Promotion of hand hygiene: the experience of the orthopaedic hospital Gaetano Pini-CTO, Milan, Italy

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Key words: Hand hygiene, Prevention, Multidisciplinary
Parole chiave: Igiene mani, Prevenzione, Multidisciplinare

Abstract

Background. Hand hygiene is the primary preventive measure against health care-associated infections in terms of cost-effectiveness. In 2005, the WHO proposed the “Global Patient Safety Challenge” campaign, with the aim of reducing the overall incidence of such infections, through multimodal programs and strategies, interactive training tools and standardised methods for monitoring compliance.

Study design. On the basis of project “Rimani”, sponsored by the Health and Social Care Authority of Emilia-Romagna, the Istituto Ortopedico Gaetano Pini has implemented a project which seeks to increase healthcare staff’s compliance with hand hygiene.

Methods. A multidisciplinary working group was created to prepare the project documents. Starting from 5th April 2015, twenty operational units were asked to produce information and training material. On 5th May, during a conference, a committee selected the three best works. The material was distributed on a monthly basis to the various departments. In addition to the training, the specifically trained operators of the Medical Monitoring Department carried out direct hand washing tests, filling out appropriate checklists. Non-compliance relating to the technique recorded in 2014 and 2015 was compared and a statistical analysis was conducted using Student’s t-test for paired data.

Results. Three tests were carried out in 2014. Ninety-nine cases were monitored and 5 non-compliance cases were reported, concerning the execution of the procedural steps, the running time and closing the tap with one’s hands at the end of the wash.

In 2015 two tests, involving 30 operational units, were carried out. 60 observations were performed, and no non-conformities emerged concerning the technique. Statistical analysis showed a significant reduction of non-compliances between the 2014 and 2015 (P = 0.000).

Conclusions. The results obtained agree with the main findings in literature. The comparison between the 2014 and 2015 tests shows a trend of improvement in the wash technique. This confirms the effectiveness of a multidisciplinary approach and recognises the active and participatory involvement suggested by the WHO.

Introduction

Health care associated infections (HCAIs) are “infections that occur during hospitalization, or after the patient’s discharge, which were neither clinically manifest nor in a state of incubation at the time of admission”.

The four most common HCAIs are: respiratory tract infections, surgical site
infections, urinary tract infections and blood infections; together they account for more than 80% of all HCAIs.

Risk factors include age, malnutrition, immunosuppression, comorbidities, the increasing use of invasive diagnostic and therapeutic procedures, the transmission of drug-resistant pathogens, and poor infection control measures.

HCAIs contribute to prolong hospital length of stay, increase long-term disability, mortality and costs for health systems (1).

According to WHO estimates, HCAIs arise in millions of patients worldwide. On the average, in developed countries, 7% of patients are affected by HCAIs, whereas, in developing countries, the attack rate exceeds 25%. In the USA, the incidence is estimated at around 5-6%, the number of cases per year is equal to at least 1.7 million, and their contribution to general mortality is 3.6% (up to 80,000 deaths per year) (2).

In Europe, it is estimated that there are more than 4 million cases per year and a total of 37,000 deaths attributable to them.

HCAIs-related costs exceed 7 billion €/year in Europe and 6.8 billion $/year in the USA (3).

Hand hygiene is the primary preventive measure in terms of cost-effectiveness.

WHO promoted the “Global Patient Safety Challenge” campaign (13 October 2005) (4) with the aim of reducing the overall incidence of HCAIs through programs and multimodal implementation strategies. The five key areas present in the “Guide to Implementation” are:

- Structural changes in healthcare systems;
- Training and education;
- Assessment and feedback;
- Tools such as work reminders;
- Patient safety.

WHO promotes the production, dissemination and use of antiseptic solutions for hands. The safety and prevention standard is the alcohol hand rub (AHR).

Five moments for hand hygiene are identified as fundamental:

- Before contact with patient
- Prior to an aseptic procedure
- After exposure to a biological fluid
- After contact with the patient
- After contact with the patient’s surrounding environment.

Health workers and managers are encouraged to use a set of tools for training and education (such as videos, posters suited to the specific context, training sessions).

It is recommended to adopt standardized surveillance methods such as direct observation, measurement of consumption of antiseptic products, and automatic devices to monitor workers’ compliance. Clinical and economic impact assessment strategies are implemented, while active participation is stimulated at institutional and individual level (5).

The majority of studies confirm a positive correlation between implementation of hand hygiene interventions, increased compliance by healthcare workers and reduced frequency of HCAIs. (7, 8, 9, 10, 11).

A prospective ecological study carried in 187 Hospitals in England and Wales (July 2004 - June 2008) demonstrated that the availability of disinfectant alcoholic solutions, equal to 10 mL/day/bed, was associated with reduced methicillin-resistant Staphylococcus Aureus (MRSA) bacteraemia (6).

A study carried in 66 English hospitals (March 2006 - July 2007) proved the effectiveness of a multimodal hand hygiene program in improving hand hygiene compliance (from 20% to 53%; P < 0.001) and in reducing the rates of MRSA isolates (from 0.54/100 patients at baseline to 0.30/100 after 12 months; P trend = 0.043) (7).

The Australian “National Hand Hygiene Initiative” (NHHI) is focused on the “Five Moments for Hand Hygiene” proposed by WHO and currently involves more than 740 hospitals nationwide. NNHI was associated
Promotion of hand hygiene in hospitals

with increased compliance by healthcare workers (43.6% at baseline, 67.8% after 2 years, 79.0% after 4 years; P < 0.001), and reduced MRSA bacteraemia (P = 0.008) (8).

Subsequent prospective, multicentre, randomized and controlled trials have reinforced these findings.

A randomized trial was carried in 2007 in Hong Kong and involved three long-term care facilities. A comparison was carried out between an intervention group that was provided with WHO-compliant educational and training material, alcohol disinfectant solution and work reminders and a control group that received instead standard information material. After a 7 month follow-up, an increase in compliance (from 25.8% to 33.3%; P = 0.01) and a reduction in the incidence of HCAI (from 1.42 to 0.65 cases/1000 hospital days; P = 0.002) was observed in the intervention group. By contrast, there were no significant changes in compliance within the control group, and an increase in the incidence of HCAI from 0.49 to 1.05 cases/1000 hospital days (P = 0.004) was recorded (9).

Other trials analyzed the possibility of adapting the WHO implementation strategy to several clinical and socio-economic contexts.

A quasi-experimental study was conducted in 43 hospitals located in five countries: Costa Rica, Italy, Mali, Pakistan and Saudi Arabia, from December 2006 to December 2008. The introduction of the WHO program led to an increase in compliance from 51% to 67.2%. The correct analysis for possible confounding factors, such as professional category, degree of development of the country and day of the week, confirmed this association (adjusted OR 2.15, 95% CI 1.99-2.32).

The level of knowledge of healthcare personnel was also measured through a questionnaire and an ad hoc score, showing an increase in the average score from 18.7 (95% CI: 17.8-19.7) to 24.7 (95% CI: 23.7-25.6) (3).

In 2013, a prospective cohort controlled study involved 33 surgical wards belonging to 10 hospitals in Europe and Israel. A combined intervention for the promotion of hand hygiene and screening for MRSA, with precautions for contacts, led to a 12% reduction in the incidence of positive cultures (adjusted incidence rate ratio 0.88, 95% CI 0.79-0.98) (10).

In 2013, an Italian study group conducted a systematic review and meta-analysis. It suggested that hand hygiene measures are effective in reducing the rate of infections caused by vancomycin-resistant enterococci (-47%; pooled RR 0.53, 95% CI 0.39-0.73). Instead, precautions for contacts are not associated with any significant reduction (pooled RR 1.08; 95% CI 0.63-1.83) (11).

Objective

Rimani is a project for the promotion of proper hand hygiene aimed at preventing HCAIs, which is promoted by the Health and Social Care Agency of the Italian Region Emilia-Romagna.

The aim of the study is to increase hand hygiene compliance by healthcare workers, through the implementation of the “Guideline on hand hygiene in healthcare” and the application of the multimodal strategy proposed by WHO.

On the basis of the project Rimani, the Istituto Ortopedico Gaetano Pini has implemented a project, which seeks to increase healthcare workers’ compliance with hand hygiene.

Materials and methods

A multidisciplinary working group, composed of the Medical Centre Director, professional nurses, trainee doctors and quality manager, was created to prepare the project plan and documents.
Starting from 5th April 2015, twenty Operating Units (OUs) and a total of 40 healthcare workers were invited to create informative and educational material containing questions on the subject and aid tools, such as posters, flyers, videos and presentations.

On 5th May 2015, during a conference, a committee composed of an expert in HCAIs prevention (the Medical Centre Director) and an expert in communication awarded the three best works.

The material was distributed on a monthly basis in the various departments and used as a reminder to improve hand hygiene compliance by healthcare workers.

Several professional profiles were involved in the implementation of the practice:
- doctors
- nurses
- social and healthcare workers
- therapists
- health technicians
- administrative staff (secretaries, clerks, receptionists, etc.)
- medical manager
- quality manager
- risk manager.

The project involves a bottom-up approach, in which each member of the working group participates in the executive process and the team as a whole establishes a general project plan and selects the methods for implementing it. This ensures the active participatory involvement of workers, through the use of communicative and interactive methods.

In addition to the training and the sensitisation campaign, a monitoring activity was undertaken. The following controls were performed:
- Periodic verifications. The workers of the Medical Centre Management, trained ad hoc, conducted direct observations of handwashing and the use of disinfectants every six months. Specific checklists were drawn up, and any breaches regarding the washing technique were reported, followed by corrective actions and training on site.

Monitoring consumption of different types of detergents and disinfectants,

<table>
<thead>
<tr>
<th>Table 1 - Checklist for active handwashing surveillance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antisepsis of hands</strong></td>
</tr>
<tr>
<td>2. Dry washing with 4 mL alcohol solution, rubbing for 30 sec, repeating washing and drying.</td>
</tr>
<tr>
<td>3. Antiseptic washing for invasive techniques and/or aseptic procedures, septic patient’s contact with antiseptic according to protocol. Drying with disposable serviette. The use of gloves is mandatory in any event</td>
</tr>
<tr>
<td>4. Surgical washing before surgery with an antiseptic according to protocol, making use of the brush for nails; repeating washing and drying with a sterile cloth.</td>
</tr>
<tr>
<td>5. Compliance with proper handwashing procedure (social washing): recording the name of the verified healthcare worker.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Use of disinfectants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Does the packaging indicate the opening and expiration date wherever applicable, as required by TAB 1/DMP?</td>
</tr>
</tbody>
</table>

Note: C = Compliant; NC = Not Compliant; NA = Not Applicable
Promotion of hand hygiene in hospitals compared to the days of hospitalization. It is an objective indicator, albeit of a proxy type, of the impact of the project.

Completion and evaluation, every six months, of the Hand-Hygiene Self-Assessment Framework proposed by WHO (2010).

It is divided into 5 sections, which represent the five key points of the WHO multimodal strategy, and includes 27 indicators, based on evidence and on expert consensus, structured around closed questions ("yes/no", multiple choice).

Section 1: System changes
6 indicators: they investigate the sink/bed ratio; the availability of products for the alcohol rubbing, soap, disposable serviettes, clean running water, the presence of a budget dedicated to the constant procurement.

Section 2: Education and training
5 indicators: they analyze the accessibility of WHO educational resources; the frequency and uniformity of training among healthcare workers; the presence of a dedicated budget and of a verification system for personnel in charge of observation.

Section 3: Assessment and feedback
5 indicators: they examine the regular monitoring of healthcare workers’ knowledge; the evaluation of compliance, both indirect through the consumption of the products, and direct by reporting a percentage of adoption of good practices.

Section 4: Reminders in the workplace
5 indicators: they assess the exhibition, updating, and periodic replacement of posters that illustrate the correct washing technique; the availability of informational leaflets in the departments; the presence of other reminders (screen savers, pins, stickers).

Section 5: Institutional safety climate for hand hygiene
6 indicators: they consider the presence and activity of a defined team for the promotion of hand hygiene, with the identification of “leaders”; the commitment by the management bodies; the active involvement of patients; the presence of initiatives in support of continuous improvement (e-learning tools, annual institutional objectives, newsletters, clinical conferences, personal empowerment, mentoring and tutoring for new recruits).

A score is assigned to each answer and, based on the overall score, 4 levels of hand hygiene are identified: Inadequate, Basic, Intermediate, Advanced.

Table 2 - Comparison between semester I and II of breaches in departments

<table>
<thead>
<tr>
<th>DEPARTMENTS</th>
<th>VERIFICATION</th>
<th>I-Use of disinfectants (1 item)</th>
<th>II SEMESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-Antiseptic of the hands (5 items)</td>
<td></td>
<td>I SEMESTER</td>
<td>II SEMESTER</td>
</tr>
<tr>
<td>1</td>
<td>*D5</td>
<td>Complain</td>
<td>Complain</td>
</tr>
<tr>
<td>2</td>
<td>*D5</td>
<td>Complain</td>
<td>Complain</td>
</tr>
<tr>
<td>3</td>
<td>*D5</td>
<td>Complain</td>
<td>Complain</td>
</tr>
<tr>
<td>4</td>
<td>Complain</td>
<td>Complain</td>
<td>**I</td>
</tr>
<tr>
<td>5</td>
<td>Complain</td>
<td>Complain</td>
<td>**I</td>
</tr>
<tr>
<td>6</td>
<td>Complain</td>
<td>Complain</td>
<td>**I</td>
</tr>
<tr>
<td>7</td>
<td>Complain</td>
<td>Complain</td>
<td>**I</td>
</tr>
<tr>
<td>8</td>
<td>*D5</td>
<td>Complain</td>
<td>Complain</td>
</tr>
<tr>
<td>9</td>
<td>Complain</td>
<td>Complain</td>
<td>**I</td>
</tr>
<tr>
<td>10</td>
<td>Complain</td>
<td>Complain</td>
<td>**I</td>
</tr>
<tr>
<td>11</td>
<td>*D5</td>
<td>Complain</td>
<td>Complain</td>
</tr>
<tr>
<td>12</td>
<td>Complain</td>
<td>Complain</td>
<td>**I</td>
</tr>
<tr>
<td>13</td>
<td>Complain</td>
<td>Complain</td>
<td>**I</td>
</tr>
<tr>
<td>TOTAL NC</td>
<td>4</td>
<td>4</td>
<td>9</td>
</tr>
</tbody>
</table>

*Non-compliance relating to the presence of jewellery and nail polish
**Non-compliance relating to expired disinfectant or failure to indicate the expiration date after the first opening
It is a systematic tool, both diagnostic and supervisory, which identifies the main problems and allows their evolution over time to be monitored.

Results

The six-monthly verification involved 30 Operating Units, 19 hospital wards and 11 clinical services.

A total of 114 items of the check-list were evaluated, 95 in the “Hand antisepsis” sector and 19 in the “Use of disinfectants” sector.

In the first semester, 13 breaches were detected (11.40%); in the second semester, 9 breaches were detected (7.89%).

The decrease only concerns the “Use of disinfectants” sector: 9/19 items (47.3%) in the first semester, 5/19 items (26.3%) in the second. The percentage of breaches relating to handwashing remained unchanged over the two semesters: 4/95 items, 4.2% (Table 2).

Six departments proved to be compliant in all the items examined in the two semesters.

A total of 66 items of the check-list were examined, 55 in the “Hand antisepsis” sector and 11 in the “Use of disinfectants” sector.

In the first semester, 6 instances of non-compliance were detected (9.1%); in the second semester, 5 instances of non-compliance were detected (7.6%).

In this case, too, the decrease only concerned the “Use of disinfectants” sector: 4/11 items (36.3%) in the first semester, 3/11 items (27.2%) in the second. The percentage of breaches relating to handwashing remained constant: 2/55 items, 3.6% (Table 3).

Four clinical services proved to be compliant in all the items considered in the two semesters.

Overall, 180 items were evaluated for each semester.

In the first semester, 19 instances of non-compliance were detected (10.5%); in the second semester, 14 (7.7%).

In the “Use of disinfectants” sector, there was an overall decrease in instances of non-compliance of 16.7% (from 43.3% in the first semester to 26.6% in the second semester).

A comparison was made of instances of non-compliance relating to the technique as recorded in 2014 and 2015, and a statistical analysis was conducted using the Student’s T test for paired data.

The statistical analysis showed a significant decrease of breaches between 2014 and 2015 (P = 0.000).

Discussion and conclusions

The results obtained agree with the main findings of literature, which shows a positive correlation between availability of programs for hand hygiene and increase in compliance (3, 9).

Table 3 - Comparison between semester I and II of breaches in the services

<table>
<thead>
<tr>
<th>SERVICES</th>
<th>D-Antisepsis of the hands (5 items)</th>
<th>I-Use of disinfectants (1 Item)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I SEMESTER</td>
<td>II SEMESTER</td>
<td>I SEMESTER</td>
</tr>
<tr>
<td>1</td>
<td>Compliant</td>
<td>*D5</td>
</tr>
<tr>
<td>2</td>
<td>Compliant</td>
<td>Compliant</td>
</tr>
<tr>
<td>3</td>
<td>*D5</td>
<td>Compliant</td>
</tr>
<tr>
<td>4</td>
<td>Compliant</td>
<td>*D5</td>
</tr>
<tr>
<td>5</td>
<td>D5</td>
<td>Compliant</td>
</tr>
<tr>
<td>6</td>
<td>Compliant</td>
<td>Compliant</td>
</tr>
<tr>
<td>7</td>
<td>Compliant</td>
<td>Compliant</td>
</tr>
</tbody>
</table>

*D5 = Non-compliance relating to the presence of jewellery and nail polish

**I1 = Non-compliance relating to expired disinfectant or failure to indicate the expiration date after the first opening
In their study, Allegranzi et al. suggested that the introduction of the WHO program led to an increase in compliance by healthcare workers after adjustment for main confounders, such as professional category, degree of development of the country and day of the week (3).

In the present study, we highlight an improvement in the trend of washing technique, which emerges from a comparison between the 2014 and the 2015 verifications.

The effectiveness of a multidisciplinary approach is also confirmed, and the actively participatory involvement proposed by WHO is promoted through interactive methods and a bottom-up approach, in which each member of the working group participates in the executive process, and the team as a whole elaborates the project plan and selects the methods for implementing it.

The periodic dissemination of training material in the various departments ensures a high feedback from workers and keeps long-term adoption constant.

In conclusion, the study provides an important motivation to implement new strategies conforming to the WHO model, to increase adoption by healthcare operators of good hand hygiene practices.

Riassunto

Promozione dell’igiene delle mani: l’esperienza dell’azienda ospedaliera di ortopedia Gaetano Pini-CTO


Metodi. È stato costituito un gruppo di lavoro multidisciplinare per predisporre i documenti progettuali. A partire dal 5 Aprile 2015, venti unità operative sono state invitate a realizzare materiale informativo e formativo. Il 5 Maggio, nel corso di un convegno, una giuria ha premiato i tre lavori migliori. Il materiale è stato diffuso con cadenza mensile nei diversi reparti. Accanto alla formazione, gli operatori della Direzione Medica di Presidio formati ad hoc hanno svolto verifiche dirette del lavaggio delle mani compilando apposite checklist. Sono state confrontate le non conformità relative alla tecnica registrate nel 2014 e nel 2015, ed è stata condotta un’analisi statistica utilizzando il test T di Student per dati appaiati.

Risultati. Nel 2014 sono state effettuate in totale tre verifiche. Sono stati monitorati 99 casi e segnalate 5 non conformità legate all’esecuzione dei passaggi della procedura, al tempo di esecuzione ed alla chiusura del rubinetto con le mani a fine lavaggio.

Nel 2015 sono state svolte due verifiche, coinvolgendo 30 unità operative. Sono state svolte 60 osservazioni, e non sono emerse non conformità relative alla tecnica. L’analisi statistica ha dimostrato una riduzione significativa tra le non conformità del 2014 e quelle del 2015 (P=0.000).

Conclusioni. I risultati ottenuti concordano con le principali evidenze della letteratura. Dal confronto tra le verifiche del 2014 e del 2015 emerge un miglioramento del trend nella tecnica di lavaggio. Si conferma l’efficacia di un approccio multidisciplinare e viene valorizzato il coinvolgimento attivo e partecipativo proposto da WHO.

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