Hand Hygiene Observation Tool (HHOT)

Feedback Intervention Trial

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1. Introduction

Following a workshop presentation at the NPSA, it became clear that there is a need for a standardised and reliable observation tool for use in hospital wards for audit and feedback. The Hand-hygiene Observation Tool (HHOT) is an ideal candidate for this.

This hand hygiene observation tool and the corresponding standard operating procedures (SOPs) were developed by us in response to this need, as part of a randomised controlled trial of a behavioural intervention to improve hand-hygiene compliance, the Feedback Intervention Trial (FIT), funded by the Patient Safety Research Programme.

Existing hand hygiene observation tools have been extensively criticised in a recent systematic review[1] and we have also found them to be unsuitable. They often had too many observational categories. Their standard operating procedures were not clearly explained, so were open to differences in interpretation. On the rare occasions when inter-rater reliability was assessed, the methods used to do this were not clearly described. In developing our observation tool, we have tried to simplify categories, described the 'rules' for classifying hand-hygiene behaviour more completely, and assessed inter-rater reliability for each observational category (see Appendix 1).

After extensive piloting and evaluation we have come up with the tool described in this document. It is a simplified version of that used in the Geneva Hospitals – with more extensive SOPs able to cover the vast majority of situations encountered on a hospital ward. It has been carefully tested and was found to be extremely reliable. The tool has since been successfully used for almost 400 hours worth of observation in 60 wards as part of the FIT trial[2], and adopted by 25 senior managers at the Royal Free who use it in their regular "walk-abouts" to monitor hand-hygiene compliance.

The next few pages describe the HHOT and its standard operating procedures. A quick overall summary is followed by our detailed rules for classifying hand-hygiene behaviour, which may not be the same as yours. We are not suggesting that our rules are 'right'. Sometimes we have had to take a 'grey' behaviour and classify it as black or white. Our SOPs are, however, based on existing guidelines[3] and are reliable (see appendix). We hope that you find the HHOT useful.

The FIT Study Team.

[1] Gould DJ, Chudleigh JH, Moralejo D, Drey N. Interventions to improve hand hygiene compliance in patient care. Cochrane Database Syst Rev. 2007 Apr 18;(2):CD005186. Review.
[2] McAteer J, Stone S P, Fuller C, Slade R, Michie S. Development of an intervention to increase UK NHS healthcare worker hand-hygiene behaviour using psychological theory. Journal of Hospital Infection 2006; 64 (supplement 1): S53.
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2. Summary of how to use the HHOT

1. Define your **"field of view"** at the start of the observation session. This should include the patient care area to be observed (e.g. three or four beds) and observable points at which HCWs caring for those patients could clean their hands (e.g. nearby sinks with soap, nearby alcohol rub dispensers). Hand hygiene taking place outside of this area, and therefore not seen, is assumed not to have taken place.

2. The HHOT records **hand-hygiene opportunities**, **hand-hygiene behaviours** and the type of **Healthcare Worker.** Use the HHOT sheet (see section 6, page 13).

3. **Hand-hygiene opportunities** during patient care occur
    - i.   before patient contact
    - ii. after patient contact
    - iii. after contact with the patient's environment (i.e. space within curtains or patient's side room)

4. **Hand-hygiene opportunities** are classified as
    - i.   high risk (mucosa, body fluids, manipulating an indwelling device)
    - ii. low risk   (all other patient contact; contact with patient's environment)
    - iii. unobserved level of risk (direct contact behind curtains)

5. **Hand-hygiene behaviours** are classified as
    - i.   alcohol handrub (AHR) (use of AHR)
    - ii. soap and water (use of soap and water)
    - iii. no action (clearly observed to do neither)
    - iv. unknown (No hand-hygiene behaviour seen before/after unobserved opportunity & AHR is behind curtains.)

6. **Health Care Workers** are classified as i. doctors
    - ii. nurses (including healthcare assistants)
    - iii. other/unsure (all others)

7. **"Before"** a hand-hygiene opportunity is defined as:
    The point at which an opportunity begins during a patient contact episode.
    "After" a hand-hygiene opportunity is defined as:
    The period immediately after a break in a contact episode.

8. **A break in a patient contact episode** includes:
    - i.   any contact with another patient (observed or unobserved)
    - ii. moving from a "low risk" contact to a 'high risk' contact in the same patient, & vice versa
    - iii. moving from a "high risk" contact to another "high risk" in the same patient
    - iv. moving out of observers field of view. (i.e. around corner).
    NB: healthcare workers moving from one low risk contact to another on the same patient are not classified as having a break in patient contact between each low risk opportunity

9. **Avoid "double counting":** Hand hygiene opportunities should not be double counted. If a HCW is observed moving directly from one hand hygiene opportunity to another, without any intervening opportunities this should be classified as one 'after" opportunity and not as an "after" <u>and</u> as a "before" opportunity.

10. **Overall compliance (%):** $\dfrac{\text{Number of soap \& AHR behaviours}}{\text{Total hand-hygiene opportunities – number of unknown behaviours}}$ x 100

3. Defining the field of view.

At the beginning of each observation session the observer should define a field of view within which those being observed should carry out hand hygiene. Identify all observable points (sinks,and alcohol handrub dispensers) at which health care workers could clean their hands when caring for patients in the observation area. Observe if any HCW appears to have a personal dispenser, but do not ask individuals directly. **Healthcare workers (HCWs) who do not clean their hands when leaving this area are assumed not to have carried out hand hygiene** (there are two exceptions to this rule, see page 11)

Definition of the field of view
This is an area defined at the start of the observation session. It should include the patient care area to be observed (e.g. three or four or more beds) and **observable** points at which HCWs caring for those patients could clean their hands (ie wall/bed or locker mounted alcohol hand rub and nearby sinks).

4.Classifying Hand Hygiene Opportunities

This section looks at how we have classified hand hygiene opportunities.

By a hand hygiene opportunity, we mean a point at which hands should be cleaned.

Our definition of a hand hygiene opportunity is based on standard guidelines which state that hand hygiene should occur:

1. Before direct patient contact
2. After direct patient contact
3. After contact with a potentially contaminated environment.

You should always have these guidelines in mind when observing hand hygiene.

The next few pages give guidance on:

1. Defining patient and environmental contacts
2. Defining low risk and high risk hand hygiene opportunities
3. How to classify hand hygiene opportunities taking place behind curtains.
4. How to classify hand hygiene opportunities between patient care activities.

Our standard operating procedures are based on current recommendations. Our interpretation of the guidelines may not be exactly the same as yours. For instance, we have defined a potentially contaminated environment as surfaces within the patient curtains. Although we would recommend that you use our definitions you may wish to alter these rules according to local circumstances. The important thing is that you are consistent.

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I. Before and after a low risk opportunity

Definitions

A low risk hand hygiene opportunity occurs:

1. **Before and after a low risk patient contact**:
   Any contact of HCWs hand (gloved or ungloved) with patients skin/clothing providing that skin is intact/covered with an impermeable dressing, there is no contamination with body fluids and there is no manipulation of an invasive device (see examples).

   Examples:
   - Vital signs (blood pressure, temperature, HR, RR)
   - Mobilisation
   - Patient cleansing
   - Other skin contacts and skin preparation
   - Medical examination without invasive procedures
   - Touching patients catheter bag *without* breaking the system

2. **After an environmental contact**
   Any contact of HCWs hand (gloved or ungloved) with patients immediate environment i.e. within patients curtains/sideroom.

   Examples: Patient's bed, cotsides, bedsheets, bedside table, locker, walking frame, patient equipment.

A hand hygiene opportunity does *not* occur:

   - When there is no patient contact (**even if** hand cleaning is observed)
   - Before an environmental contact

"Before" is defined as the point at which the low risk opportunity commences during a patient contact episode.

"After" is defined as the period immediately after a break in a contact episode.

A **break in a contact episode** occurs:
   - when moving to any contact with another patient (observed or unobserved)
   - when moving to an observed 'high risk' contact in the same patient
   - when moving out of observers field of view. i.e. around corner.

II. Before and after a high risk opportunity

Definitions

A high risk opportunity occurs:

Before and after
- Contact with wounds/mucosa
  (uncovered skin breaks, nose, eyes, mouth including dentures)
- Contact with body fluids (on patient or in environment)
  (urine,faeces, blood or serous fluid, sputum, pus)
- Manipulation of invasive device
  (urinary catheter; intravenous catheters; PEG or NG feeding tubes; oral, nasal or tracheostomy respiratory tubes; injections or blood samples im,iv or sc)

An **invasive device** is defined as any foreign body which breaks the skin barrier/enters clean or sterile cavities.

Manipulation of an invasive device is defined as any activity which breaks a closed system. Do not include simple contact with the device which does not break the system.

Examples:
i. Initial insertion of indwelling device i.e. catheter, IV cannulae
ii. Any subsequent breaking of the system i.e.
   1) Taking samples via a port or skin, emptying stoma/catheter bags
   2) Introducing substances into a sterile cavity via a port or skin, (drugs, flushes, feed)
   3) Disconnecting patient from invasive device
iii. Changing dressings at entry site/touching entry site
iv. Removal of invasive device

"Before" is defined as the point at which the high risk opportunity commences during a patient contact episode.

"After" is defined as the period immediately after a break in a contact episode.

A "**break in a contact episode"** occurs:

- when moving to a low risk contact with the patient or their immediate environment
- when moving on to any contact with another patient or their immediate environment
- when moving to a another 'high risk' contact in the same patient.
- when moving out of observers field of view. i.e. around corner.

III. Before and after unobserved opportunities

Definitions

A proportion of patient contacts take place behind curtains out of view of the observers. In these cases it is valid to infer that an opportunity is taking place, but not to infer the level of risk. These contacts should, therefore, be classified as unobserved hand hygiene opportunities.

Examples:

- Nurse goes behind patient's curtains with bed pan.
  Classify as unobserved patient contact

- Phlebotomist goes behind patient curtains and comes out with blood sample.
  Classify as unobserved patient contact.

"Before" is defined as the point at which the "unobserved" opportunity commences during a patient contact episode.

 "**After"** is defined as the period immediately after a break in an unobserved contact episode.

A break in an unobserved contact episode occurs:
- when moving to any contact with another patient or another patient's environment (unobserved or observed)
- when moving on to an observed high risk opportunity in the same patient
- when moving out of the observer's field of view i.e. around the corner

IV. Classifying opportunities between patient contact episodes

Hand hygiene opportunities should not be double counted. If a HCW is observed moving directly from one hand hygiene opportunity to another, this should be classified as one, 'after patient' opportunity and not as an 'after' *and* 'before' opportunity.

Examples:

- HCW checks blood pressure of patient 1 and moves directly to patient 2 without any intervening opportunities.
  This should only be classified as: after low risk patient contact (patient 1).

- HCW checks blood pressure of patient 1 (low risk) and then empties catheter bag of patient 1 (high risk).
  Classify as after low risk patient contact.

There is one exception to this rule:

1) If a HCW leaves the observer's field of view after contact with a patient, and subsequently has another HHO this should be classified as two separate opportunities.

Examples:

- HCW checks blood pressure of patient 1, leaves the observers field of view, returns and has another contact with patient 1.
  This should be classified as: after patient contact (patient 1), and before contact (patient 1).

- HCW checks blood pressure of patient 1, leaves the observers field of view, returns and has contact with patient 2.
  This should be classified as: after patient contact (patient 1), and before contact (patient 2).

5. Classifying Hand Hygiene Behaviours

The next section looks at recording hand hygiene behaviours i.e. whether HCWS have cleaned their hands or not. It classifies hand-hygiene behaviour as

i.   Alcohol hand rub
ii.   Soap and water
iii.   No action
iv.   Unknown

It defines what we mean by hand hygiene and tells you:

- What to do in situations when it is not clear whether hands have been cleaned or not.

- What to do when gloves are worn.

This tool does not record the quality of hand cleaning, only whether it has taken place or not.

I. Classifying Hand Hygiene Behaviours

A hand hygiene behaviour is defined as hand cleansing (or lack of it) within the field of view (see section 3).

1. **Hand cleansing observed**
   Any contact of the **ungloved** hand with soap and water or alcohol hand rub that is connected with a hand hygiene opportunity should be classified as soap or alcohol in and entered as such in the relevant box. If both soap and alcohol hand rub are used only classify the first hand hygiene behaviour.

Examples:

- HCW cleans hands with alcohol hand rub and takes patients blood pressure.
  Classify hand hygiene behaviour as "alcohol".

- After making patient bed, HCW cleans hand with soap, and then cleans hands with alcohol hand rub.
  Classify hand hygiene behaviour as "soap".

  You will sometimes see hand cleansing which is not connected with a hand hygiene opportunity (as defined above). These should not be classified as a hand hygiene opportunity. Hand cleansing with water but no soap. This is classified as "no action"

Examples:

- HCW enters field of view washes hands with soap and leaves field of view.
  Do not classify as a hand hygiene opportunity.

- HCW cleans hands *before* an environmental contact.
  Do not classify as a hand hygiene opportunity.

I. Classifying Hand Hygiene Behaviours (cont)

2. Hand cleansing not observed
If hand hygiene is not seen by the observer it is possible that there has been no hand hygiene **or** that it has not been observed. The main difficulty in classification is when the patient contact takes place behind curtains and there is also alcohol hand rub behind the curtains. This section covers how to classify hand hygiene behaviour in these situations.

2a. Before/after low risk/high risk/unobserved contacts. If bedside alcohol hand rub is visible to the observer and hand hygiene behaviour is not seen in the observers field of view.
Classify hand hygiene behaviour as "no action."

Examples:

- HCW enters observers field of view, touches patient and is not observed cleaning hands. **Classify hand hygiene behaviour as"no action".**

- HCW leaves observers field of view after observed patient contact and does not clean hands. **Classify hand hygiene behaviour as "no action".**

Exceptions are:
i) The patient contact episode extends beyond the observers field of view.
   Classify hand hygiene behaviour as "unknown".

Example:

- HCW leaves bay with dirty laundry bag , full commode etc.

ii) If the HCW moves from patient contact onto an unobserved hand hygiene opportunity in another patient (i.e. behind curtains) where alcohol hand rub is present, classify hand hygiene behaviour as "unknown".

Example:

- HCW takes blood from patient 1 and moves behind curtains to patient 2. The HCW does not clean their hands in observer's field of view. There is alcohol hand rub present & accessible at the end of patient 2's bed which cannot be seen by the observer. Classify hand hygiene behaviour as *"*unknown".

I. Classifying Hand Hygiene Behaviours (cont)

2b. Before/after an unobserved contact. If a hand hygiene behaviour is not seen in the observers field of view *and* **there is alcohol hand rub present & accessible behind the curtains, classify hand hygiene behaviour as "unknown".**

Example:

- HCW comes out from behind bedside curtains after unobserved hand hygiene opportunity. Hand cleaning is not observed, but there is alcohol hand rub at the bedside. **Classify hand hygiene behaviour as "unknown".**

2c. Before/after an *unobserved* **contact. If a hand hygiene behaviour is not seen in the observers field of view** *and* **there is no near patient alcohol hand rub present, classify as "no action".**

Example:

- HCW comes out from behind bedside curtains after an unobserved contact. Hand cleaning is not observed, *and* there is no alcohol hand rub at the bedside. **Classify as "no action"**

Glove Use

Classification of hand hygiene behaviour when gloves are worn is almost exactly the same as when gloves are not worn.

Exceptions are:

- HCW enters the observer's field of view, already wearing gloves and goes behind patient curtains (where bedside alcohol hand rub is available).
  Classify hand hygiene behaviour as "no action".
  If gloves had not been worn the hand hygiene behaviour would be classified as unknown.

- HCW cleans gloved hand with alcohol hand rub or soap and water.
  Classify hand hygiene behaviour as "no action".

6. Using the Observation Tool

In the following section we give a practical example of how the tool is used with the corresponding completed sheet.

As researchers we observe wards for longer time periods than most ward audits. We use one sheet for every 20 minute session. Where the bay or observation area is particularly busy, additional sheets can be used per session.

Practical Example:

1. A doctor who has been reading patient notes near the nurse's station, puts on a pair gloves without cleaning hands and puts together a tray with syringe needles, and blood tubes. He takes the blood from a patient, and puts the tray on a table next the sink.
    Classify as: *Before high risk contact, doctor, no action*

2. He takes off the gloves and washes his hands at the sink.
    Classify as: *After high risk contact, doctor, soap*

3. A nurse uses the alcohol hand rub as she approaches a patient. She takes the patient's obs.
    Classify as: *Before low risk contact, nurse, alcohol*

4. She leaves the bay without cleaning her hands.
    Classify as: *After low risk contact, nurse, no action*

5. A physiotherapist walks onto the ward and uses the alcohol hand rub. She pulls the curtain around a patient bed and spends 10 minutes doing patient exercises.
    Classify as: *Before unobserved contact, other, alcohol*

6. At the end of the session, she pulls back the curtains and moves to the nurse's station to write up her notes without you seeing her wash her hands. There is alcohol hand rub behind the curtain. You can't tell whether she has cleaned her hands or not.
    Classify as: *After unobserved contact, other, unknown*

Name: **Observer**   Session no: **1**   Sheet no..........

	Before low risk contact					After low risk contact					Before high risk contact					After high risk contact					Before unobserved contact					After unobserved contact				
Doctor																														
Opp.											1						2													
Soap																	2													
Alcohol																														
No action											1																			
Unknown																														
Nurse/HCA																														
Opp.	3					4																								
Soap																														
Alcohol	3																													
No action						4																								
Unknown																														
Other/Unsure																														
Opp.																					5					6				
Soap																														
Alcohol																					5									
No action																														
Unknown																										6				

Hospital: **Nosuch**   Ward: **A**   Date: **1.6.07**   Start time: **9.00**   End time: **9.20**

Patients observed: 6   No. of soap dispensers: 1   No. of alcohol dispensers: 7

Calculating hand hygiene compliance:

Hand hygiene compliance is calculated by dividing the number of times that hands were cleaned by the number of times that hands should have been cleaned.

Step 1. Add together the number of times that soap or alcohol was used.
Step 2. Count the total number of hand hygiene opportunities in which hand hygiene has been classified as soap, alcohol or no action
Step 3. Divide the result from step 1 by the result from step 2.
Step 4. Multiply by 100 to give a percentage compliance score.

In our practical example soap was used on one occasion, alcohol twice and hands were not cleaned on two occasions. Compliance score was 60%

$$\frac{1\text{soap} + 2\text{ alcohol hand rub}}{1\text{soap} + 2\text{ alcohol hand rub} + 3\text{ no action}} \times 100 = \frac{3}{5} \times 100 = 60\%$$

7. APPENDIX 1. RELIABILITY TESTING OF THE HHOT

(i) Inter-observer agreement for individual HHOs and HHBs
Based on 95 pilot observations a sample size of 298 hand-hygiene opportunities was required to ensure precision in the estimated kappa statistics.

Two trained observers, working in pairs, watched HCWs, their hand-hygiene opportunities (HHOs) and behaviours (HHBs) occurring within a pre-defined clinical area of four to six beds on one intensive care unit and one acute care of the elderly ward at one inner London NHS hospital during two high frequency patient contact periods 9:00-12:00 and 14:00-16:00 hours. Six two-hour sessions were conducted. The observers sat near each other but were unable to see each other's recording. Each hand-hygiene event was recorded on a separate observation sheet. Upon completion of each event, as signalled by a hand-hygiene behaviour, observers conferred as to whether or not they observed the same observable instance. If they did, observer classifications were paired with one observer stapling the two observation sheets as one pair. If one observer observed an instance and the other did not, the classified hand-hygiene opportunity and behaviour was paired and stapled with a *blank* observation sheet. A total of 298 observations were collected.

For all HHOs (n= 298), raw agreement (%) and kappa co-efficients were 77% and 0.68 for HHB; 83% and 0.77 for HHOs; 90% and .77 for HCWs. Kappa analyses therefore indicate substantial agreement for all categories on the Landis and Koch scale (ref 1) (<0 = less than chance agreement, .01-.20 = slight agreement, .21-.40 = fair agreement, .41-.60 = moderate agreement, .61-.80 = substantial agreement, .81-.99 = almost perfect agreement). Most disagreements concerned hand-hygiene events in which HHB was assessed either as 'no action' or 'unknown'. When "unknowns" were excluded, i.e. for those events where HHB was either clearly seen or not seen, raw agreement and kappa co-efficients for HHB were 93% and .88 for HHB.

(ii) Inter-observer reliability for overall compliance of a group of HCWs
Four trained observers carried out 19 hours of observation (1191 HHOs) between them working in pairs observing HCWs, their HHOs and HHBs on two ACE wards and an ITU at a London teaching hospital during two high frequency patient contact periods as described as above. Each pair of observers agreed the area of the ward to be observed, and made independent assessment of HCWs, HHOs and HHBs for an hour at a time, without reference to each other, recording multiple events on one sheet. Observers sat near each other to ensure a similar vantage point. Each observers' assessment of overall compliance of HCWs observed over the hour was recorded. The mean absolute difference in compliance as assessed by individual observers was 12% (range 1% -40%). Overall agreement was very good (r= 0.893; p<0.000). (See Figure 1). There was an inverse relationship (r=-0.502 p=0.028) between the number of HHBs observed (i.e. with "unknowns" excluded) and the size of the differences in observed compliance with differences of 10% or more most likely to be seen if there were less than 15 HHBs observed per hour.

(1) Landis J R, Koch G G (1977) The measurement of observer agreement for categorical data, *Biometrics, 33,* 159-174.

Figure 1: Inter-observer reliability for overall compliance
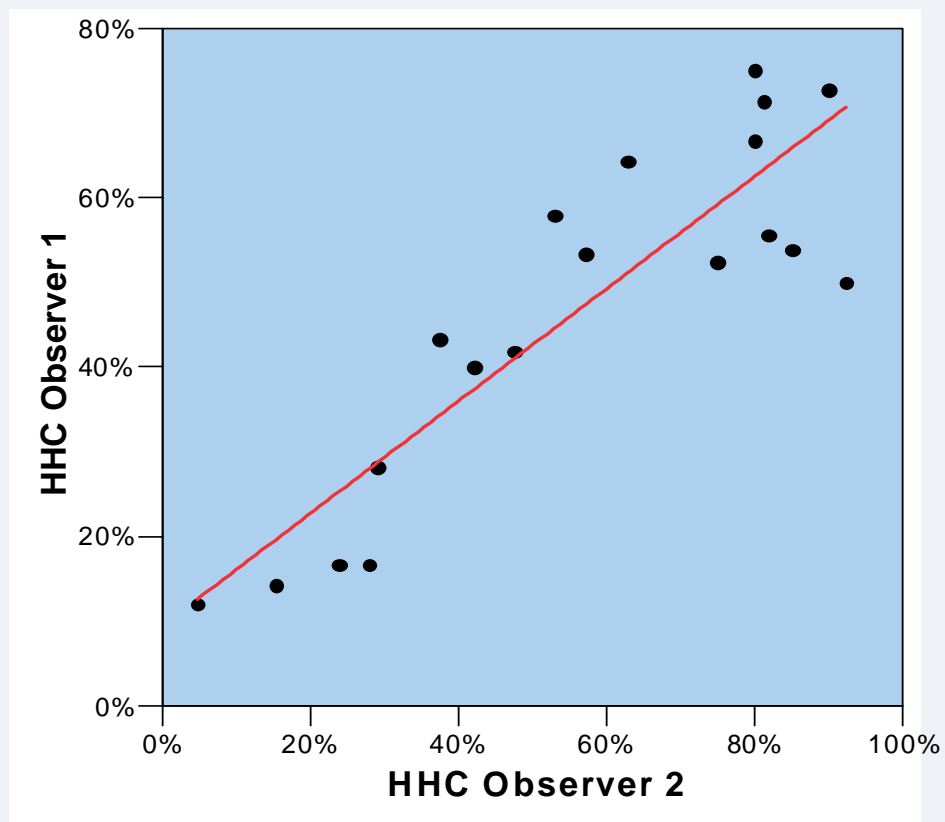
8. APPENDIX 2. SENSITIVITY TO CHANGE

A trained observer observed hand-hygiene compliance on an ITU at a London teaching Hospital for one hour during the morning each month for nine months (October-June inclusive) as part of a pilot study to develop an intervention to improve hand-hygiene. During February a prolonged outbreak of Acinetobacter began. This resulted in a major emphasis on infection control with measures such demarcation of the clinical area around each bed by red tape on the ground, within which area all staff and visitors all had to wear gown and gloves. Hand-hygiene was emphasised by the infection control team and senior staff in all disciplines and the hand-hygiene intervention began. From March onwards a rise in hand-hygiene compliance was observed.

A generalised estimating equation model, which assumed an autoregressive correlation structure was used to assess both the temporal trend in the proportion compliant and the shift in the proportion compliant after the onset of the Acinetobactor outbreak. There was no evidence that the temporal trend differed in the pre and post outbreak periods ($p=0.8$). Therefore, a main effects model was fitted, in which the estimated odds of compliance increased seven fold (7.00, 95% CI 4.02 to 12.20; $p<0.0001$).