ISSN 1753-044X



Volume 5 Issue 1 April 2011

# INTERNATIONAL JOURNAL OF CLINICAL SKILLS

A Peer Reviewed International Journal for the Advancement of Clinical Skills - 'docendo ac discendo' - 'by teaching and learning'



In this issue:

With proceedings from The 8th International ePortfolio Conference



Clinical Training Associates & Pelvic Examinations WHO 'Five Moments for Hand Hygiene' Holistic approach to resuscitation Cranial nerve examination

# **Executive Board**

# Contents

The Executive Board Members	I
Acknowledgements	I
The Editorial Board	2
Foreword - <b>Professor Harry Owen, Mr Serge Ravet</b>	3

## 8<sup>th</sup> International ePortfolio Conference

ePortfolio Conference Abstracts	4
'Physician, know thyself': a role for self-assessment in ePortfolios? <b>- Alex Haig</b>	8
ePortfolios in general dental practice: validating CPD activity for improved performance - Julia O'Sullivan	14
Effective embedding and integration of ePortfolios in medical and dental curricula	
- Simon Cotterill	18
'Knowing me, knowing you': tutor practices of encouraging student learning through ePortfolio - Christopher Murray	24
Do I dare disturb the universe? An ePortfolio vision fostering independent mindedness in healthcare	29
- Anne-marie nowes	29

## **Original Research**

Evaluating the WHO 'Five Moments for Hand Hygiene' as a new way of teaching hand hygiene to junior medical students - George Hogg	32
Factors motivating 'Clinical Training Associates' (CTAs) to work with medical students to teach pelvic examinations - Annette Burgess	39
'There isn't a right or a wrong way to do it': supporting student reflection in professional practice, a qualitative action research study - Kate Rowe-Jones	42
What factors influence decision making by graduate nurses initiating medication? - Loretta Garvey	50
Reviews	
Cranial nerve examination	

- Rachel Asghar	56
Holistic approach to resuscitation: required skills beyond advanced life support - Noraliza Ariffin	64
Teaching to suture: an innovative training tool - David Walker	68
Correspondence	70

Clinical	Skills	Notice	Board	71

**Dr Humayun Ayub** Editor-in-Chief editor@ijocs.org

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International Journal Of Clinical Skills P O Box 56395 London SEI 2UZ United Kingdom

E-mail: info@ijocs.org Web: www.ijocs.org Tel: +44 (0) 845 0920 114 Fax: +44 (0) 845 0920 115

Published by SkillsClinic Ltd.

## Acknowledgements

We would like to take this opportunity to show appreciation to all those involved with the production of the International Journal of Clinical Skills (IJOCS). Many thanks to all members of the Editorial and Executive Boards.

Congratulations to Mr Ronak Ved of Cardiff Medical School (UK) on successfully winning The IJOCS Award 2010 - presented for creativity and excellence in the field of Clinical Skills.

The International Journal of Clinical Skills looks forward to contributing positively towards the training of all members of the healthcare profession.

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# Foreword

# We want raw ePortfolio data, and we want the data now

Patients trust that healthcare professionals will possess the clinical skills to provide safe and effective treatment. Serious failures of medical care, through the actions of individuals and the inaction of organisations, have shaken that trust and led to a re-examination of the process of registration. In many countries and disciplines, continued registration now depends on the documentation of continuing professional development. Some jurisdictions, such as the UK, have gone further and are planning more comprehensive evaluation of clinical performance for revalidation. In all cases, assessment is based on some form of ePortfolio.

"An e-portfolio is a purposeful aggregation of digital items – ideas, evidence, reflections, feedback etc, which 'presents' a selected audience with evidence of a person's learning and/or ability." Sutherland and Powell (2007)

Presenters in the healthcare ePortfolio track at the 8th International ePortfolio Conference, London (July 2010) described a wide range of ePortfolios being used or being developed for allied health, dental surgeons, surgeons, physicians, nurses, medical education, foundation medical graduates. ePortfolios are used by students to evidence acquisition of clinical skills for initial registration, by new graduates to collect evidence of competence for credentialing and by trained staff for evidence of consistent expert performance. As Stuart Cable from the Royal College of Nursing (UK) explained:

"[the ePortfolio] enables nurses to demonstrate their competence in different areas of nursing practice. They are able to capture 'just-intime' reflections on their practice or a learning experience and then re-present this evidence for different purposes, for example, personal development planning, competence demonstration and educational accreditation of prior learning." (Stuart Cable, Proceedings of the ePortfolio Conference, Maastricht, 2007)

The need for repurposing the same set of collected data across time was confirmed by many of the International ePortfolio Conference presenters: as their careers develop, healthcare professionals will be required to transition across several ePortfolio systems, from those used during initial training, continuing professional development, quality assurance procedures and, at regular intervals, to support reaccreditation processes.

To support evidence of informed and reflective practice, healthcare professionals collect evidence from a variety of sources and data systems, such as patient personal health records, laboratory test analysis, clinical diaries, feedback from peers and patients. Unfortunately, all these different pieces of information are usually stored in independent information silos, making the work of ePortfolio construction and assessment more difficult, notwithstanding that silos make data errors more likely to occur and less likely to be corrected. As most individual ePortfolios also create their own data silos, it reduces the ability to share relevant and critical information across a profession to advance professional practice.

While the initial idea of repurposing ePortfolio data rests on the editing work of an individual compiling a new document, there is an alternative and more radical way of exploiting ePortfolio data: data freedom, i.e. allowing a wide range of online services to exploit raw ePortfolio data.

Imagine a world in which all data created by a healthcare professional when interacting with patients, teachers, colleagues and organisations is securely stored in a Personal Data Store (PDS), creating a 'life log'. Imagine that patients in the healthcare ecosystem have their own personal data stores and can share the contents, under their control, with the people and services they trust. Imagine a world where everyone would be able to choose any health ePortfolio services while being fully interoperable with those used by various institutions with which healthcare professionals interact.

Imagine a world where the performance of students at several medical schools could be confidentially mined to identify best practice for teaching clinical skills. Imagine a service collecting data from the personal data stores of all the staff of a hospital to conduct audit procedures. Imagine another service identifying the need for training and linking it to workshops on particular topics at a conference or a review in a journal. Imagine a service mining anonymous healthcare data collected in personal data stores by a patient's support group. What Amazon® and Google® can do with their global data stores to identify patterns and trends and target advertising, we can do, with personal data stores for the benefit of healthcare, professional education, patient safety and society in general.

Such a world is possible. It was presented by ElfEL at the launch of the Internet of Subjects (www.iosf.org) during the 8th International ePortfolio Conference. The Internet of Subjects supports the programme that Sir Tim Berners-Lee, the inventor of the Internet, called for: *"we want the data raw, and we want the data now!"* To achieve that goal, which is to facilitate reuse, repurposing and exchange of data, we need to achieve the separation of data from the applications and services producing and exploiting it; applications and online services must remain the servants, not the masters, of our personal data.

In the near future institutions will not have to select the ePortfolio platform for their students or professionals; it will be an individual choice. On the other hand, educational institutions, professional communities and public healthcare authorities will have the opportunity to develop a number of innovative services, based on the exploitation of the raw data contained in personal data stores. For example, with an Internet of Subjects, data collected by students and trainees for assessment of progress or by trained staff for revalidation could be used, with permission, for other useful purposes such as quality assurance, needs analysis and career planning.

By providing access to raw data in personal data stores (anonymised and under the full control of individuals) to the services of their choice, healthcare professionals and communities would have the foundations to support the development of lively learning communities, for the benefits of their members, patients and society at large. Data collected whilst compiling an ePortfolio is too rich to be limited to a unique usage. We want raw ePortfolio data, we want it now, to contribute amongst other things, to the improvement of the continuing education of healthcare professionals.



Professor Harry Owen Professor of Simulation and Anaesthesia Flinders University Australia





Mr Serge Ravet loS Innovation Director Former CEO of ElfEL France

# Evaluating the WHO 'Five Moments for Hand Hygiene' as a new way of teaching hand hygiene to junior medical students

### Mr George Hogg MSc BN DANS PGC(THE) RGN FHEA Lecturer in Interprofessional Education University of Dundee

### **Correspondence:**

Mr George Hogg Lecturer in Interprofessional Education University of Dundee Institute for Health Skills and Education Clinical Skills Centre Ninewells Hospital and Medical School Dundee DDI 9SY UK

E-mail: g.x.hogg@dundee.ac.uk Tel: +44 (0) 1382 633937 Fax: +44 (0) 1382 633950

### Keywords:

Hand hygiene Infection control Action research

### Abstract

The teaching of effective compliance with hand hygiene has been foremost in the early education of junior medical students within the Clinical Skills Centre at the University of Dundee (UK) for the last five years. Early introduction of students to the hospital ward setting in Semester I of their course means that the prevention of infection is at the forefront in the minds of the teaching staff. Until September 2007 the focus of teaching was hand washing using soap and water with some reference to alcohol hand rub. The introduction of the World Health Organisation (WHO) 'Five Moments for Hand Hygiene Model' into the National Health Service (NHS) was an ideal opportunity to implement and evaluate this model as a new method of teaching medical students.

This paper describes an Action Research based project undertaken by the author with 165 Year I, Semester I medical students. The results from Objective Structured Clinical Examination (OSCE) and focus groups demonstrate that the 'WHO Five Moments' is an effective base from which to improve hand hygiene compliance in a clinical skills setting.

### Background

Hand washing is the single most important factor in preventing healthcare acquired infections (HCAIs) [1, 2, 3] and was first identified by a Viennese House Surgeon in 1847; Ignaz Semmelweis discovered that the high mortality rates amongst women and newborn babies in the Maternity Ward of a Viennese Hospital were being caused by bacteria on the hands of medical students. Through observation he noted that the medical students were working in the dissection room in the morning and then going into the maternity wards in the afternoon without washing their hands. He then observed midwives and found that the mortality rates were lower assuming that this was due to the fact that they did not work with corpses. He introduced a system of hand washing using chlorinated lime (Bleach) and the mortality rate was cut by half.

Today, over 150 years later, we still have rates of compliance with hand hygiene amongst healthcare staff which rarely exceed 40% [4]. The consequences of poor hand hygiene compliance leads to patients being infected, results in increased hospitalisation, pain and morbidity and most importantly is a breach of the health professional's moral and legal duty of care.

Within the UK Health Services HCAIs occur in 1 in every 12 hospital in-patients [5] and cost the UK National Health Service (NHS) approximately  $\pm 1$  billion a year [6]. The deaths in the Vale of Leven Hospital on the West Coast of Scotland from *Clostridium difficile* is a case that demonstrates the human impact of HCAIs not only for the families and friends of those who died, but also the healthcare staff involved in the care of these patients.

For clinical skills teachers, a major component of teaching is based on the promotion of patient safety and as such the prevention of infection and compliance with hand hygiene is paramount in promoting safe and clean care. The importance placed on the skills of hand washing and infection control has been evident in the interprofessional teaching within the University of Dundee Clinical Skills Centre (UK) for the last four years. Medical and nursing students learn together from teams of medical, nursing and infection control staff the technique of hand washing using liquid soap and water, the correct method for applying gloves and aprons for personal protection and the safe disposal of waste. Students practice hand washing and work through other practical stations which give them a background to the importance of proper infection control in their own safety, that of those they learn and work with and ultimately the patients they will care for.

In late 2008 the World Health Organisation (WHO) produced new guidelines on hand hygiene and the use of alcohol hand gels which was being adopted by the NHS in the United Kingdom. This coincided with a review of Year I medical student teaching at the University of Dundee which provided an ideal opportunity for the investigation into any changes that would be necessary to introduce and teach the new hand hygiene guidelines.

### Theoretical Perspective

Many observational studies have shown that hand washing is the single most important behaviour in the prevention of HCAIs [7 - 11] yet compliance amongst healthcare workers remains suboptimal [12,13]. Some reasons given by healthcare workers for non-compliance are harsh hand washing agents which dry the skin [14], rough paper towels [15] and insufficient sinks [16]. However, in terms of education, one of the main reasons is the healthcare workers perceptions and behaviours concerning hand washing. Infection control teams spend many hours cajoling, observing, and teaching healthcare staff about hand hygiene, but still compliance remains low [17].

In 1997 the NHS Hand Washing Liaison Group was formed with the mission 'to modify the behaviour of healthcare workers to produce sustained improvement in compliance with agreed hand washing standards and so improve the quality of patient care' [18]. The Group gathered information from all of the previous studies and work from all over the world; of particular relevance to this paper they found that doctors were the worst culprits for not complying with hand washing. The issue of poor compliance amongst medical staff in particular has included interventions aimed at changing behaviour such as education, feedback, financial rewards and penalties [18, 19], however, the most appropriate method of ensuring compliance remains to be determined [4, 20]. Some more recent work has looked at the reasons for non-compliance from a behavioural perspective [21, 22, 23] and suggests that this might be the best way to tackle educational approaches to increase hand hygiene compliance.

The WHO Programme was based on work undertaken in the University of Geneva Hospital [4] in which the team observed over 20,000 hand hygiene opportunities and noted an increase in compliance from 48% to 66% over a three year period. The team [4] used a mix of methods to promote hand hygiene compliance including the production and distribution of A3 size posters and the issue of individual bottles of alcohol hand gel to every member of hospital staff. One of the most relevant findings of this study was that compliance amongst medical staff remained an unresolved and 'vexing' issue [4, page 1311].

Many observational studies have been carried out mainly in critical care areas which demonstrate low compliance with hand hygiene,

especially medical staff [24, 25]. Tibballs (1996) [26] asked a sample of medics to estimate their own hand washing compliance before patient contact; their own perceived rate of 73% contrasted sharply with the observational rate of 9%. Pritchard and Raper [27] stated that they were astonished that 'doctors can be so extraordinarily self-delusional about their behaviour'.

The eradication of all healthcare acquired infections is perhaps an unrealistic goal especially when the evidence is that even after being taught the theory of hand hygiene, healthcare workers do not seem to appreciate the risks to patients of non-compliance. It was therefore incumbent on the author to think about and devise a teaching session that would take cognisance of literature review and aim to overcome some of the barriers identified.

### **Methods**

For the purposes of the project an action research approach was used. Action research was defined by McNiff [28, page 15] as '... a name given to a particular way of researching your own learning. It is a practical way of looking at your practice in order to check whether it is as you feel it should be'. Hart and Bond [29] suggest that action researchers reject the view of research as a linear progression in favour of cycles of research, action and evaluation [30].

### Cycle 1: Current Situation Analysis

As the cycles demonstrate one starts at the bottom thinking about 'developing an improved system' by firstly undertaking an analysis of the current situation. The current situation at the start of this research was that hand hygiene was taught to first year medical students at the University of Dundee in Year I, Semester I as interprofessional learning with nursing students at the same stage of training. The sessions started with groups of 40 students in a seminar room watching a video on hand hygiene which demonstrated the spread of infection in a hospital ward and then progressed to show the correct method for hand washing using liquid soap and water. Students were then split into smaller groups of 10 and worked around a circuit of practical stations which were as follows:

- 1. Correct disposal of domestic and clinical waste (10 Students)
- 2. Personal Protective Equipment (PPE)
  - (10 Students)
- 3. Hand decontamination and hand care. (20 Students)

Evaluations from medical students at the end of Semester I were positive about the hand decontamination sessions, but not the disposal of waste and PPE. Students suggested that the importance of the hand decontamination was being lost in the other sessions and that they would have preferred longer to practice actually washing their hands.

In the Summer of 2008 the NHS in Scotland was implementing the World Health Organisation (WHO) 'Five Moments for Hand Hygiene' Programme which was an ideal opportunity to look at the ways in which students were being taught hand hygiene and infection control. The 'Five Moments' (Figure I) was based on research undertaken by the World Health Organisation 'Safer Care is Clean Care' Taskforce and is based on the work of Pittet et al [4] around the use of alcohol based hand gels for hand hygiene. All staff and students are issued with personal alcohol hand rub and this is available at strategic points in the ward and patient areas.

### Figure I: The 'Five Moments' for Hand Hygiene (World Health Organisation)



The 'Five Moments' when healthcare workers should use alcohol gel are given as:

- I. Before patient contact
- 2. Before an aseptic task
- 3. After body fluid exposure risk
- 4. After patient contact
- 5. After contact with patient surroundings

The plan was to introduce the 'Five Moments' for hand hygiene into the Year I, Semester I teaching as the main focus for revised sessions. The original hand washing video would be kept as a trigger for the concept of cross infection and as a visual introduction to the practical procedure of hand washing using liquid soap and water. Students would then spend the other two practical sessions identifying the spread of infection in a ward area and discussing the 'Five Moments' and hand hygiene with alcohol hand rub. The sessions would be supported with visual materials including posters, handouts and individual cards detailing the 'Five Moments'.

### Cycle 2: Improvements Implemented

The revised teaching sessions were introduced in September 2008 and a total of 165 medical students participated in the teaching. Two weeks after the sessions students were asked if they would participate in focus groups and a formative OSCE station was also included in December 2008 which was based on hand hygiene. All students in Year I were asked if they would participate in focus groups via posters displayed in the Clinical Skills Centre.

Ethical approval was sought and received from the University of Dundee Research Ethics Committee for the focus groups and questionnaire. The OSCE station is part of the programme of assessment for students in place within the clinical skills curriculum and so was compulsory. Approval to use the results of the OSCE was given by the Teaching Dean and the Examinations Office of the Medical School.

### Results

### Focus Groups

Two focus groups were organised with six students in each group. Before commencement of focus group sessions students had been reminded to maintain confidentiality and anonymity. They were informed that the sessions would be tape recorded and transcribed and they also completed consent forms giving permission to use their comments in the research.

The following four questions were used to facilitate discussion in the groups:

- 1. What was the main thing that you learned from the hand hygiene sessions?
- 2. What was the main message that you got from the hand hygiene sessions?
- 3. What is your impression of the 'Five Moments' as a concept for promoting hand hygiene compliance?
- 4. What would you change about the hand hygiene sessions for the future?

The students' comments during the focus groups were transcribed and then passed to three educational and three

infection control experts to verify the themes, which were identified as follows:

### Transfer of contamination from hands to other areas

S1: 'I couldn't believe how quickly the gel spread from my hands...it was even on my trousers within 5 minutes'

S3: 'It [gel] was everywhere...like I was shocked to see the places that could be contaminated...like even the white board with patient names was covered'

### Hands are the main cause of contamination in a hospital ward

S4: 'I was amazed that my hands could be so dirty...when we washed off the gel...like half the stuff was still there...it made me realise how important it is to really wash my hands'

S2: 'I was shocked when the lady spoke about taking infections home on our hands...it sort of brings it home when you think like that'

# A way of reminding you to clean your hands; availability of personal alcohol rub dispenser should increase compliance S9: 'I think its good, its easy to understand and even when we haven't been to a ward its making us think about washing before and after

we see a patient' S8: 'It makes sense...like you might not always think about going to a

sink, but if you have the gel with you then you should just use it

### Local context reinforcement

S4: 'It might be a good idea to have a video which shows the real wards...like the nurse with the belt buckle was a bit unreal'

S3: 'The video was a bit corny...but...well yes that means that I'll remember it so I would keep it in but like S4 says it would be good if it was more relevant to the hospital we're in'

### **OSCE** Station

The instructions for the OSCE station were: 'At this station you are required to demonstrate hand hygiene using one of the products available' (products were liquid soap, bar of soap, antiseptic solution and alcohol hand gel).

Of the 165 students who completed the OSCE station, 130 (79%) correctly used alcohol hand gel, 34 (21%) correctly used liquid soap and only I student incorrectly used antiseptic solution. This was the first time students had been given the choice to use alcohol hand gel and it was encouraging to see such large numbers using it correctly after the prior teaching sessions.

### Cycle 3: Review Changes

It is clear from the literature that teaching and encouraging hand hygiene compliance is a complex, multifaceted task. Some interventions have seen short term improvements in hand hygiene compliance [2, 4, 31], but little in terms of long term compliance. This leads one to wonder what can be discovered in the educational theory literature about how to develop the session content so that the long term compliance can be improved.

The method described in this paper, of teaching hand washing using soap and water and then assessing the acquisition of this skill using an OSCE, could be described as didactic [32] and assesses technical competence. The advocates of OSCEs as an assessment tool suggest that they are reliable and objective [33, 34], but the critics counter that this is at the expense of knowledge and understanding [35, 36] and the behaviourists suggest that this form of teaching and assessment only demonstrates short term changes [37].

There is a growing literature around hand hygiene compliance which focuses on behavioural science and behavioural change as the basis for educational programmes [38 - 41]. It was after consulting this literature and reflecting on the teaching sessions, that this research was planned and changes were made to the hand hygiene teaching for Year I students at the University of Dundee. Cole [41] is a particularly relevant paper which suggests that 'despite much time, effort and cost, there is a growing frustration within infection control that training programmes do not appear to have a lasting effect on behaviour or produce consistently good hand hygiene compliers'. Consequently, this research examined the theories of behaviourism, cognitivism and role modelling, mapping where each of these theories related to the revised teaching session and how this might help to improve hand hygiene compliance in junior medical students.

### Behaviourism

The Health Belief Model [17] states that our actions are based on our perceptions of a threat to health and in terms of hand hygiene the transmission of harmful bacteria between staff and patients is a recognised threat. However, Rickard [42] pointed out that bacteria cannot be seen and that hands can look clean even when contaminated with bacteria. This means that people see the threat of cross infection from hands as a 'theoretical' risk rather than an actual risk, e.g. when hands are visibly soiled there is no problem washing them [43]. In order to overcome this issue, this study used what was called 'CSI' (Crime Scene Investigation) whereby a cream, which shows up under ultraviolet light, was put on the hands of an individual who then touched various parts of equipment, the hospital bed, chair etc, around a typical hospital setup. Students then used an ultraviolet light to trace the cream and identify where the contamination was, thus giving students a visual indicator of the contamination.

### Cognitivism

Larson [44] suggests that learning interventions need to be part of a planned programme of behaviour change and must involve a cognitive aspect in order to produce learning and so long term behavioural changes. We can teach our students the technique of hand washing (behaviourism), but if we do not identify and discuss the barriers to compliance (cognitivism) then students will forget to wash their hands when they become busy [41]. In order to overcome this during the study, students were given visual (posters), auditory (discussions) and practical (ultraviolet gel) reminders of the importance of carrying out hand washing.

### Role Modelling

The active involvement of key staff who are working with medical students is vital if students are to maintain good behaviour in terms of hand washing compliance [45]. Pittet et al identified that being observed (hand washing audits) is when most staff will comply with hand washing, but outside of audit periods only those staff who display good role modelling in terms of compliance will encourage students to do the same [24, 44]. In the Clinical Skills Centre all staff carry alcohol hand rub and make it a deliberate act to use it during teaching and when in contact with simulated patients. This role modelling, however, cannot be guaranteed in the clinical setting and is one

of the limitations of the project which needs to be addressed in a continuing cycle of action research.

### Conclusion

As with all research, there were limitations to this project, which included the small number of students involved in the focus groups. This was necessary to comply with the time constraints of the Module being taken by the author and could be overcome by extending the time of the project. The other major limitation was the inability to follow students into clinical practice and observe their hand hygiene compliance in the 'real setting'. This can be overcome by including another cycle of the action research process which allows work with students and role modelling the good behaviour of hand hygiene compliance.

The complex nature of healthcare and the hospital setting make the simple task of hand washing more difficult for medical students. In order to provide effective teaching to ensure hand hygiene compliance we must take account of this, the individual learning needs of students and the culture students are entering. Having used teaching tools based on the theories of behaviourism, cognitivism and role modelling, the results of the focus groups, OSCE and observation of students shows that the changes implemented as a result of this study have had a positive impact on medical students hand hygiene compliance.

### Acknowledgements

The author wishes to thank all of the students who participated in the project and the teaching and support staff at the University of Dundee Clinical Skills Centre who added to the success of the project.

### **Author Information**

**George Hogg** is Lecturer in Interprofessional Education at the University of Dundee Clinical Skills Centre. George is a Registered Nurse and was previously a Senior Clinical Skills Tutor within the Clinical Skills Centre. Prior to this he was a Transfusion Nurse Specialist with the East of Scotland Blood Transfusion Service. This was where his interest in patient safety and education of healthcare staff developed. He is currently researching the development, implementation and evaluation of an undergraduate interprofessional programme of human factors teaching.

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