Ann Ig 2020; 32(5): 462-471 doi:10.7416/ai.2020.2370

The Clean Care Contest: promoting hand hygiene among healthcare and medical students

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Key words: Hospital epidemiology, healthcare-associated infections, hand hygiene, education
Parole chiave: Epidemiologia ospedaliera, infezioni correlate all'assistenza, igiene delle mani, educazione

Abstract

Introduction. *Despite continuing efforts, compliance rates and knowledge of best practices in hand hygiene remain disappointing. Recognizing that conventional educational tools seem out of touch with young people and that the med and messages contents need refreshing, the Italian Study Group of Hospital Hygiene of the Italian Society of Hygiene, Preventive Medicine and Public Health devised a novel approach to promote the creation of innovative educational tools for improving knowledge of, and compliance with, hand hygiene rules among healthcare and medical students.*

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Methods. *A contest in creating educational material on hand hygiene practices involved university students of nursing and medicine, and of other healthcare degrees. Students from the universities of the GISIO network were invited to create educational material (e.g., videos, posters, presentations, leaflets, and screensavers) to be presented by May 5th 2019 during the World Hand Hygiene Day / Save Lives: Clean Your Hands Global Annual Initiative of the World Health Organization). A local and a national winners were awarded.*

Results. *Three different local and national contests were performed during 2016, 2017 and 2018. During the three-year period, more than 270 educational tools have been developed: 130 (48%) were judged useful for hand hygiene promotion campaigns. The most frequent projects participating in the contests were videos (39%), posters (29%), leaflets (14%), and others (18%) submitted by more than 1,500 students of nursing (40%), medicine (31%), dentistry (7%), and of other healthcare courses in 14 universities. Products were evaluated by a local committee and, subsequently, local winners represented their University in a national contest.*

Conclusions. *The contest provided a framework for the creation of innovative and potentially effective educational tools via an engaging approach that leveraged student creativity. Given the need to improve compliance rates, this study suggests that new ways can be advantageously explored to teach hand hygiene procedures and increase awareness of the importance of their consistent use among healthcare and medical students.*

Introduction

Healthcare-associated infections (HAIs) pose a huge threat to patient safety. HAIs are associated with increased morbidity, mortality, and substantial additional costs to healthcare organizations. HAIs also cause medical liability and medical malpractice litigations (1). In the United States alone, HAIs occur in about two million patients every year, with 99,000 deaths and an overall cost of $ 33 billion each year (2). In their meta-analysis of the five major targetable HAIs (surgical site infections, central line-associated bloodstream infections, catheter-associated urinary tract infections, ventilator-associated pneumonias, and *Clostridium difficile* infections) Zimlichman et al. (3) estimated that 440,916 such infections occur annually among US adult inpatients and incur an annual cost of $ 9.8 billion. Moreover, based on 2011-2012 data from the European Centre for Disease Prevention and Control (ECDC) point prevalence survey of HAIs, Cassini et al. (4) reported that over 2.6 million new cases and over 91,000 deaths each year in the European Union and European Economic Area (EU/EEA) are attributable to these five HAIs plus healthcare-associated neonatal sepsis.

In 2005, the World Health Organization (WHO) launched the Global Patient Safety Challenge campaign to reduce the overall incidence of HAIs through multimodal implementation strategies (5). Its guidelines recommend that hand hygiene be performed at five key moments using an alcohol-based rub or soap and water if the hands are visibly dirty (6).

Studies have shown that hand hygiene is the most effective measure to reduce the incidence of HAIs and that a positive correlation exists between the implementation of hand hygiene improvement programs and a decrease in HAIs incidence (7-12). Healthcare workers' (HCWs) compliance remains suboptimal, however. Kingston et al. systematically reviewed the literature published between December 2009 and February 2014 about hand hygiene compliance among a broad range of HCWs, including nurses, doctors, respiratory therapists, physical therapists, occupational therapists, speech pathologists, dieticians, radiology technicians, and many others. After combining all studies, they found an overall mean baseline compliance rate of 34.1%.

As recommended by the WHO, multimodal interventions including knowledge questionnaires followed by

immediate feedback and visual reminders (videos, posters, cartoons) resulted in a net improvement of 22.88% (13). Labrague et al.'s systematic review showed that nursing students had a low-to-moderate knowledge of, and compliance with, hand hygiene rules, which were still higher than the rate among medical students (14). According to an Italian study, only 22.4% of nursing students and 18.5% of medical students scored above 50% on survey knowledge questions (Hand Hygiene Questionnaire) (15). In their study, involving undergraduate medical students, Kaur et al. reported the need for new approaches to improve awareness, acceptance, and attitudes to hand hygiene (16). Involving a completely different study sample, McInnes et al. examined senior hospital managers' perspectives on innovative strategies to improve hand hygiene compliance (17). Most participants reported that traditional educational tools are now "stale". They highlighted the need to refresh the mode and content of messages, stating that "posters that illustrate best practices in hand hygiene need to be revamped and changed in the same way that advertising posters get changed at my local bus stop". The study also focused on how hand hygiene improvement strategies need to fit with existing knowledge about determinants of behavioral change. Increased compliance with hand hygiene rules implies a change in behavior. In their systematic review of ten qualitative studies investigating the behavioral factors that impact on hand hygiene compliance among HCWs. Smiddy et al. suggested that motivational factors include the use of cues as reminders to trigger memory, attention, and decision processes (18).

The Italian Study Group of Hospital Hygiene (GISIO) of the Italian Society of Hygiene, Preventive Medicine and Public Health (SItI) conducted a study on effective teaching strategies for HAI prevention. A literature review and qualitative analyses via surveys and focus groups were performed, and a multidisciplinary exchange of knowledge among postgraduate programs was encouraged. The aim of the present study is to describe a novel approach to promote the creation of innovative educational tools to improve knowledge of, and compliance with, hand hygiene rules among healthcare and medical students.

Methods

The GISIO of SItI promoted a contest addressed to students on degree courses in nursing, medicine, and other healthcare professions. Students attending a university of the GISIO network were invited to prepare an educational tool (e.g., videos, posters, presentations, leaflets, screensavers) by May 5th 2016, 2017 and 2018 (the World Hand Hygiene Day / World Health Organization Save Lives: Clean Your Hands Global Annual Initiative). The contest was meant to engage students in raising their awareness about hand hygiene and HAIs in general. To this end, GISIO promoted the production of educational tools and leveraged the students' creativity. No restrictions were placed on product content, mode of presentation or visual characteristics. To be included in the contest, messages had to be:

- Relevant
- Appropriate for display in a healthcare setting
- Potentially effective in educating students, visitors, patients, and HCWs about best practices in hand hygiene.

A literature review was conducted to develop a framework for evaluating the products. Six criteria were included in the framework, and a higher score was assigned for scientific accuracy, potential impact, and usefulness for health promotion campaign (Table 1).

A local Committee from each university in the GISIO network judged the products

according to the framework. Local contest winners represented their university in the national contest. A national committee, composed of international experts, evaluated the products according to the same criteria and selected a national winner. Three local and national contests were held during 2016, 2017, and 2018.

Table 1 - Framework for product evaluation.

Criterion	Score
Scientific accuracy	3
Creativity	2
Technical quality	2
Originality	2
Potential impact	3
Usefulness for campaign	3
Total	15

Results

Currently, the course entitled "General and Applied Hygiene" (MED/42) is taught in 54 Italian universities: 14 (26%) participated at least in one local and national contest; six of them participated in 3 contests (2016, 2017, 2018), while three centers participated in 2 contests and five centers took part in one contest (Table 2).

During the three-year period 2016-2018, more than 1500 students on degree courses were involved: nursing (40%), medicine (31%), dentistry (7%), and other healthcare professions (22%) (Fig. 1).

Overall, more than 270 educational tools were developed; 130 (48%) were judged useful for hand hygiene promotion campaigns. Videos were the most common product (39%), followed by posters (29%), leaflets (14%), and other material (18%) (Fig. 2).

The video features considered especially effective in improving hand hygiene compliance rates were:

- Brevity and clarity
- Illustration of instructions
- Visual presentation of WHO-recommended hand hygiene procedures
- Dissemination through multiple information channels, e.g., social networks

Figure 3 shows a poster displaying a video, winner of the 2017 contest at local level.

The use of animation was selected to convey a clear message in an engaging manner, particularly suitable for students and residents who are the main target of the product. The video is structured in five

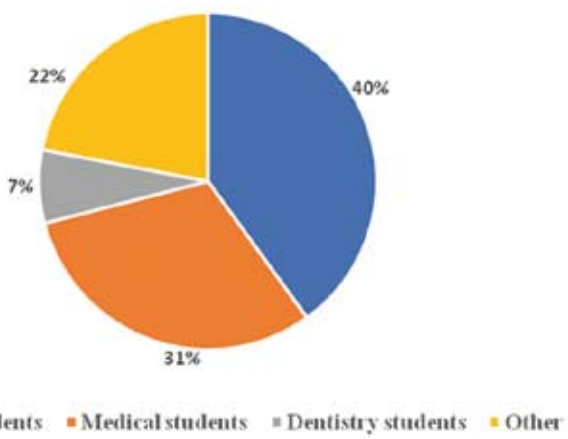

Figure 1 - Contest participants by curriculum enrollment (%).

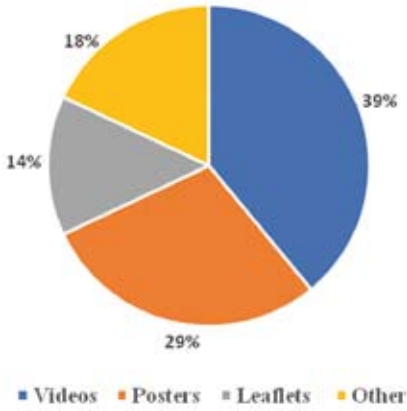

Figure 2 - Educational product by type of tool (%).

parts that answer five typical questions about hand hygiene: Who, What, Why, When, Where. The illustrations were created with Photoshop, a digital painting technique. Colors, characters, and soundtracks were symbolic; for example, bacterial colonies, spores, and sources of infection were given off-colors, while clean hands were displayed in vivid colors. Messages were conveyed using an educational-emotional approach; for example, the hand washing procedure was illustrated step-by-step using metaphors such as "dangerous battles" fought against

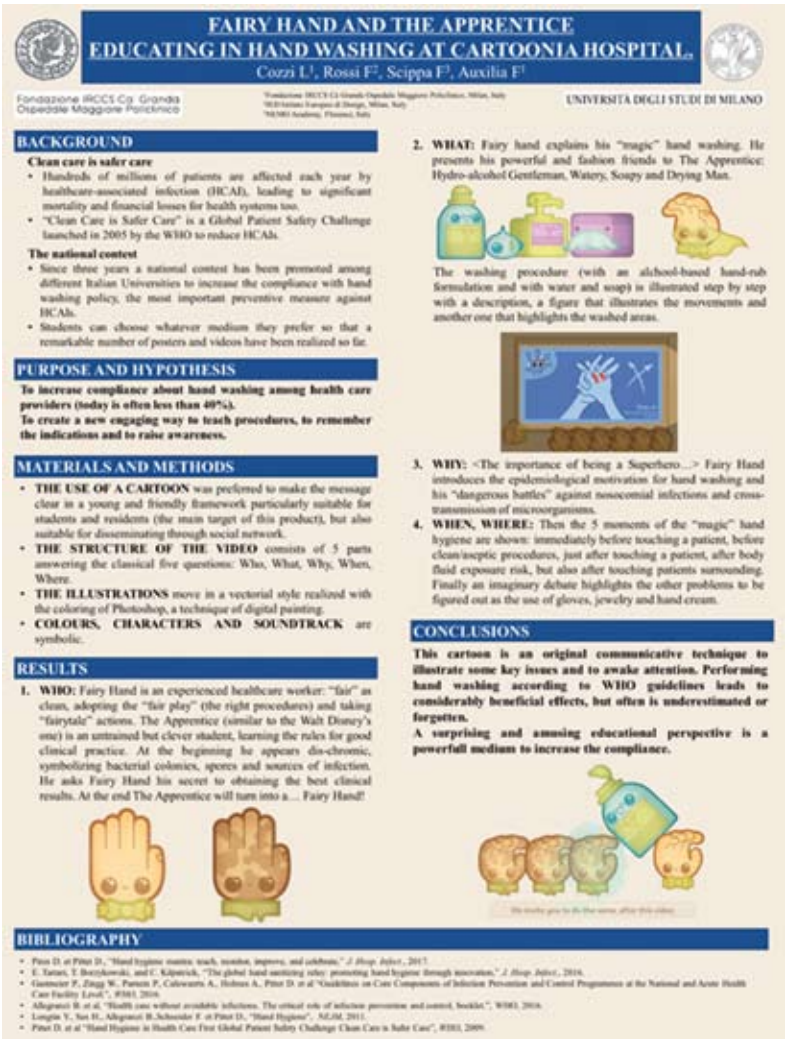

Figure 3 - Poster presenting the video that won the 2017 local contest.

nosocomial infections and transmission of microorganisms or the "magic" of hand hygiene.

The second classified of the 2018 contest and the winner of the 2019 contest at national level are available, respectively, at:
http://www.sitinazionale.org/bdsdocs/gisio/formazione/2sc2018.mp4
http://www.sitinazionale.org/bdsdocs/gisio/formazione/1sc2019.mp4

The first video combines the use of animation and the soundtrack of a famous videogame. The hand hygiene washing procedure is illustrated step-by-step as multi-level game, the correct execution of each step shortens the bacterial "life bar", while the wrong execution is displayed as a "game over".

The second video uses a dance music soundtrack, and the hand hygiene washing procedure is illustrated using hand and body movements that are typical of group dance.

Discussion and conclusions

There is an ongoing need to develop multimodal, creative approaches to improve hand hygiene compliance rates in healthcare settings. Ofek Shlomai et al. systematically reviewed a variety of multimodal strategies implemented in neonatal care units, including e-learning packages, screensavers, videos of common mistakes on computers in a unit, posters with cartoons showing correct hand washing procedures, e-mailed brochures, prominently displayed bulletins, musical parodies, leaflets, labels with slogans placed throughout the nursery, pictures of step-by-step hand washing placed above sinks, and reminder stickers. The meta-analysis showed an improvement in compliance with hand hygiene rules after these interventions were implemented (odds ratio [OR] 2.04, 95% confidence interval [CI] 1.40 – 2.97) (19). Similarly, Alshehari et al. conducted a systematic review to identify effective strategies to increase hand hygiene compliance among HCWs in adult intensive care units; reminders such as wall posters or other visual cues were included in the analysis (20). Wiles et al. found that visual reminders and visual reinforcement of gaps in hand hygiene practices are more effective than didactic education and verbal reminders alone (21).

Improving hand hygiene compliance implies a shift in behavior; accordingly, improvement strategies should leverage determinants of behavioral change. In their systematic review, Huis et al. classified improvement techniques by the determinants they addressed. Nine categories of determinants were identified and the increase in effectiveness of interventions was correlated closely with the number of determinants ($p = 0.009$); in other words, interventions focusing on a combination of determinants yielded better results. The study concluded by stating that "we should be more creative in the application of alternative activities addressing determinants" (22). The use of visual reminders was listed under the "action control" category, which included hospital-wide poster campaigns. We suggest, however, that visual reminders, which are strongly related to information and creativity, could also address other determinants such as knowledge, awareness, attitudes, and intention. Knowledge refers to the provision of general information; awareness includes information about the risks of inadequate hand hygiene such as infection rates and costs; attitudes deal with persuasive communication of the positive outcome of proper hand hygiene; intention implies explanation of goals and targets concerning hand hygiene. Visual reminders such as posters, videos or presentations have a "hybrid" nature: they provide both information and emotional messages, and so could be partially referred to as *multiple determinants*.

Moreover, Fuller et al. used a theoretical framework for behavioral change to identify

predictors of non-compliance with hand hygiene among HCWs. The most commonly emerging themes were related to "Memory/ Attention/Decision Making", for example, forgetting or being distracted by some sort of interruption, and "Knowledge", which implies lack of knowledge about hand hygiene best practices (23). Visual reminders enhance knowledge and support its retention in memory, thus addressing multiple predictors of poor and hygiene compliance.

The effectiveness of hand hygiene improvement strategies may be influenced by psychological factors as well, including emotion, as McAteer et al. found in their thematic analysis of semi-structured interviews (24).

Before implementing a hospital-wide campaign, researchers used surveys to test the emotional quality of pictures (25). Emotions have been used as suitable proxies for the ability of an image to leverage predictors of hand hygiene compliance. Emotional aspects are crucial in visual reminders. Porzig-Drummond et al. tested the effectiveness of emotional concepts compared to traditional educational tools in an experimental context. Participants were randomly allocated to watch one of three videos: an educational video that conveyed information about hand hygiene, a "disgust" video that communicated the same information but exploited disgust-eliciting content, and an unrelated control video. The subjects who watched the disgust-eliciting video were more likely to wash their hands on a subsequent behavioral test and more likely to wash them for a longer time (26). In addition, dynamic audiovisual instructions have been tested at the point of patient care. Hoang et al. conducted a real-time video didactic intervention in a neonatal intensive care unit. A nurse practitioner in the video reminded viewers to remove wrist jewelry and illustrated the WHO's "Six Poses" of hand washing step-by-step, while simultaneously giving verbal instructions. Hand-washing events were captured by a surveillance camera: the didactic video improved the average duration of hand washing among the staff over a 9-month time period ($p < 0.0005$) (27).

The need for hand hygiene promotion campaigns relying on approaches other than education alone was also highlighted by Mackert et al., who tested two different hand hygiene poster campaigns. The one leveraged the benefits of proper hand hygiene for everyone ("Protect everyone"), while the other reported the historical evidence of the effectiveness of hand hygiene ("Timeline"). In brief, while the first message was grounded in persuasion, the second was grounded in knowledge. The overall results suggested that a persuasive approach was more effective than a didactic approach in eliciting attention, likability, and impact on behavioral intention (28). Other studies compared two posters that, by using informative or emotional language, conveyed the same message about the spread of gastrointestinal illnesses and its prevention through hand hygiene. The studies concluded that an emotional link to disease could be more effective than a cognitive link in prompting hand hygiene (26).

Emotional and persuasive elements are frequently used in the products competing in the GISIOs contests. Symbolic colors, characters, and soundtracks in the video described above are a good example of this kind of approach. Moreover, some students stated: "We tried to leverage emotions as motivational factors", thus confirming evidence from the literature.

The present study has several limitations. First, only 14 Italian universities were involved in the project. They accounted for 26% of schools where the General and Applied Hygiene course is on the curriculum. Nonetheless, more than 1,500 students enrolled in a broad range of academic

degree courses in medicine and healthcare actively contributed to the production of educational tools. Participating schools were located throughout the country, ensuring a broad coverage. Second, the effectiveness of the products in improving hand hygiene compliance was not tested in healthcare settings. The project was organized as a creative contest with the purpose to improve knowledge, beliefs, and practice of hand hygiene among healthcare and medical students through active involvement. Further research is desirable to evaluate the usefulness of these communicative tools in achieving and maintaining hand hygiene compliance rates high over time in healthcare settings.

Summarizing, innovative and potentially effective educational tools can be advantageously developed using an engaging approach and leveraging student creativity. Given the need for new techniques to improve hand hygiene practices, this study suggests novel ways to teach procedures and increase awareness among healthcare and medical students.

Riassunto

La sfida creativa del GISIO: promozione dell'igiene delle mani tra gli studenti di medicina e delle professioni sanitarie

Introduzione. Nonostante gli sforzi continui, la percentuale di conformità e la conoscenza delle best practices sull'igiene delle mani tra gli operatori sanitari rimangono deludenti. Gli strumenti formativi tradizionali risultano inadeguati quando rivolti alle fasce di età più giovani, i canali comunicativi ed i contenuti necessitano di aggiornamenti, pertanto il Gruppo di Lavoro GISIO (Gruppo Italiano di Studio di Igiene Ospedaliera) della Società Italiana di Igiene, Medicina preventiva e Sanità pubblica (SItI) ha ideato un nuovo approccio per promuovere lo sviluppo di strumenti formativi innovativi, volti a migliorare la conoscenza e il rispetto delle buone pratiche sull'igiene delle mani tra gli studenti di medicina e delle professioni sanitarie.

Metodi. Una gara di creazione di materiale didattico sulle buone pratiche di igiene delle mani ha coinvolto studenti dei corsi universitari di infermieristica, medicina ed altre professioni sanitarie. Gli studenti delle università appartenenti alla rete GISIO sono stati stimolati a produrre materiale didattico (ad esempio video, poster, presentazioni, volantini e screensavers) da presentare il 5 maggio (Giornata Mondiale dell'Igiene delle Mani / Save Lives: Clean Your Hands. Global Annual Initiative of the World Health Organization [WHO]). Sono stati premiati un vincitore a livello locale ed uno nazionale.

Risultati. Tre differenti gare a livello locale e nazionale hanno avuto luogo nel 2016, 2017 e 2018, nel triennio sono stati sviluppati oltre 270 strumenti educativi: 130 (48%) sono stati giudicati idonei per campagne di promozione dell'igiene delle mani. I contributi più spesso presentati ai concorsi sono stati video (39%), poster (29%), volantini (14%) e altri contributi (18%) da parte di più di 1500 studenti tra corsi di laurea in infermieristica (40%), medicina (31%), odontoiatria (7%) ed altre professioni sanitarie in 14 università complessivamente. Il materiale prodotto è stato valutato da una giuria locale, ed i vincitori a livello locale hanno rappresentato le loro Università nelle gare nazionali.

Conclusioni. Nelle gare è stato sviluppato un framework per la creazione di strumenti educativi innovativi e potenzialmente efficaci, utilizzando un approccio coinvolgente che ha fatto leva sulla creatività degli studenti. Vista la necessità di migliorare le percentuali di conformità, questo studio suggerisce che è possibile indagare nuovi approcci per una formazione efficace sull'igiene delle mani, aumentando la consapevolezza sull'importanza del tema tra gli studenti di medicina e delle professioni sanitarie.

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