



Improved hand hygiene technique and compliance in healthcare workers using gaming technology

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SUMMARY

Background: In 2009, the World Health Organization recommended the use of a 'multi-faceted, multi-modal hand hygiene strategy' (Five Moments for Hand Hygiene) to improve hand hygiene compliance among healthcare workers. As part of this initiative, a training programme was implemented using an automated gaming technology training and audit tool to educate staff on hand hygiene technique in an acute healthcare setting.

Aim: To determine whether using this automated training programme and audit tool as part of a multi-modal strategy would improve hand hygiene compliance and technique in an acute healthcare setting.

Methods: A time-series quasi-experimental design was chosen to measure compliance with the Five Moments for Hand Hygiene and handwashing technique. The study was performed from November 2009 to April 2012. An adenosine triphosphate monitoring system was used to measure handwashing technique, and SureWash (Glanta Ltd, Dublin, Ireland), an automated auditing and training unit, was used to provide assistance with staff training and education.

Findings: Hand hygiene technique and compliance improved significantly over the study period ($P < 0.0001$).

Conclusion: Incorporation of new automated teaching technology into a hand hygiene programme can encourage staff participation in learning, and ultimately improve hand hygiene compliance and technique in the acute healthcare setting.

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Introduction

Although Semmelweis discovered the link between unwashed hands and hospital-acquired infections in the 1800s,¹ the healthcare profession still struggles with hand hygiene compliance in the 21st Century.^{2,3}

In 2009, the World Health Organization (WHO) recommended the use of a 'multi-faceted, multi-modal hand hygiene

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strategy' (Five Moments for Hand Hygiene) to improve hand hygiene compliance among healthcare staff. It provided a strategy to assist with hand hygiene, recommending interventions such as healthcare worker (HCW) training and education, monitoring of alcohol hand rub usage, auditing of hand hygiene practices with feedback, reminders in the work place, and increased availability of handwash sinks and alcohol-based hand rubs at point of care. The importance of cultivating an environment where senior management support a culture of patient safety was also stressed.

This paper describes the use of automated teaching technology (SureWash, Glanta Ltd, Dublin, Ireland) combined with adenosine triphosphate (ATP) as part of a multi-modal

approach to educate all grades of HCWs on hand hygiene technique and compliance.

Literature review

Healthcare-associated infections (HCAIs) remain a concern in Europe and worldwide.⁴ It is also an accepted fact internationally that hand hygiene is linked to prevention of HCAIs,^{1,5–7} and is the most effective intervention to reduce infection rates.^{8–10} However, HCWs' compliance with hand hygiene is still far from perfect.^{2,11}

A Cochrane review of the evidence relating to those interventions found to be most effective was undertaken by Gould *et al.*¹² They found a dearth of evidence regarding the best methods to employ due to the poor design of the majority of published papers. However, others have argued that research demonstrates that practice improves when staff are educated and audited, with feedback provided.^{10,13} It is evident that levels of hand hygiene decrease once interventions cease.^{3,11,12}

Numerous research papers have attempted to explain why people do not wash their hands.^{12,14–17} The unanswered question remains, what can be done to ensure that HCWs are convinced once and for all that 'clean hands save lives'?^{12,16,17}

There is agreement among behavioural researchers that an individual's experience of an effect from not washing their hands is of greater importance than formal education in improving hand hygiene behaviour.^{17,18} This would imply that HCWs need to personally experience an effect from not washing their hands in order to ensure sustained practice change. Nicol *et al.* noted that HCWs themselves agreed that a personal experience or experimental learning was more powerful in changing their practice.¹⁸ However, the Cochrane review by Gould *et al.* found that, in practice, HCWs are trained rather than educated in hand hygiene.¹²

The authors attempted to improve hand hygiene compliance in their acute care private hospital, and identified poor technique as a second issue. Unable to provide the individualized training needed to tackle this, ATP and gaming technology were used to capture the imagination of HCWs with the aim of improving both hand hygiene compliance and technique.

Intervention

A baseline audit of HCWs' compliance with the Five Moments for Hand Hygiene¹⁰ was carried out between November and December 2009.

In January 2011, a multi-faceted approach to hand hygiene^{3,10} was implemented. This involved monthly hand hygiene audits of the Five Moments for Hand Hygiene, the design of new posters, increased supplies of alcohol hand rubs, and the use of ATP to demonstrate visually and numerically the level of contamination on the hands of staff in clinical areas. Commitment from management at the highest level was essential, and thus hand hygiene audit results were provided not just to ward and department managers, but also to the hospital executive team and board.

In early 2010, compliance with the Five Moments for Hand Hygiene improved to 58%, but this had decreased to 29% by the end of 2010. The audits also identified another issue, as ATP used to assess the level of hand contamination identified poor

handwashing technique. Visual observation of HCWs using alcohol hand rubs confirmed a similar problem. The individualized training and assessments needed to improve practice were not feasible within available resources. As such, SureWash, a mobile computer-based unit using gaming technology, was purchased. SureWash, a mobile stand-alone computer system, guides the user through the seven steps of hand hygiene,¹⁰ demonstrating each position and allowing the user to practice. Next, it video audits the user as they move through all the steps, and provides them with an instant percentage score.

In February 2011, an advertising campaign about SureWash was carried out in the hospital through e-mails and general hospital mail. The unit was set up outside the staff canteen, and all those entering the canteen were encouraged to try it. Fob watches were provided as spot prizes. An information leaflet was designed and copies were left in the canteen, at nurses' stations, in staff meeting rooms etc.

The SureWash unit was deployed to each ward and department for periods of one week at a time. Once all departments had been reached, the unit was redeployed to each area. Over a 12-month period, it spent two weeks in each unit. All HCWs were asked to use the unit for hand hygiene training and to practice their handwashing technique. This training was in addition to the annual hand hygiene training provided to all HCWs by the infection prevention control (IPC) team.

Throughout the study period, random audits of HCWs' handwashing technique were undertaken using ATP to ascertain if any improvements in technique had occurred. Monthly hand hygiene audits continued. All patient areas of the hospital were included in the study, and all HCWs working in clinical areas were included. ATP testing was only carried out after handwashing with soap and water. Administration staff working in non-clinical areas such as consultant secretaries and office-based staff were not included.

Methods

Hand hygiene audits

The monthly hand hygiene audits of the Five Moments for Hand Hygiene were performed using an audit tool based on the WHO audit tool. Verbal feedback was provided directly to staff during the audits. Reports detailing results by HCWs' grade and department were provided monthly to each ward manager, hospital executive team and board. The audits were performed by IPC nurses who completed a recognized training course on the use of the audit tool. The course was designed to ensure that auditors nationally were using the tool accurately, and competence was only confirmed following reliability testing. There was no change in the auditing method or in the lead auditor for the duration of the study.

Adenosine triphosphate

In conjunction with these audits, ATP was used in the clinical area during spot audits and also at regular intervals outside the staff canteen. HCWs were selected at random and asked to wash their hands with soap and water. Once the hands were completely dry, the swab was rubbed against the tips of each finger, in between each finger and then in an S-shape along the palm of one hand. The swab was then placed in the monitor and

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