The development of hand hygiene compliance imperatives in an Emergency department

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Abstract:

Background: Poor hand hygiene compliance monitoring results in a major, busy emergency department prompted a quality improvement initiative to improve hand hygiene compliance.

Purpose: To identify, remove and reduce barriers to hand hygiene compliance in an emergency department

Methods: A barrier identification tool was used to identify key barriers and opportunities associated with hand hygiene compliance. Hand hygiene imperatives were developed and agreed with clinicians and a framework for monitoring and improving hand hygiene compliance was developed.

Results: Barriers to compliance were ambiguity about when to clean hands, pace and urgency of work in some areas of the department leaving little time for hand hygiene and environmental and operational issues. Sore hands were a problem for some staff. Expectations of compliance were agreed with staff and changes were made to remove barriers. A monitoring tool was designed to monitor progress. There was a gradual improvement in all areas except in emergency situations which require further improvement work.

Conclusions: The context of care and barriers to compliance should be reflected in hand hygiene expectations and monitoring. In the emergency department the requirement to deliver urgent live-saving care can supersede conventional hand hygiene expectations.

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Highlights

- There have been many attempts to improve and sustain hand hygiene compliance in Emergency departments
- A quality improvement methodology was used to understand the barriers, opportunities and context of care to improve compliance
- There was ambiguity about hand hygiene expectations and clinicians were disengaged
- Hand hygiene imperatives were developed and agreed with clinicians
- It was concluded that sometimes the requirements of urgent care supersede rigid hand hygiene requirements

Introduction

Hand hygiene is essential to prevent and control healthcare associated infection [1] and in many countries, is audited as part of quality assurance based on World Health Organization (WHO) recommendations.[2, 3]. Cleansing hands is important in emergency departments where treatment that often includes high risk invasive procedures is frequently necessary leaving no time to assess patient susceptibility to infection or likelihood of transmitting it. The consequences of suboptimal infection prevention through lack of hand hygiene in emergency departments are therefore significant [4]. Despite knowledge and positive attitudes to infection control [5] staff in emergency departments demonstrate low hand hygiene compliance compared to ward staff [6,7,8, 9,10]. Although intervention studies can result in high levels of compliance in this setting (90%) [11] such attempts do not usually lead to sustained performance [7,12,13,14,15,16]. Factors reported to influence hand hygiene and infection control compliance more generally in emergency departments include workplace culture, the speed of actions required in emergencies and frequent interruptions[7,17], heavy workload, lack of time [18,19], patients' urgent care requirements being prioritized above hand hygiene[9], the location of patients in non-clinical areas including corridors[11], access to facilities and products[20, 8, 10] and overcrowding [17,21]. Other possible factors which have been reported in health care settings more generally that might be influential are lack of staff education and skills and capacity [19]. Behavioural influences including the impact of role models are also important[22].

Problem identified for quality improvement

We report a quality improvement program to improve hand hygiene compliance in the emergency department of an acute national health service (NHS) hospital in the United Kingdom serving a local population of >250,000 people. The emergency department was purpose built in 2005 and provides a continuous 24-hour service. It comprises areas devoted to triage, ambulatory care, minor and major injuries, paediatric emergencies, resuscitation and a clinical decision unit. Attendance increased from > 112,500 in 2011-2 to > 140,000 in 2013-4. Approximately seventy nursing staff and over thirty: doctors and allied health professionals are employed.

Background

A comprehensive hand hygiene promotion, compliance monitoring and reporting system was introduced throughout the hospital in 2008. It was adapted from an existing, validated tool [23] and incorporated the World Health Organization 'Five Moments of Hand

Hygiene'[24]. Auditing was undertaken by staff who had received special training in hand hygiene compliance monitoring. They were responsible for monitoring a random sample of clinicians for one hour each month in each clinical area. Hand hygiene compliance was reported as a percentage and was used to provide assurance of infection control practice. Operation of the system involved a process of peer review and validation of results in which the same auditors working in pairs intermittently audited practitioners simultaneously.

The hand hygiene monitoring tool identified clinical areas where there was scope for improved compliance, including the emergency department [25]. It demonstrated that overall mean hand hygiene compliance in the organization increased from 78% in 2008 to >94% in 2012. It also showed that the emergency department remained a consistent outlier however (Figure 1). Managers reported that staff had become demoralised by negative feedback and lack of clarity on how improvements could be made given the particular challenges to hand hygiene in this setting. A senior member of the infection control team agreed to work with the emergency department staff and managers to develop a quality improvement program to improve hand hygiene compliance.

Methods

We employed a barrier identification tool[26] which has been used successfully to improve practice outcomes in other settings[27,28,29]. The tool provides a systematic means of identifying, prioritizing and removing barriers to compliance in five stages:

1) Assemble the team
2) Identify the barriers:
    a) Observe the process
    b) Ask about the process
    c) Walk the process
3) Summarize the barriers
4) Prioritize the barriers
5) Develop an action plan

The barrier identification tool was selected because of its ability to observe and document events in the clinical area in 'real time' with opportunities to question staff about the reasons underlying practice, explore possible misconceptions and assumptions and work collaboratively with clinicians to find solutions. 'Walking the process' over a two-week period and impromptu meetings with clinicians identified challenges. Comments made by staff were recorded in writing verbatim and summarised in key themes.

Three one hour ad hoc simultaneous audits in two weeks were undertaken by the infection control practitioner and auditors to assess the validity of the data collected and observe the methods used.

A new framework to monitor and improve hand hygiene compliance tailored to meet the special requirements of the emergency department was co-produced by the infection prevention practitioner, managers and senior clinicians. Using the bespoke framework, hand hygiene facilities and barriers to performance were monitored separately from behavioural compliance (known as 'must do's') and measured as opportunities for hand hygiene compliance. The framework was discussed and agreed with frontline workers before implementation. Education and training in the use of the data collection tool and the results was led by the local education and practice improvement staff.

Results

Identification of barriers

Observe the process

The comparison of simultaneous audits by three different infection control practitioners and auditors in the emergency department revealed a high degree of consistency (Kappa > 0.95) suggesting the scores of the observers were a reliable indication of performance.

Ask about the process

Numerous potential barriers to compliance were identified by frontline staff. More than 10% reported redness or sore hands in common with staff in other clinical areas where high levels of compliance were recorded.

Staff reported that alcohol gel, soap and hand towels were replenished in the morning and afternoon but ran out in the evening and early hours of the morning which were often the busiest periods. At the same times, the waste bins for discarded paper hand towels were frequently in need of emptying, deterring the use of sinks.

Discussion with managers indicated that staff reported that they did not always understand or agree with organizational goals for hand hygiene and monitoring arrangements as they applied to the emergency department. Many staff reported that they had attempted compliance with the WHO Five Moments[30] but were still unclear about when and how hands should be cleansed.

No posters or information about hand hygiene were visible throughout the department although there were hand hygiene posters and signage had been provided and were not on display. Staff drew attention to lack of applicability of the posters to the work of the emergency department as they inevitably depicted patients in bed in traditional ward settings.

Walk the process

It was observed that the majority of patients were in the department for less than four hours and the pace of work was often fast. It was evident that hand hygiene expectations in the triage and minor injury sections were achievable i.e. before and after patient contact in line with WHO recommendations[2]. In some instances, hands cleaned after one patient also counted as before the next patient which is accepted practice[30].

In the major injury and resuscitation areas, high levels of compliance with the WHO five moments of hand hygiene was frequently not feasible because the guidance fails to consider the challenges staff encounter delivering care in this setting (see Box 1). Following discussion with staff and managers it was agreed that this situation was a common occurrence and that occasionally the time required for hand hygiene introduced a delay providing care which could have serious consequences for patient survival and recovery. Sometimes the requirements of life-saving urgent care delivery (for example to maintain an airway) could transcend the need for hand hygiene. In rare situations where time is at a premium, it was agreed that a rational and reasonable response would be to put on clean disposable gloves, thus ensuring at least some level of protection to both patient and staff until there is time to decontaminate hands properly.

Numerous potential barriers to compliance including environmental factors were identified: issues of sore hands, inadequate provision of hand hygiene products, waste disposal and signage. In addition, the layout of the department meant that staff frequently left the patient area to collect supplies and equipment from elsewhere.

Summarize barriers

After the two weeks of observation and meetings with staff, the ICP collated and summarised the key findings and delivered feedback to the management team. Environmental barriers were present including the layout and operational issues. Sore hands deterred hand washing and decontamination, as identified above.

Motivation to prevent infection was biased towards self-protection, which included disposable glove use. Staff perceived that hand hygiene delayed urgent care with no immediate patient benefit and sometimes compromised the safety of critically ill patients.

There was a lack of prompts such as posters which clarified when to clean hands which contributed to the ambiguity about hand hygiene compliance expectations in the department. The work undertaken in the department was not reflected in the hand hygiene compliance tool in use at that time. A monitoring framework which took into account the working conditions of the ED including the potential risks and barriers to hand hygiene, was required to provide scope for improving practice.

Prioritize barriers

Staff were asked by the local education team to prioritize the barriers which were key to improving hand hygiene compliance. The layout and design of the department were not included as structural change plans to improve the department were already at an advanced stage.

Four main issues were identified:

1. Sore and irritated hands
2. Intermittent empty hand hygiene product dispensers and over flowing waste bins
3. Insufficient time to clean hands as often as expected
4. Ambiguity about hand hygiene compliance expectations

Develop action plan

The barriers identified formed the basis of the four-point plan which was subsequently developed and implemented. The aims of the plan were to:

- Improve staff hand skin condition
- Improve hand hygiene product availability and reduce overflowing waste bins
- Reduce ambiguity and feasibility of hand hygiene compliance
- Develop a tool to monitor compliance and quality improvement plan

Results of implementing the quality improvement plan

1. Improve skin condition

Issues relating to sore hands related to poor hand hygiene practices (e.g. not drying hands properly). In most cases they were resolved with education. Those with persistent skin problems were reviewed by the Occupational Health Department. Two members of staff required alternative products or advice.

2. Improve hand hygiene product availability and reduce overflowing waste bins

Changes were made to the timing of hand hygiene product refills and emptying of waste bins by sinks, which improved night time product availability and waste disposal. This was achieved by providing evidence of the issues encountered by staff to managers and negotiating changes with the service provider. The issue was prioritised, championed and pursued by managers.

3. Reduce ambiguity and feasibility of hand hygiene compliance

Most staff worked throughout all areas of the department, but were generally allocated to one or two areas for the shift. The perception of insufficient time to clean hands appropriately was primarily associated with the major injury and resuscitation areas. Senior staff believed it was important that expectations of compliance were consistent and equitable throughout the whole department. Hand hygiene imperatives or 'must do's' rules were therefore developed and proposed by the ICP and then modified and agreed by the ED team. (Box 2) These placed the priority and feasibility of cleaning hands into context and acknowledged that sometimes situations were urgent and hand hygiene was not the first priority.

New hand hygiene posters were specifically designed for the department and subsequently new hand hygiene products and dispensers with integral hand hygiene instructions were introduced throughout the organisation.

4. Development of a tool to monitor compliance and quality improvement plan

A new monitoring tool was developed with the infection prevention team, frontline staff and managers. It was in two parts and based on the agreed imperatives of hand hygiene and the barriers to compliance identified. The 'must do's' were used as the basis for the observational monitoring of individual compliance. The barriers which were predominantly environmental were used to audit how the department optimised hand hygiene compliance.

Figure 1 shows hand hygiene compliance for the period 2008-2012. Table 1 is an example of the monitoring tool used in 2008-12 whereas Table 2 shows the tool used in 2012-14. Direct comparison of outcomes is not meaningful because different audit tools were used (Table 3). Nevertheless, the introduction of the new, bespoke tool suggests that there was a concurrent gradual improvement in all measured compliance criteria in the first year of the new phase, following the clarification and agreement of expectations. Subsequently whilst most of the measured criteria produced a high score, the compliance in an emergency situation declined. This was in part associated with the lack of agreement of the definition of an emergency situation and use of disposable gloves. The identification of this decline was perceived to be an opportunity to improve practice. An additional quality improvement cycle was then undertaken to clarify when an emergency was really an emergency and to reinforce the need to remove gloves and clean hands as soon as possible in an emergency situation.

Discussion

The work of the ED carries intrinsic and significant infection risks[4]. Appropriate hand hygiene, asepsis and the use of infection controls such as isolation and personal protective equipment are essential to protect patients and staff. However, infection prevention must take into account the speed with care has to be delivered and balance of risks.

Until now it has been assumed that the same hand hygiene compliance measurement tools are appropriate in both the ED and inpatient settings. The marked differences observed in patient acuity and the sequence of care that was observed in this quality improvement study refute this assumption, however. Many published HHC studies have been conducted on critical care units[31] where the care process is generally more predictable and readily observed. The complexity and unpredictability of ED work makes the monitoring of HHC difficult, perhaps explaining why so few studies of HHC are undertaken in this setting and why the different requirements of this speciality are not widely recognised.

It is likely that HHC in EDs appears to be low when taken at face value because the context of care has not been considered adequately when designing measurement tools and evaluating the results. The situation is further complicated because different expectations apply in different parts of the same ED. A traditional approach is appropriate in triage and minor areas where the pace of care is relatively predictable but a more flexible, pragmatic approach needs to be taken in resuscitation and major areas where patients are mortally ill.

Uncertainty about when to clean hands was a significant concern amongst staff. Such ambiguity may lead to resistance[32]. Improvements may not be sustained if they are not owned, understood or supported by staff and the organisation[33, 34]. By co-producing a new tool and must do's with the staff responsible for applying them, our quality improvement program makes a significant contribution to the knowledge and practice. The new monitoring tool and its application were agreed and adopted by staff, thus reducing ambiguity and resistance, although the principles still reflect 1-4 Moments in the WHO guidance. Similar modifications have been made elsewhere in response to specific clinical settings[35]. There is still potential to build in the capacity and capability of staff to continue improvements[36] and this work is ongoing in the ED where the data were collected.

In emergency situations, a reasonable deviation from acceptable practice is to put on gloves and not clean hands first if hand hygiene will significantly delay a life-saving intervention. Although there is evidence that disposable gloves may acquire some microorganisms during open storage[37] there is little evidence that hand hygiene prior to donning non-sterile gloves is valuable in reducing glove contamination[38]. If gloves are already contaminated, washing hands prior to donning gloves may have little effect on the part of the glove in contact with the patient. In addition, self-protection is a significant motivating factor in hand hygiene[39,40] and could be used to increase compliance.

This quality improvement initiative was initiated and undertaken rapidly in response to a local request for assistance to improve practice. Although the initiative lacked the rigour of a research study, collaboration with clinicians and managers could be viewed as a strength because of its potential to contribute to sustainability which is often lacking in HHC studies[41].

The concept of 'learning the context' to suggest improvements, is not achievable with a preconceived audit format as this approach limits the potential to learn from practice. Observing practice in order to understand what is happening, is an opportunity to identify potential areas for improvement, although the perspective and ability of the observer creates both bias and limitations of what can be seen and heard.

The quality improvement initiative we report was undertaken in one ED in London, UK. The comments made by the staff may not be representative of all its large workforce or

the opinions of staff and the work in other EDs. In addition, the presence and impact of the change leader (ICP) and management pressure to improve performance may have influenced the outcomes. The findings are nevertheless likely to reflect current ED practices as our department is typical of those found in the UK and the fast pace of work undertaken with acutely ill patients is typical of EDs elsewhere. In addition, some of the issues identified such as sore hands, ambiguity concerning expectations and failure to replenish product dispensers are not unique to EDs. In view of these limitations we suggest that further quality improvement programs should be conducted in other EDs to identify and tackle local issues.

Our purpose was to demonstrate the value of using an approach to measurement aimed at improving quality and reducing risk rather than focusing on achieving a pre-conceived and inappropriate target. The aim is to continuously improve practice utilising the information collected to help identify areas where improvements are required taking them as an opportunity to improve. Our experience was that this approach can identify changes in compliance and provided an opportunity to focus on areas of practice that could lead to tangible and realistic improvements with minimal resource[42]. On the evidence of our study, quality improvement methods which acknowledge the local context and engage stakeholders have the potential to increase and sustain hand hygiene compliance more effectively than traditional intervention studies that report randomized trials. The methodological challenges of designed trials, especially blinding staff in the control arm to group allocation, therefore resulting in an inevitable Hawthorne effect emerged as a key finding in a recent systematic review evaluating HHC studies[44]. As pointed out in one of the earliest and most influential HHC initiatives[1] the Hawthorne effect can be an important factor. Our work has demonstrated the value of reminding health workers about the need to cleanse hands combined with sympathetic understanding of the local challenges presented locally in the clinical environment.

Conclusion

Using a method to identify barriers to compliance and taking local context into account identified several factors including ambiguity and feasibility of compliance. The development of compliance expectations and standards led to a transparent reporting system which was agreed with stakeholders. The evaluation of quality improvement initiatives relates to the success of the intervention in terms of efficacy, effectiveness and efficiency[43]. In this instance the operational constraints and views of staff were successfully used to develop a flexible and dynamic tool which was accepted and utilized to make improvements in compliance. This process could be used in other clinical settings.

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FIGURE 1. HHC from routine surveillance: ED (filled circles) compared with the medical specialties board as a whole (empty squares) and all trust locations (line). The arrow indicates the month when the new reporting system started (July 2012); see text for more details.

FIGURE 1

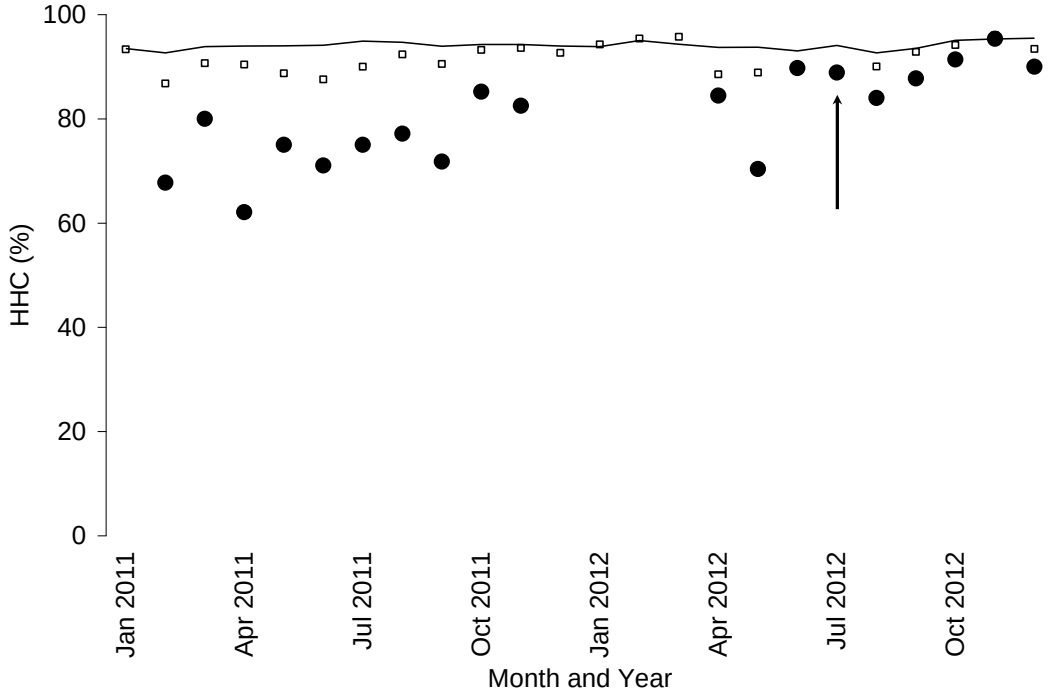

Table 1. Example of the hand hygiene compliance monitoring tool used in the ED in 2008-11 (see text for details). This was the tool used in the ED for June 2010 and shows a total of 17 opportunities and 16 hand hygiene observations resulting in 94% compliance; the only opportunity missed was by a doctor, in the medium risk category.

Profession	Hand hygiene done?	Activity risk		Total frequency
		Medium	High	
Nurses	Missed			
	Cleaned	5	3	8
Doctors	Missed	1		1
	Cleaned	3		3
HCAs	Missed			

	Cleaned	4		4
Therapists	Missed			
	Cleaned	1		1
Others	Missed			
	Cleaned			

Table 2. Example of the hand hygiene compliance monitoring tools used in the ED from 2012 (see text for details).

(a) Facilities compliance score (e.g. February 2012) [CF = Compliant Facilities, TF =Total Facilities].

		Gel	**Soap**	**Paper towels**	**Bins**	**Total**
Total score	**CF**	35	35	35	39	144
	AF	31	34	34	35	134
	Comp.	**89%**	**97%**	**97%**	**90%**	**93%**
Triage	**CF**	3	3	3	3	12
	AF	3	3	3	3	12
	Comp.	**100%**	**100%**	**100%**	**100%**	**100%**
Paeds	**CF**	4	4	4	4	16
	AF	3	4	4	3	14
	Comp.	**75%**	**100%**	**100%**	**75%**	**88%**
Minors	**TF**	14	14	14	15	57
	CF	12	13	13	13	51
	Comp.	**86%**	**93%**	**93%**	**87%**	**89%**
Majors	**TF**	8	8	8	11	35
	CF	8	8	8	11	35
	Comp.	**100%**	**100%**	**100%**	**100%**	**100%**
Resus	**TF**	6	6	6	6	24
	CF	5	6	6	5	22
	Comp.	**83%**	**100%**	**100%**	**83%**	**92%**

(b) Behavioural compliance (or 'Must do's) (e.g. Feb 2012) [CB= Compliant Behaviour, TO =Total Opportunities].

		Shifts & Breaks	**Patient contact**	**Aseptic Task**	**Dirty Task**	**Emergency Situation**	**Total**
Total score	**TO**	2	31	11	7	1	52
	CB	2	28	7	6	1	44
	Comp.	**100%**	**90%**	**64%**	**86%**	**100%**	**85%**
Triage	**TO**	0	5	0	0	0	5
	CB	0	5	0	0	0	5
	Comp.	**-**	**100%**	**-**	**-**	**-**	**100%**
Paeds	**TO**	1	3	0	1	0	5
	CB	1	3	0	1	0	5
	Comp.	**100%**	**100%**	**-**	**100%**	**-**	**100%**
Minors	**TO**	1	7	2	2	0	12
	CB	1	6	1	2	0	510
	Comp.	**100%**	**86%**	**50%**	**100%**	**-**	**83%**
Majors	**TO**	0	10	6	1	0	17
	CB	0	9	4	1	0	14
	Comp.	**-**	**90%**	**67%**	**100%**	**-**	**82%**
Resus	**TO**	0	6	3	3	1	13
	CB	0	5	2	2	1	10
	Comp.	**-**	**83%**	**67%**	**67%**	**100%**	**77%**

Table 3. Outcomes of the hand-hygiene compliance tools shown as percentages (the old tool valid from 2008-11; the new tool valid from 2012-14). Within each cell, sample sizes are shown in brackets.

Outcome	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Nurses Doctors **HCA's** Therapists **Others** Medium risk **High risk**	**72 (102)** 39 (83) **96 (23)** 67 (3) **71 (7)** 62 (196) **55 (22)**	**94 (210)** 86 (63) **100 (16)** - **93 (15)** 92 (269) **100 (304)**	**94 (135)** 88 (64) **100 (59)** 100 (2) **100 (16)** 95 (215) **92 (61)**	**80 (193)** 63 (63) **76 (74)** 60 (5) **-** 73 (276) **88 (60)**			
Facilities							
Gel **Soap** Paper Towels **Bins**					93 (212) **98 (186)** 99 (182) **99 (204)**	99 (98) **96 (98)** 100 (97) **99 (100)**	100 (201) **100 (195)** 100 (197) **96 (226)**
Behavioural compliance							
Shifts & Breaks **Patient contact** Aseptic Task **Dirty' task** Emergency Situation					99 (86) **82 (303)** 90 (101) **98 (116)** 93 (15)	100 (137) **86 (307)** 97 (141) **95 (126)**	99 (91) **89 (363)** 98 (121) **97 (117)** 47

						61 (18)	(19)†
All opportunities (Behaviours)	61 (218)	93 (304)	94 (276)	76 (336)	89 (621)	92 (729)	92 (711)

†Chi-square test for trend of odds: p = 0.013.

BOX1

After a relatively quiet 30 minute in the resuscitation bay in which staff had meticulously and appropriately cleaned hands, three patients with serious conditions, requiring numerous interventions arrived within a few minutes. Staff responded rapidly to the immediate requirements including circulatory and ventilation support. It was observed that staff stopped what they were doing and donned disposable gloves prior to the arrival of the patients. It was only later in the sequence of events that hand hygiene was introduced. Subsequently staff were asked '*why did you put on gloves*?' Their response was '*you don't know what's coming through the door'*. Gloves were worn as protection for staff which was entirely appropriate, as there were copious body substances present and no opportunity to undertake a risk assessment.

Box 2

Hand hygiene imperatives

- Thoroughly clean hands i.e. roll up sleeves and wash hands, at beginning of shift or on entry to the department (this would include following breaks and for visiting clinicians)
- Clean hands on finishing work or shift
- Clean hands before and after touching each patient – this may mean that cleaning hands after one patient may count as the clean before the next patient if they follow in rapid succession.
- Clean hands before a clean or aseptic procedure
- Clean hands after a dirty procedure or event.

- Clean disposable gloves may be used when speed or safety is required and cleaning hands would adversely affect patient outcomes e.g. receiving patients in resuscitation& majors, stopping a haemorrhage etc. though hand hygiene should be undertaken as soon as possible.
- Patient safety in severe emergency situations is always the first priority (Saving a life always 'trumps' hand hygiene)