self-reported rates are usually higher than on-site surveillance rates, and might not reflect the real practices [8,9]. This may be addressed by the performance feedback.

Patient needs perceived as a priority was the most recognized reason of the respondents for their poor compliance, followed by forgetfulness and irritating hand-washing solution. Alcohol-based hand rub is recommended by several studies to be a method of choice to improve hand-hygiene compliance since when compared to standard handwashing, it is less time-consuming, is at least as efficient, and has fewer adverse effects on the skin [10-14]. It should replace handwashing in all indications, except when hands are macroscopically soiled [11]. The promotion of bedside, alcohol-based hand rub may largely contribute to the increase in compliance particularly in case of urgency. In addition, the quality of hand-hygiene agents needs to be considered for higher compliance. Alcohol-based hand rub containing emollients was reported in several

Table 2. Behavior, attitudes, and beliefs regarding hand hygiene of health care workers and visitors in intensive care units at King Chulalongkorn Memorial Hospital

Question	Respondent			
	Attending-physician n (%)[1] (N[2] = 13)	Resident n (%) (N = 23)	Fellow n (%) (N = 4)	Medical student n (%) (N = 13)
1. Hand hygiene before patient contact				
1.1 Always	2 (15.3)	6 (26.1)	-	1 (7.7)
1.2 Often	6 (46.2)	13 (56.5)	4 (100)	9 (69.2)
1.3 Seldom	5 (38.5)	4 (17.4)	-	3 (23.1)
1.4 Never	-	-	-	-
2. Reason for non-compliance of hand hygiene*				
2.1 Forgetfulness	5 (38.5)	14 (60.9)	3 (75)	10 (76.9)
2.2 Lack of awareness of impact on nosocomial infection	1 (7.7)	-	-	-
2.3 Short patient contact	-	2 (8.7)	1 (25)	4 (30.8)
2.4 Wasting time	-	3 (13.0)	-	2 (15.4)
2.5 Patient needs take priority	4 (30.8)	7 (30.4)	-	4 (30.8)
2.6 Inconveniently located basin	2 (15.4)	7 (30.4)	-	3 (23.1)
2.7 Inconveniently located alcohol-based hand rub	2 (15.4)	5 (21.7)	-	4 (30.8)
2.8 Lack of paper towels	3 (23.1)	4 (17.4)	1 (25)	1 (7.7)
2.9 Lack of re-sterilized cloth towels	1 (7.7)	8 (34.8)	1 (25)	4 (30.8)
2.10 Skin irritation from hand-hygiene agent	2 (15.4)	1 (4.3)	2 (50)	4 (30.8)
2.11 Wearing gloves	-	2 (8.7)	-	-
3. Measure to improve hand-hygiene compliance*				
3.1 Reminder before patient contact	9 (69.2)	11 (47.8)	2 (50)	4 (30.8)
3.2 Immediate oral reminding before patient contact	3 (23.1)	8 (34.8)	-	5 (38.5)
3.3 Informing current nosocomial infection rate	3 (23.1)	11 (47.8)	2 (50)	4 (30.8)
3.4 Performance feedback	2 (15.4)	6 (26.1)	-	2 (15.4)
3.5 Easily accessed hand-hygiene location	6 (46.2)	18 (78.3)	1 (25)	10 (76.9)
3.6 Low irritating hand-hygiene agent	1 (7.7)	17 (73.9)	2 (50)	7 (53.8)
3.7 Available paper towels	4 (30.8)	9 (39.1)	1 (25)	4 (30.8)
3.8 Available re-sterilized cloth towels	3 (23.1)	14 (60.9)	2 (50)	9 (69.2)
4. Knowledge of correct hand-hygiene technique				
4.1 Yes	13 (100)	23 (100)	4 (100)	13 (100)
4.2 No	-	-	-	-
4.3 No answer	-	-	-	-
5. Most effective hand-hygiene method that will be used before patient contact*				
5.1 Water only	-	-	-	-
5.2 Unmedicated soap and water	2 (15.4)	2 (8.7)	-	-
5.3 Medicated soap and water	2 (15.4)	7 (30.4)	2 (50)	4 (30.8)
5.4 Aseptic agent and water	4 (30.8)	11 (47.8)	1 (25)	7 (53.8)
5.5 Alcohol-based hand rub	8 (61.5)	4 (17.4)	3 (75)	1 (7.7)
5.6 Alcohol-based hand rub, followed by water rinsing	1 (7.7)	2 (8.7)	-	2 (15.4)

[1] n (%) = number of respondents selected the answer (% = n/N X 100); [2] N = total number of respondents
* More than one answers may be selected by each respondent

studies to be better tolerated by HCWs than non-medicated and antimicrobial soaps [15,16]. The availability of bedside, alcohol-based hand rub with emollients is thus recently introduced in our hospital. Reminders, such as posters, at bedside or entrance area may promote awareness, and reduce "forgetfulness" in the workplace. Other reasons for poor compliance were associated with knowledge about hand hygiene such as no perception of the importance of hand hygiene, no necessity of handwashing after short patient contact or when wearing gloves. Although almost all subjects claimed that they knew correct hand-hygiene technique, only about one-forth of them selected alcohol-based hand rub to be the most efficient method of hand

Table 2. Behavior, attitudes, and beliefs regarding hand hygiene of health care workers and visitors in intensive care units at King Chulalongkorn Memorial Hospital (continued)

	Respondent					Total
Nurse n (%) (N= 152)	Nursing assistant n (%) (N = 62)	Nursing student n (%) (N = 14)	Radiographer n (%) (N = 4)	Physical therapist n (%) (N = 2)	Visitor n (%) (N = 35)	n (%) (N = 322)
44 (28.9)	28 (41.9)	8 (57.1)	-	2 (100)	19 (54.3)	33.5
108 (71.1)	34 (56.5)	5 (35.7)	3 (75)	-	12 (34.3)	60.6
-	1 (1.6)	1 (7.1)	1 (25)	-	3 (8.6)	5.6
-	-	-	-	-	1 (2.8)	0.3
35 (23.0)	22 (35.5)	6 (42.8)	2 (50)	-	18 (51.4)	115 (35.7)
1 (0.7)	-	-	-	-	-	2 (0.6)
24 (15.8)	9 (14.5)	-	2 (50)	-	5 (14.3)	47 (14.6)
1 (0.7)	1 (1.6)	1 (7.1)	-	-	-	8 (2.5)
104 (68.4)	36 (58.1))	3 (21.4)	2 (50)	-	5 (14.3)	165 (51.2)
16 (10.5)	4 (6.5)	2 (14.3)	-	-	4 (11.4)	40 (12.4)
3 (2.0)	4 (6.5)	1 (7.1)	-	-	1 (2.8)	20 (6.2)
9 (5.9)	7 (11.3)	-	-	-	3 (8.6)	28 (8.7)
16 (10.5)	11 (17.7)	-	-	-	3 (8.6)	44 (13.7)
26 (17.1)	14 (22.6)	1 (7.1)	-	-	-	50 (15.5)
13 (8.6)	11 (17.7)	1 (7.1)	1 (25)	-	-	28 (8.7)
45 (29.6)	26 (41.9)	7 (50.0)	3 (75)	1 (50)	24 (68.6)	132 (41.0)
39 (25.7)	15 (24.2)	1 (7.1)	-	-	9 (25.7)	80 (24.8)
76 (50.0)	38 (61.3)	9 (64.3)	2 (50)	2 (100)	11 (31.4)	158 (49.1)
46 (30.3)	21 (33.9)	-	1 (25)	-	4 (11.4)	82 (25.5)
68 (44.7)	22 (35.5)	10 (71.4)	2 (50)	1 (50)	11 (31.4)	149 (46.3)
98 (64.5)	35 (56.5)	6 (42.9)	1 (25)	1 (50)	4 (11.4)	172 (53.4)
65 (42.8)	23 (37.1)	4 (28.6)	2 (50)	1 (50)	5 (14.3)	117 (36.3)
78 (51.3)	21 (33.9)	2 (14.3)	2 (50)	1 (50)	7 (20.0)	138 (42.9)
151 (99.3)	61 (98.4)	14 (100)	4 (100)	2 (100)	27 (77.1)	312 (96.9)
-	1 (1.6)	-	-	-	8 (22.9)	9 (2.8)
1 (0.7)	-	-	-	-	-	1 (0.3)
3 (2.0)	5 (8.1)	-	-	-	-	8 (24.2)
41 (27.0)	17 (27.4)	3 (21.4)	1 (25)	-	7 (14.3)	73 (22.7)
69 (45.4)	29 (46.8)	8 (57.1)	2 (50)	2 (100)	22 (62.9)	147 (45.7)
26 (17.1)	10 (16.1)	-	-	-	3 (8.6)	62 (19.3)
37 (24.3)	16 (25.8)	4 (28.6)	-	-	3 (8.6)	76 (23.6)
3 (2.0)	7 (11.3)	3 (21.4)	2 (50)	-	4 (11.4)	24 (7.5)

hygiene. Lacking of the knowledge was supported by the fact that some subjects washed their hands with water after decontaminating with an alcohol-based hand rub. Routinely washing hands with soap and water immediately after using an alcohol-based hand rub is not recommended, and may lead to dermatitis [16]. Therefore, education and motivation at individual level is required for better understanding and attitudes about hand hygiene. Moreover, compliance should be promoted by regular performance feedback and informing current rate of nosocomial infection. In addition, better practice by senior doctors as role models may enhance compliance in medical students, residents, and fellows.

Our study has some limitations. The study was conducted in only adult ICUs during limited observation period. As a result, the number of our subjects was too low in some categories of HCWs. Hence, our results may not be generalized to the every HCWs and ICUs in the hospital. In addition, although our observations were unobtrusively as possible, HCWs may have changed their behavior because they were being observed. The compliance rate may be overestimated than that of the real practice. Despite these limitations, this study indicates that non-compliance with hand hygiene is a major problem among HCWs and visitors in our hospital. Compliance is unacceptably poor in the workplace where high demand for hand hygiene is required such as ICUs [4]. Therefore, the hand-hygiene strategies that were developed here for ICUs should be able to apply to other sections in the hospital.

Based on the results obtained from this study, the multimodal and multidisciplinary approach, such as encouraging of using bedside, alcohol-based hand rub, motivation and education, reminders in the workplace, performance feedback, reinforcement of the role model, and involvement of institutional leaders, should be included in the hand-hygiene campaign. However, hand hygiene should not be the only mean to reduce nosocomial infection. Other strategies include infection control measures such as contact isolation and hospital environment hygiene [17]. Following the campaign, compliance of hand hygiene and nosocomial infection rate in parallel need to be regularly determined and informed for sustained compliance.

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การสำรวจแบบcross-sectionalเพื่อหาอัตราการล้างมือและทัศนคติต่อการล้างมือก่อนการสัมผัสผู้ป่วยของบุคลากรทางการแพทย์และผู้เข้าเยี่ยมผู้ป่วยในหอผู้ป่วยวิกฤตโรงพยาบาลจุฬาลงกรณ์

กนิษฐา ภัทรกุล, อัจนา แทนขำ, สุธาดา กัณหะ, ดรุณี ผดุงเพียร, องค์อร ใจชัยภูมิ

ที่มาของปัญหา: *การล้างมือก่อนสัมผัสผู้ป่วยเป็นที่ยอมรับว่าเป็นมาตรการที่สำคัญและมีประสิทธิภาพที่สุดในการป้องกันการติดเชื้อในโรงพยาบาล โรงพยาบาลจุฬาลงกรณ์จึงจัดให้มีการรณรงค์เรื่องการล้างมือซึ่งเป็นส่วนหนึ่งของนโยบายการควบคุมโรคติดเชื้อ แต่ข้อมูลพื้นฐานของอัตราการล้างมือ ทัศนคติและความเชื่อต่อการล้างมือก่อนการสัมผัสผู้ป่วยยังไม่เคยมีรายงานมาก่อน*

วัตถุประสงค์: *เพื่อหาข้อมูลพื้นฐานของอัตราการล้างมือ ทัศนคติและความเชื่อต่อการล้างมือก่อนการสัมผัสผู้ป่วยของบุคลากรทางการแพทย์และผู้เข้าเยี่ยมผู้ป่วยในหอผู้ป่วยวิกฤต โรงพยาบาลจุฬาลงกรณ์*

วัสดุและวิธีการ: *การสำรวจอัตราการล้างมือก่อนการสัมผัสผู้ป่วยของบุคลากรทางการแพทย์และผู้เข้าเยี่ยมผู้ป่วยอาศัยการสังเกตการณ์ที่หอผู้ป่วย และการสำรวจโดยใช้แบบสอบถามเพื่อหาทัศนคติและความเชื่อต่อการล้างมือก่อนการสัมผัสผู้ป่วย*

ผลการศึกษา: *จากการสังเกตการณ์พบว่าอัตราการล้างมือก่อนการสัมผัสผู้ป่วยของบุคลากรทางการแพทย์และผู้เข้าเยี่ยมผู้ป่วยโดยรวมต่ำกว่าร้อยละ 50 และแตกต่างกันในแต่ละสายงานของบุคลากรทางการแพทย์และผู้เข้าเยี่ยมผู้ป่วย ผลการตอบแบบสอบถามพบว่าภาวะเร่งด่วนในการให้การพยาบาลเป็นสาเหตุที่ทำให้ไม่ได้ล้างมือบ่อยที่สุด (51.2%) สาเหตุรองลงมาคือลืม (35.7%) และการล้างมือทำให้มีอาการระคายเคือง (15.5%) ผู้ถูกสำรวจเชื่อว่าการเพิ่มอัตราการล้างมือต้องอาศัยหลายมาตรการร่วมกันเช่น มีน้ำยาล้างมือที่ทำให้เกิดการระคายเคืองต่ำให้ใช้ (53.4%) มีการรายงานอัตราการติดเชื้อในโรงพยาบาลให้ทราบ (49.1%) ที่ตั้งน้ำยาล้างมืออยู่ในตำแหน่งที่ใกล้ สะดวก (46.3%) ผู้ถูกสำรวจส่วนใหญ่ (99.7%) เชื่อว่าตนเองทราบวิธีการล้างมือที่ถูกต้องและการล้างมือด้วยสบู่ที่มีสูตรผสมน้ำยาฆ่าเชื้อเป็นวิธีการล้างมือที่ดีที่สุด (37.8%)*

สรุป: *อัตราการล้างมือก่อนการสัมผัสผู้ป่วยของบุคลากรทางการแพทย์และผู้เข้าเยี่ยมผู้ป่วยพบว่าต่ำจำเป็นต้องอาศัยหลายมาตรการในการเพิ่มความรู้ การปฏิบัติ ทัศนคติ และความเชื่อที่ถูกต้องเกี่ยวกับการล้างมือก่อนการสัมผัสผู้ป่วย*