Effect of Quality Improvement program on Health Care Workers towards Hand Hygiene at Family Practice Centers-Ismailia-Egypt

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Abstract

Background: **Hand hygiene is the most effective single measure to prevent transmission of healthcare-associated pathogens. It can be performed either by washing with soap and water or by rubbing with an alcohol-based hand rub.** ***Aim:*** **to identify barriers of poor adherence of Health Care Workers (HCWs) to standard hand hygiene, and to assess the impact of quality improvement program regarding hand hygiene.** ***Subjects and Methods:*** **This quasi-experimental study was conducted on 57 HCWs working in three Family Practice Centers in Ismailia Governorate; [physicians (n=20), nurses (n=24), Laboratory technicians (n=6), and cleaning workers (n=7)]. We used the Six Sigma model as a tool for quality improvement in health care facilities. The quality improvement program towards hand hygiene was conducted over a period of 8 weeks. The impact of the intervention was assessed before and one year after the intervention using self-assessment questionnaire and observation checklist.** ***Results:*** **defective training and lack of scientific information were responsible for 80% of the problem (vital few) as evident from Pareto chart. About eighty-four percent (84.2%) of the studied population achieved appropriate self-assessment after one year from intervention compared to 33.3% before the intervention (P<0.05). About eighty-one percent (80.7%) of the studied population achieved appropriate practices one year post-intervention compared to 1.80% pre-intervention(P<0.05).** ***Conclusion:*** **continuous quality improvement program could improve knowledge and practices of HCWs toward hand hygiene. Overcoming barriers as lack of training and scientific evidences are important. Implementing such program in all primary health facilities is recommended to achieve a more favorable performance.**

Key words: *Hand Hygiene, Infection Control, Quality Improvement.*

Introduction

Hand washing with soap and water has been considered as a measure of personal hygiene for centuries. In the mid-1800s, many studies were conducted worldwide and concluded that, Hospital-Acquired Infections (HAIs) were transmitted via the hands of Health Care Workers (HCWs)[(1)] The current knowledge regarding transmission of pathogens through hands and prevention of infection has greatly evolved. The first international guidelines on hand hygiene were published in 2009 and recommend a range of evidence-based actions[(2)] Improving adherence with hand hygiene requires considerable effort to ensure HCWs have access to appropriate equipments/supplies and have sufficient knowledge about the importance of hand washing[(3)]. Without adequate hand hygiene, hand contamination increases and

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contaminated HCWs' hands have been associated with endemic HAIs. Therefore, hand hygiene is the primary measure to prevent HAIs and helps in decreasing antimicrobial resistance ultimately. However, many determinants, such as lack of time, lack of equipment/supplies, and behavioral factors, often result in neglecting hand hygiene from HCWs. Although many HCWs perceive their performance as high, their adherence to hand hygiene is usually less than 40% in the absence of any interventions in this regard[4]

Hand rubs containing 60–80% alcohol are satisfactory, provided that they meet recommended standards[5]. Indeed, HCWs tend to comply more frequently with indications that protect themselves (e.g., after exposure to body fluids, after glove use, after contact with the patient or the patient's environment)[6]. The "My five moments for hand hygiene" approach merges the hand hygiene indications recommended by the WHO Guidelines into five moments when hand hygiene is required. These are: 1) Before touching a patient, 2) before clean/aseptic procedures, 3) after body fluid exposure/risk, 4) after touching a patient, and 5) after touching patient surroundings. This approach proposes a unified vision for HCWs, trainers, and observers to minimize inter-individual variation[7]

The WHO Multimodal Hand Hygiene Improvement Strategy and the WHO Implementation Toolkit have been developed to assist health care facilities to implement improvements in hand hygiene in accordance with the WHO Guidelines on Hand Hygiene in Health Care[8] They have been pilot tested by the WHO in settings with different levels of resources and in a multicultural environment. The results were encouraging regarding knowledge and practices of HCWs. Furthermore, a substantial improvement was achieved in the facilities and equipment available for hand hygiene, including the low-cost provision of alcohol based hand rubs through local production of the WHO-recommended formulations where these were not available commercially[9,10].

Many systems and processes guide quality improvement efforts today. These quality improvement approaches are derivatives and models of the ideas and theories developed by thought leaders as Plan-Do-Check-Act/Plan-Do-Study-Act(PDCA/PDSA), Associates for Process Improvement's (API) Model for Improvement, ISO 9000 and Six Sigma. *(Six Sigma is a set of tools and strategies for process improvement. Processes that operate with "six sigma quality" over the short term are assumed to produce long-term defect levels below 3.4 defects per million opportunities[11])*

Subjects and Methods

This is a quasi-experimental study (one-group pretest-posttest design). The study was conducted on health care providers working in Family Practice Centers (FPCs) affiliated to Faculty of Medicine-Suez Canal University in Ismailia Governorate (El Mahsama FPC, Abu Khalifa FPC, and Fanara FPC). The sample was a comprehensive one where all HCWs in three family practice centers were included in the study. They are categorized as physicians (n=20), nurses (n=24), Lab. technicians (n=6) and cleaning workers (n=7) with total number of 57 participants in the study.

The researcher used the Six Sigma model as a tool for quality improvement in health care facilities. The researchers passed through a process of Define, Measure, Analyze, Improve and Control (DMAIC) in this model. A Pilot study was conducted on six HCWs to test feasibility and reliability of the questions. The total number of the studied population was 51 HCWs and completed the study to the end. The quality improvement program towards hand hygiene was conducted over a period 8

weeks. Workshops and on job training were used in the program.

The study was conducted using self-assessment questionnaires and observational checklists as study tools. Self-assessment questionnaires included one English questionnaire designed for physicians and three Arabic questionnaires for nurses, laboratory technicians and cleaning workers. Observational checklists included the same contents of the self-assessment questionnaires. They were designed for direct observation by the researcher. One checklist was designed for observing adherence of health care providers to hand hygiene. Another one for observing structure and process related to hand hygiene in the centers. Both questionnaires and checklists were developed using the national guidelines for infection control in Egypt and British guidelines for monitoring infection control within the community setting[12,13]

The impact of this intervention was assessed by comparing the performance before and one year after the intervention using the same tools (self-assessment questionnaire and observation checklist). Informed consent was obtained from participants after sharing them the aim of the study and assuring confidentiality. Data had been coded, and fed into the computer. The statistical package for social sciences (SPSS version 20.0) was used for data management. The data were presented in tables and graphs. Chi-square test was used to test the statistical significance of categorical data.

Table 1: Distribution of the studied population according to their job description

Health Care Workers (n=51)	No (%)
Physicians	20 (35%)
Nurses	24 (42%)
Laboratory Technicians	6 (11%)
Cleaning Workers	7 (12%)

Results

The current study was conducted on all health care Workers (HCWs) working in Family Practices Centers affiliated to Faculty of Medicine, Suez Canal University (FOM/SCU). HCWs included physicians (n=20) 35%, nurses (n=24) 42%, laboratory technicians (n=6) 11% and cleaning workers (n=7) 12% with total number of 51 participants in the study as shown in table (1). Female predominance was observed among physicians (85%), nurses (87%), and technicians (100%). Ninety-five percent of physicians, 62.4% of nurses, and 83.4% of laboratory technicians were in the age group of ≥ 25 years. Sixty percent of the studied physicians have practical experiences for ≥5 years comparable with 79.2% for nurses and 66.6 % for laboratory technicians. No HCWs received any annual check-up. Only 25% of the studied physicians, 12.5% of nurses, none of laboratory technicians and cleaning workers received Hepatitis B Vaccine (HBV). Regarding workload of the studied physicians, 45% of them consulted up to 10 patients per days in daily practice, similar percent (40%) consulted patients at a rate of 10-20 daily. Only 15% of them had consulted more than 20 patients per day.

Pareto chart was used to identify the vital few causes of poor adherence to hand hygiene. *(Pareto chart is a type of chart that contains both bar and line graph where individual values are represented in descending order by bars and the cumulative total is represented by the line).* It is evident that, defective training and lack of

scientific information were responsible for 80% of causes of poor adherence to hand hygiene vital few) while the other causes account for 20 % of the problem (useful many) as addressed in Pareto chart (Figure 1). Remedy no (3) was the most effective remedy to be implemented according to the set of proposed criteria (total score was 19). This remedy (improvement intervention) included training courses for CHWs towards hand hygiene by researcher in the centre (on job training along with interactive lectures) as addressed in table (2).

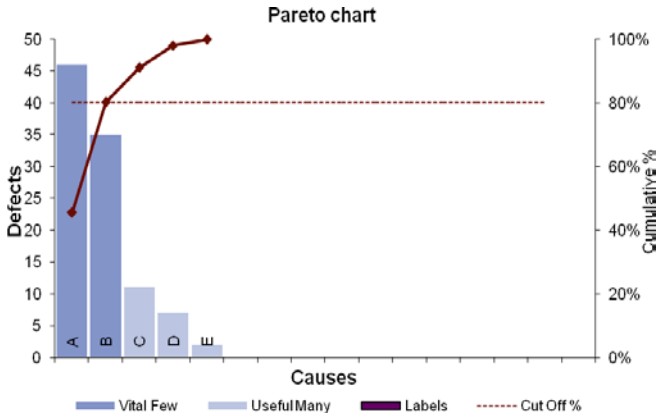

Figure 2: Causes of poor adherence to standard hand hygiene (Pareto chart). A: Defected training, B: Lack of scientific information: Increase rate of patients; D: Lack of resources: lack of super vision and monitoring

Concerning self-assessment of the studied population, there was a statistically significant difference between pre and post intervention [one year] (P<0.05) regarding the hand hygiene as shown in table (3). About eighty four percent (84.2%) of the studied population achieved appropriate self-assessment (>80%) after one year from intervention comparable with 33.3% before the intervention. It is evident that physicians, nurses and cleaning workers showed significant statistical difference before and after the intervention regarding self-assessment of hand hygiene (P<0.05) as demonstrated in table (4).

Table 2: Remedies for improvement of defective training regarding hand hygiene

Criteria	Remedy 1	Remedy 2	Remedy 3
1- Cost (least cost take score 3)	1	3	3
2- Impact on problem	1	2	3
3- Benefit from remedy	1	3	3
4-Implementation time	2	2	3
5-Resistance to change	1	1	2
6-Certainty about effectiveness	1	2	2
7-Health and environment	3	2	3
Total scores	10	15	19

Remedy 1: Training courses for CHWs towards hand hygiene by team from MOHP; Remedy 2: Training courses for CHWs towards hand hygiene by Infection control (IC) team of Suez Canal University Hospital affiliated to SCU; Remedy 3: Training courses for CHWs towards hand hygiene by researcher in the centre (on job training along with interactive lectures).

Table 3: Comparison of Pre-post intervention regarding self-assessment of studied population towards hand hygiene

Self-assessment regarding hand hygiene	Pre intervention No. (%)	Post-intervention (1 year) No. (%)	P value
Appropriate (>80%)	19 (33.3)	48 (84.2)	
Inappropriate (< 80%)	38 (66.7)	9 (15.8)	0.000*

* Statistically significant difference (p-value < 0.05); Total No =57

Table 4: Comparison of pre and post intervention self-assessment of the studied population regarding hand hygiene

Groups of studied population	Hand hygiene (self-assessment)	Pre- intervention No. (%)	Post-intervention (1 year) No. (%)	P value
Physicians (n=20)	Appropriate	9 (45)	19 (95)	
	Inappropriate	11 (55)	1 (5)	0.001*
Nurses (n=24)	Appropriate	8 (33.2)	20 (83.3)	
	Inappropriate	16 (65.8)	4 (16.7)	0.001*
Technicians (n=6)	Appropriate	2 (33.3)	5 (83.3)	
	Inappropriate	4 (66.6)	1 (16.7)	0.121
Workers (n=7)	Appropriate	0	4 (57.1)	
	Inappropriate	7 (100)	3 (42.9)	0.021*

* Statistically significant difference (p-value < 0.05)

Table (5) shows there was highly significant difference between pre and post intervention (one year) regarding direct observation of hand Hygiene practice of the studied population. About eighty one percent (80.7%) of the studied population achieved appropriate practices (>80%) in post intervention compared to 1.80% before intervention. All HCWs (physicians, nurses , laboratory technicians and cleaning workers) demonstrated significant improvement in practices related to hand hygiene one year after the intervention comparable with before intervention ($p<0.05$) as shown in table (6).

Table 5: Practices of studied population regarding hand hygiene by direct observation (Pre-post intervention)

Direct observation regarding hand hygiene	Pre- intervention No. (%)	Post-intervention (1 year) No. (%)	P- value
Appropriate (>80%)	1 (1.8)	46 (80.7)	
Inappropriate (< 80%)	56 (98.2)	11 (19.3)	0.000*

* Statistically significant difference (p-value < 0.05); Total No. =57

Discussion

The current study was carried-out on 57 HCWs working at family practice centers affiliated to FOM/SCU -Ismailia Governorate. It aimed at identifying barriers of poor adherence of HCWs to standard hand hygiene. In addition, it assessed the impact of quality improvement program regarding hand hygiene. On studying barriers (causes) of non-adherence among HCWs, it was found that most of the studied population

(45.6%) think that the non-adherence due to lack of training. Lack of scientific information as a barrier to adherence to standard hand hygiene was mentioned by 35% of the studied population. Other barriers were addressed as consulting a high rate of patient daily 10.6% and lack of required resource (7.1%). These findings were in partial agreement with other studies reported that lack of awareness of the risk of getting infection and lack of knowledge of guidelines related to hand hygiene were perceived as barriers to good hand hygiene practices. Furthermore, some HCWs believed that they washed their hands when necessary even when observations indicated that they did not[14]

Table 6: Practices of different groups of studied population regarding hand hygiene by direct observation (Pre-post intervention)

Groups of studied population	Hand hygiene (direct observation)	Pre- intervention No. (%))	Post-intervention (1 year) No. (%)	P value
Physicians (n=20)	Appropriate	1 (5)	17 (85)	
	Inappropriate	19 (95)	3 (15)	0.000*
Nurses (n=24)	Appropriate	0	20 83.3)	
	Inappropriate	24 (100)	4 (16.7)	0.000*
Technicians (n=6)	Appropriate	0	4 (66.7)	
	Inappropriate	6 (100)	2 (33.3)	0.000*
Workers (n=7)	Appropriate	0	5 (71.4)	
	Inappropriate	7 (100)	2 (28.6)	0.000*

***** Statistically significant at $p < 0.05$

Concerning self-assessment of the studied population, there was a statistically significant difference between pre and post intervention [one year] ($P<0.05$) regarding hand hygiene. About eighty four percent (84.2%) of the studied population achieved appropriate self-assessment (>80%) after one year from intervention comparable with 33.3% before the intervention. It is evident that physicians, nurses and cleaning workers showed significant statistical difference before and after the intervention regarding self-assessment of hand hygiene ($P<0.05$). The results of the current study were consistent with the reported results from numerous studies. Our study showed that educational programs can effectively increase knowledge, and positive attitudes which ensures adherence with international protocols, and regulations for the prevention and control of infection[15]. Such concordance might be explained in the view of adherence of HCWs worldwide to a new behavior. This could be fostered maintained as shown after one year in the current study by overcoming barriers to such behavior particularly training and updated knowledge regardless their job. The direct observation of practices of CHWs is more objective than self-assessment because it reflects the reality. It was evident that, there was highly significant difference between the pre and the post intervention (one year) regarding direct observation of adherence to practices of good hand hygiene among the studied population. About eighty one percent (80.7%) of the studied population achieved appropriate practice (>80%) in the post intervention compared to 1.80% in the pre intervention. All health care providers (physicians, nurses, laboratory technicians and cleaning workers) demonstrated significant improvement in practices related to hand hygiene one year after the intervention comparable with before intervention ($p<0.05$).

These results were not in full agreement with the reported results from European society. In the final report of the Clean Hands Save Lives Campaign which Was conducted in New South Wales between November 2005-May 2007, it was found that overall hand hygiene adherence between February 2006 and February 2007 improved from 47.1% to 62.2%[16]. Also, adherence of HCWs to recommended hand hygiene procedures has been unacceptably poor, with mean baseline rates ranging from 5% to 81%, with an overall average of about 40%[17]. In an epidemiological study of HH carried out in 1994 in hospitals affiliated to the University of Geneva, an average rate of compliance of 48% was observed[18]. Generally there is poor adherence with hand hygiene regulations by health care workers all over the world, and all the studies carried out in hospitals suggest that the frequency of adherence is lower than 50%[18]. The relative limited number of the studied population could explain such discrepancy between the results of the current study, and the abovementioned one, and the researcher being in touch with them frequently makes them more adherent to the new behavior. On the other hand, most of the reported results from hospital based studies not primary care. In addition, they were more motivated to be accredited from the national body belonging to MOHP at the time of conducting the study.

Conclusions

Continuous quality improvement intervention could improve knowledge and practices of health care workers toward hand hygiene. This will be achieved after overcoming the barriers such as lack of training, and scientific information that were evident in the current study. Implementing such program in all primary health care facilities is recommended.

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