Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

hpsc

Report on Hand Hygiene Compliance in Acute Hospitals

Period 5, May/June 2013

Summary

- **This report should be reviewed by hospital management teams in conjunction with alcohol based hand rub surveillance reports, mandatory hand hygiene training reports & other HCAI indicators such as *C. difficile* infection & device-related infection surveillance.**
- **The fifth national hand hygiene audit took place in 50 acute hospitals (43 public and 7 private) during May/June 2013.**
- **The overall compliance for Period 5 was 85% (Table 1) which represents a small increase from Period 4 (84.3%) though is less than the target of 90% for 2013. Tables 2-6 summarise compliance by hospital & HSE region.**
- **The compliance of medical staff continued to improve, from 70.7% in Period 4 to 73.4% in Period 5. However, compliance for auxiliary[1] healthcare staff decreased significantly from 84.1% to 81.1% (Figure 2 and Table 7). Further improvements in compliance with hand hygiene are essential, particularly among medical staff.**
- **Compliance with moment 2 (before clean and aseptic technique) decreased in Period 5 (84.9%) compared with Period 4 (86.1%), however the decrease was not significant (Table 8 and Figure 3). Hand hygiene is an essential part of prevention of healthcare infection associated with procedures that require clean/aseptic technique such as insertion of IV lines and urinary catheters.**
- **The HSE has set a target of achieving > 90% compliance with hand hygiene by end of 2013. The World Health Organisation (WHO) recommends a multimodal approach to improving hand hygiene compliance. This consists of the following 5 areas**
  1. **System change: Hospitals should promote the advantages of alcohol handrub[i] compared to soap and water. This should include facilitating ready access to alcohol hand rub at the point of care.**
  2. **Training and education: Hand hygiene education is mandatory for all healthcare staff that interact with patients at induction and *at least* every 2 years. Agency and temporary staff need to be included in this programme, unless there is documentary evidence that they have received equivalent training prior to commencing work. Hospital should have a system of monitoring the proportion of staff that have received hand hygiene training on a regular basis.**
  3. **Evaluation/Audit & Feedback: All acute hospitals should have trained and validated hand hygiene auditors. Regular hand hygiene audits with feedback of results as per the national standard operating procedure (SOP) are an essential component of improving hand hygiene compliance. Hospitals should ensure that they have a local ward/unit based hand hygiene audit programme in addition to participation in the biannual national hand hygiene audit programme.**

[1] Healthcare assistants, porters, catering and household services

[i] Includes alcohol hand gel or foam

4. **Reminders in the work place: this includes posters, screensavers etc. See www.hse.ie/go/handhygiene for hand hygiene videos & posters.**
5. **Institutional safety climate: Visible support from senior management and a culture of hand hygiene excellence. Hospital managers of facilities where compliance is less than 80% need to foster the correct conditions to allow for the required improvements in compliance to be made.**

1. Introduction & Methodology

Measuring hand hygiene compliance by direct observation is described by the World Health Organisation (WHO) as the gold standard.[1] The national hand hygiene SOP was published in 2011 by the national hand hygiene steering group. [2] This SOP outlines the WHO methodology which was adopted for undertaking hand hygiene observational audits. Acute hospitals submitting data for this report are required to measure healthcare worker compliance against 30 hand hygiene opportunities for each of the seven randomly selected wards in their facility resulting in 210 opportunities per hospital. National workshops for training lead auditors are held biannually. Each auditor's inter-rater reliability is assessed using the Kappa statistic.[3;4]

The results from the fifth national hand hygiene compliance audit in 43 HSE and seven private hospitals are presented in this report. Comparisons are drawn with data from Periods 1 to 4 (where applicable). For facilities that submitted more than the required 210 opportunities, the first 30 opportunities per ward were used for the analysis. Facilities that submitted less than 180 opportunities were not included in the analysis. Binomial exact 95% confidence intervals are presented.

While standardised hand hygiene auditor training and validation (with inter-rater reliability testing) should ensure that measurement of hand hygiene should be comparable, the results presented in this report have not been validated by external auditors. It is therefore possible that hand hygiene auditing may not have been performed in a comparable fashion in all hospitals. The limitations of auditing hand hygiene compliance by direct observation are outlined in Appendix 1.

2. Results

2.1 Overall Hand Hygiene Compliance in Acute Hospitals, Period 5 – May/June 2013

Results from 43 HSE hospitals were analysed in Period 5, an increase from 36 hospitals in Period 1. In total, 9,010 opportunities for hand hygiene were observed; achieving an overall compliance of 85% (Table 1 and Figure 1). This represents an improvement from previous audits though is below the HSE target of 90% for 2013. The compliance in different HSE facilities ranged from 63.8% to 94.3% (Tables 1-5 and Figure 1). Compliance data from seven private hospitals were submitted for publication in the national report in Period 5 (Table 6).

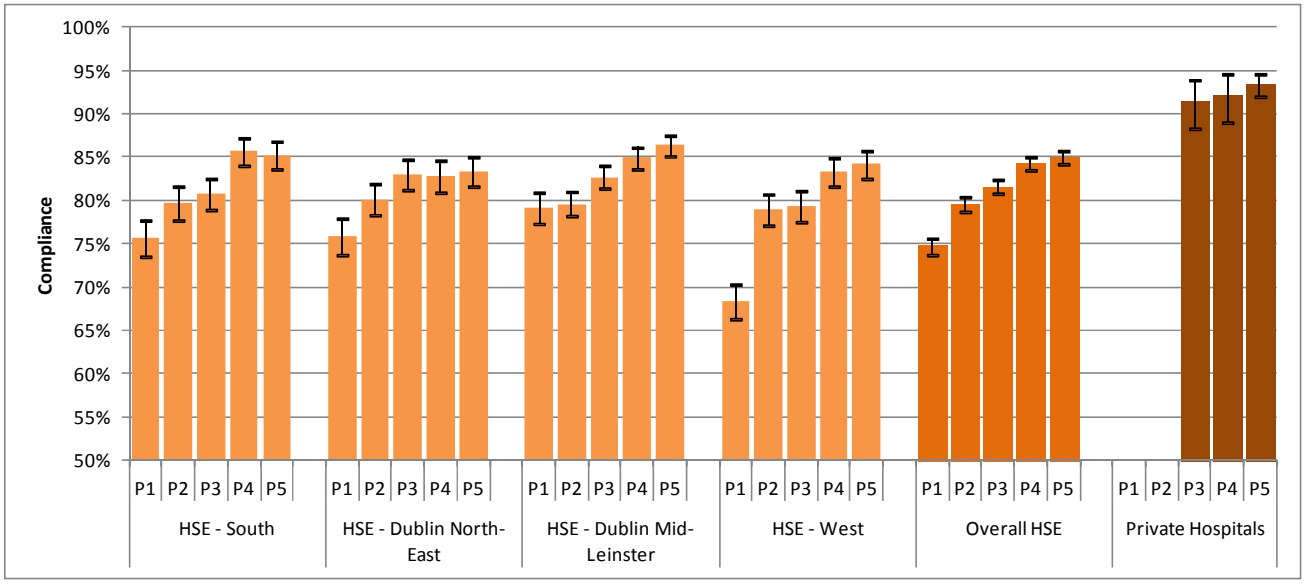

Figure 1: Hand hygiene compliance by HSE regions, for Periods 1 (June 2011), 2 (October 2011), 3 (June/July 2012), 4 (October 2012) and 5 (May/June 2013) including 95% confidence intervals

Table 1: Hand hygiene compliance by HSE regions and overall compliance for Periods 1 (June 2011), 2 (October 2011), 3 (June/July 2012), 4 (October 2012) and 5 (May/June 2013)

	Period 5					Period 4	Period 3	Period 2	Period 1
	Hand Hygiene Opportunities	Hand Hygiene Actions	Percent Compliance	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Percent Compliance	Percent Compliance	Percent Compliance	Percent Compliance
HSE - South	1,890	1,611	85.2%	83.6%	86.8%	85.7%	80.7%	79.7%	75.7%
HSE - Dublin North-East	1,878	1,565	83.3%	81.6%	85.0%	82.8%	83.0%	80.1%	75.8%
HSE - Dublin Mid-Leinster	3,146	2,717	86.4%	85.1%	87.5%	84.9%	82.7%	79.6%	79.1%
HSE - West	2,096	1,764	84.2%	82.5%	85.7%	83.3%	79.3%	78.9%	68.3%
Overall HSE	**9,010**	**7,657**	**85.0%**	**84.2%**	**85.7%**	**84.3%**	**81.6%**	**79.6%**	**74.7%**
Private Hospitals	1,447	1,351	93.4%	92.0%	94.6%	92.1%	91.4%	*	*

* No Data Available

Table 2: Hand hygiene compliance by individual acute hospitals in HSE – South for Periods 1 (June 2011), 2 (October 2011), 3 (June/July 2012), 4 (October 2012) and 5 (May/June 2013)

	Period 5					Period 4	Period 3	Period 2	Period 1
	Hand Hygiene Opportunities	Hand Hygiene Actions	Percent Compliance	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Percent Compliance	Percent Compliance	Percent Compliance	Percent Compliance
Bantry General Hospital	210	176	83.8%	78.1%	88.5%	83.3%	82.4%	77.0%	69.0%
Cork University Hospital	*	*	*	*	*	*	*	*	*
Kerry General Hospital, Tralee	210	170	81.0%	75.0%	86.0%	81.0%	81.9%	80.5%	82.4%
Mallow General Hospital	210	190	90.5%	85.7%	94.1%	87.1%	85.7%	81.4%	77.1%
Mercy University Hospital, Cork	210	192	91.4%	86.8%	94.8%	91.4%	90.0%	85.7%	76.2%
South Infirmary - Victoria University Hospital, Cork	210	179	85.2%	79.7%	89.7%	88.6%	80.5%	71.4%	*
South Tipperary General Hospital, Clonmel	210	186	88.6%	83.5%	92.5%	84.3%	86.7%	72.9%	71.9%
St Luke's General Hospital, Kilkenny[1]	210	184	87.6%	82.4%	91.8%	88.1%	71.4%	85.7%	82.4%
Waterford Regional Hospital	210	183	87.1%	81.8%	91.4%	91.4%	77.6%	82.9%	86.1%
Wexford General Hospital	210	151	71.9%	65.3%	77.9%	75.6%	70.3%	*	59.2%

1 - Incorporating Kilcreene Orthopaedic Hospital; * No Data Available

Table 3: Hand hygiene compliance by individual acute hospitals in HSE – Dublin North-East for Periods 1 (June 2011), 2 (October 2011), 3 (June/July 2012), 4 (October 2012) and 5 (May/June 2013)

	Period 5					Period 4	Period 3	Period 2	Period 1
	Hand Hygiene Opportunities	Hand Hygiene Actions	Percent Compliance	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Percent Compliance	Percent Compliance	Percent Compliance	Percent Compliance
Beaumont Hospital	210	173	82.4%	76.5%	87.3%	86.2%	75.7%	79.3%	*
Cappagh National Orthopaedic Hospital, Dublin	210	181	86.2%	80.8%	90.6%	87.6%	91.0%	71.4%	75.6%
Cavan General Hospital	210	134	63.8%	56.9%	70.3%	*	74.3%	80.0%	69.5%
Connolly Hospital, Blanchardstown	210	191	91.0%	86.2%	94.5%	80.5%	89.5%	85.7%	85.7%
Louth County Hospital, Dundalk	209	187	89.5%	84.5%	93.3%	91.9%	90.0%	85.7%	91.9%
Mater Misericordiae University Hospital	210	171	81.4%	75.5%	86.4%	79.0%	78.1%	73.3%	55.7%
Our Lady of Lourdes Hospital, Drogheda	210	170	81.0%	75.0%	86.0%	68.6%	83.3%	79.5%	71.4%
Our Lady's Hospital, Navan	200	175	87.5%	82.1%	91.7%	82.7%	81.8%	79.5%	78.1%
Rotunda Hospital	209	183	87.6%	82.3%	91.7%	86.1%	83.3%	86.7%	78.6%

* No Data Available

Table 4: Hand hygiene compliance by individual acute hospitals in HSE – Dublin Mid-Leinster for Periods 1 (June 2011), 2 (October 2011), 3 (June/July 2012), 4 (October 2012) and 5 (May/June 2013)

	Period 5					Period 4	Period 3	Period 2	Period 1
	Hand Hygiene Opportunities	Hand Hygiene Actions	Percent Compliance	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Percent Compliance	Percent Compliance	Percent Compliance	Percent Compliance
Children's University Hospital, Temple Street	210	163	77.6%	71.4%	83.1%	73.3%	75.7%	83.3%	*
Coombe Women's Hospital	206	185	89.8%	84.8%	93.6%	84.3%	80.9%	82.4%	83.3%
Midland Regional Hospital Mullingar	210	161	76.7%	70.4%	82.2%	87.6%	75.2%	75.7%	74.3%
Midland Regional Hospital Portlaoise	210	183	87.1%	81.8%	91.4%	81.4%	79.0%	70.5%	72.9%
Midland Regional Hospital Tullamore	210	151	71.9%	65.3%	77.9%	81.9%	80.0%	67.1%	75.7%
Naas General Hospital	210	194	92.4%	87.9%	95.6%	90.5%	85.2%	78.1%	*
National Maternity Hospital, Holles Street	210	198	94.3%	90.2%	97.0%	85.7%	89.5%	72.4%	*
Our Lady's Hospital for Sick Children, Crumlin[1]	210	196	93.3%	89.1%	96.3%	92.8%	88.6%	86.7%	*
Royal Victoria Eye & Ear Hospital, Dublin[2]	210	191	91.0%	86.2%	94.5%	86.1%	86.2%	78.1%	76.2%
St Columcille's Hospital, Loughlinstown	210	181	86.2%	80.8%	90.6%	85.2%	82.9%	73.8%	74.8%
St James's Hospital	210	175	83.3%	77.6%	88.1%	84.3%	90.9%	87.6%	85.7%
St Luke's Hospital, Dublin	210	193	91.9%	87.4%	95.2%	84.8%	85.7%	86.7%	79.5%
St Michael's Hospital, Dun Laoghaire	210	187	89.0%	84.0%	92.9%	85.1%	85.9%	81.4%	83.3%
St Vincent's University Hospital	210	191	91.0%	86.2%	94.5%	87.1%	82.9%	89.5%	85.7%
Tallaght Hospital	210	168	80.0%	73.9%	85.2%	82.9%	72.4%	81.0%	*

* No Data Available

Table 5: Hand hygiene compliance by individual acute hospitals in HSE – West for Periods 1 (June 2011), 2 (October 2011), 3 (June/July 2012), 4 (October 2012) and 5 (May/June 2013)

	Period 5					Period 4	Period 3	Period 2	Period 1
	Hand Hygiene Opportunities	Hand Hygiene Actions	Percent Compliance	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Percent Compliance	Percent Compliance	Percent Compliance	Percent Compliance
Galway University Hospitals[1]	210	188	89.5%	84.6%	93.3%	86.7%	83.3%	76.7%	54.8%
Letterkenny General Hospital	210	194	92.4%	87.9%	95.6%	79.0%	76.6%	77.6%	65.2%
Mayo General Hospital, Castlebar	210	176	83.8%	78.1%	88.5%	82.2%	76.2%	69.4%	61.9%
Mid-Western Regional Hospital, Ennis	210	184	87.6%	82.4%	91.8%	93.8%	89.9%	88.5%	72.7%
Mid-Western Regional Hospital, Nenagh	210	172	81.9%	76.0%	86.9%	85.2%	86.7%	79.0%	79.0%
Mid-Western Regional Hospitals[2]	210	176	83.8%	78.1%	88.5%	82.4%	77.6%	83.8%	78.1%
Portiuncula Hospital, Ballinasloe	210	160	76.2%	69.8%	81.8%	78.6%	73.3%	70.5%	56.7%
Roscommon County Hospital	206	172	83.5%	77.7%	88.3%	85.0%	73.3%	72.2%	63.6%
Sligo General Hospital	210	178	84.8%	79.2%	89.3%	76.2%	75.5%	89.0%	79.5%
St John's Hospital, Limerick	210	164	78.1%	71.9%	83.5%	84.3%	82.4%	81.4%	71.2%

1 -Incorporating Merlin Park Regional Hospital, Galway; 2 -Incorporating Limerick Regional, Maternity and Croom Orthopaedic Hospitals; compliance in Period 1 applies to Limerick Regional Hospital only. No data from Limerick Maternity or Croom Orthopaedic Hospitals in Period 1

Table 6: Hand hygiene compliance by individual acute private hospitals for Period 3 (June/July 2012), 4 (October 2012) and 5 (May/June 2013)

	Period 5					Period 4	Period 3	Period 2	Period 1
	Hand Hygiene Opportunities	Hand Hygiene Actions	Percent Compliance	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Percent Compliance	Percent Compliance	Percent Compliance	Percent Compliance
Blackrock Clinic	187	178	95.2%	91.1%	97.8%	89.6%	88.1%	*	*
Bon Secours Hospital, Cork	210	190	90.5%	85.7%	94.1%	*	*	*	*
Bon Secours Hospital, Galway	210	189	90.0%	85.1%	93.7%	*	*	*	*
Bon Secours Hospital, Glasnevin	210	196	93.3%	89.1%	96.3%	*	*	*	*
Bon Secours Hospital, Tralee	210	199	94.8%	90.8%	97.4%	*	*	*	*
Galway Clinic, Doughiska	210	201	95.7%	92.0%	98.0%	*	*	*	*
Mater Private Hospital	210	198	94.3%	90.2%	97.0%	94.3%	94.8%	*	*

* No Data Available

2.2 Hand Hygiene Compliance by Healthcare Worker Category in HSE Facilities

The compliance for the different categories of healthcare workers in Period 5 was: nurses/midwifes 89.7%, doctors 73.4 %, auxiliary staff [ii] 81.1% and 'other'[iii] healthcare staff 85.2% (Figure 2 and Table 7). When compared with Period 4, a significant increase in compliance was reported for medical staff, but compliance significantly decreased for auxiliary staff.

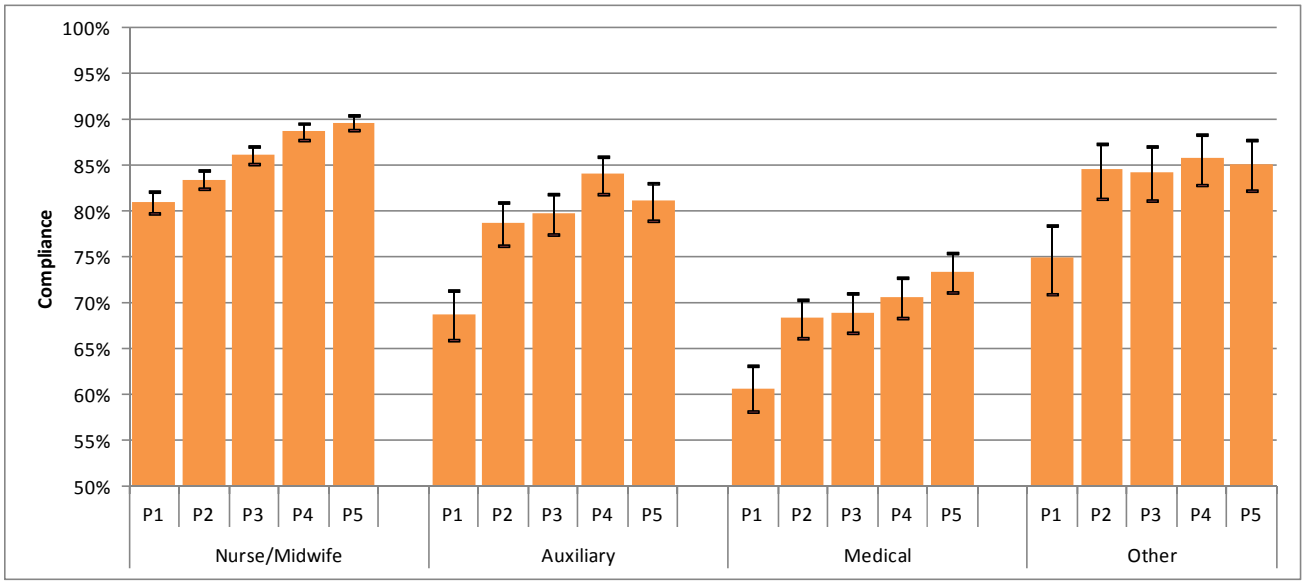

Figure 2: Hand hygiene compliance by healthcare worker category for Periods 1 (June 2011), 2 (October 2011), 3 (June/July 2012), 4 (October 2012) and 5 (May/June 2013) including 95% confidence intervals

Table 7: Hand hygiene compliance by healthcare worker category for Periods 1 (June 2011), 2 (October 2011), 3 (June/July 2012), 4 (October 2012) and 5 (May/June 2013)

	Period 5					Period 4	Period 3	Period 2	Period 1
	Hand Hygiene Opportunities	Hand Hygiene Actions	Percent Compliance	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Percent Compliance	Percent Compliance	Percent Compliance	Percent Compliance
Nurse/Midwife	5,231	4,693	89.7%	88.9%	90.5%	88.7%	86.2%	83.5%	81.0%
Auxiliary	1,432	1,162	81.1%	79.0%	83.1%	84.1%	79.8%	78.7%	68.7%
Medical	1,673	1,228	73.4%	71.2%	75.5%	70.7%	69.0%	68.4%	60.7%
Other	674	574	85.2%	82.3%	87.8%	85.8%	84.3%	84.6%	74.9%

[ii] Healthcare assistants, porters, catering and household services

[iii] Physiotherapists, radiologists, dieticians, social workers and pharmacists

2.3 Compliance with the Five Moments of Hand Hygiene in HSE Facilities

Hand hygiene compliance with the 'Five Moments for Hand Hygiene' is outlined in Table 8 and Figure 3. When compared with Period 4, there was a decrease in compliance with moment 2 (before clean and aseptic technique), however this decrease is not significant. Increased compliance was reported for the other 4 moments (before touching a patient, after body fluid exposure risk, after touching a patient and after touching patient surroundings).

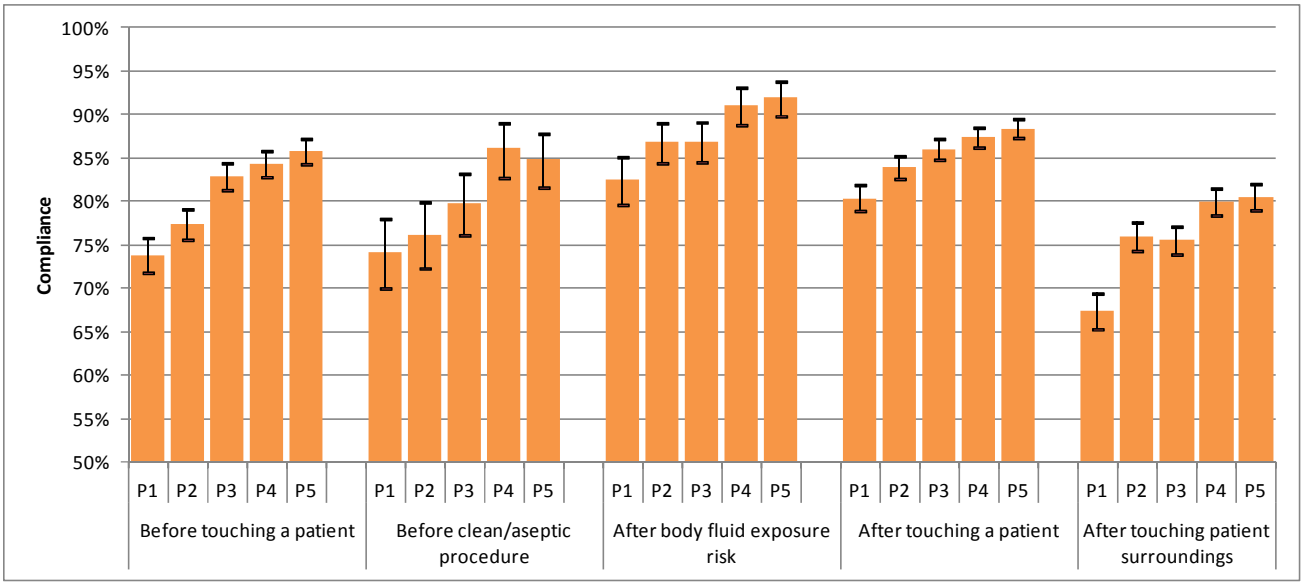

Figure 3: Hand hygiene compliance by the WHO 5 moments for Periods 1 (June 2011), 2 (October 2011), 3 (June/July 2012), 4 (October 2012) and 5 (May/June 2013) including 95% confidence intervals

Table 8: Hand hygiene compliance by the WHO 5 moments for Periods 1 (June 2011), 2 (October 2011), 3 (June/July 2012), 4 (October 2012) and 5 (May/June 2013)

	Period 5					Period 4	Period 3	Period 2	Period 1
	Hand Hygiene Opportunities	Hand Hygiene Actions	Percent Compliance	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Percent Compliance	Percent Compliance	Percent Compliance	Percent Compliance
Before touching a patient	2,325	1,994	85.8%	84.3%	87.2%	84.4%	82.9%	77.4%	73.8%
Before clean/aseptic procedure	537	456	84.9%	81.6%	87.8%	86.1%	79.8%	76.2%	74.1%
After body fluid exposure risk	772	710	92.0%	89.8%	93.8%	91.1%	86.9%	86.8%	82.5%
After touching a patient	3,437	3,039	88.4%	87.3%	89.5%	87.4%	86.0%	83.9%	80.4%
After touching patient surroundings	2,750	2,214	80.5%	79.0%	82.0%	80.0%	75.5%	76.0%	67.4%

Note: More than one moment may be observed per hand hygiene opportunity

2.4 Type of Hand Hygiene Agent Used By Healthcare Workers

Of the total hand hygiene opportunities observed in Period 5, 85% (7,657) were compliant. Alcohol hand Rub (AHR) was the method used for hand hygiene for 64% (4,904) of hand hygiene actions compared to 60.4% in Period 4. Further information on AHR consumption in acute hospitals can be accessed here.

3. Conclusions

The overall compliance was 85% which is below the HSE target of 90% for 2013 but has increased from 84.3% in Period 4.[5] The compliance rate reported for medical staff (73.4%) represents a significant increase

compared with Period 4 (70.7%) though is still significantly lower than the other staff categories. Nurses/Midwives and the 'other' staff group (primarily allied health professionals) achieved the highest compliances (89.7% and 85.2% respectively).

The WHO's 'Five Moments for Hand Hygiene' define when healthcare workers should decontaminate their hands when undertaking care at the bedside. In common with the previous four audits, moments 3 (after body fluid exposure risk) and 4 (after touching a patient) achieved the highest compliances (92% and 88.4% respectively). Compliance for moment 2 (before a clean/aseptic procedure) at 84.9% decreased compared to Period 4 (86.1%) although this decrease is not significant. Clean and aseptic procedures pose a critical infectious risk to patients; therefore it is important that facilities continue to target education and training to increase compliance with moment 2. Determining compliance by the 'Five Moments for Hand Hygiene' and by staff categories allows facilities to target educational and promotional activities where they are most needed to improve patient safety.

AHR was the preferred method used for hand hygiene for 64% of hand hygiene actions. This is consistent with international best practice as AHR is faster, more effective at reducing bacterial counts and kinder to skin compared to plain or antiseptic soap and water. [1] However, the WHO recommends that AHR should be used for 80% of hand hygiene actions. [6] In addition to the AHR data in this report, overall AHR consumption data from public acute hospitals is published biannually by HPSC.[7] The overall AHR consumption data represents the total volume of AHR delivered or dispensed to wards, clinics and other hospital areas per quarter, excluding that used for pre-operative surgical hand hygiene. Measurement of hospital-level consumption of AHR, expressed as volume used per 1,000 bed-days, has been shown to correlate with overall hand hygiene activity in hospitals.[1] Facilities should review the data available from both reports to target education and training and to inform staff of the advantages of AHR over hand washing.

There are many factors that can contribute to improving healthcare workers hand hygiene compliance including improved infrastructure, increased awareness through education, audit and feedback, support from senor management/clinicians and an informed patient population.[1;8] A multimodal strategy is recommended by the WHO to improve hand hygiene compliance including system change, training and education, evaluation and feedback, and institutional safety.[9]

4. Recommendations

Improving hand hygiene compliance in acute hospitals will require commitment from all HSE staff and consideration should be given to implementing the WHO multi-model strategy in all facilities. [9]

Key areas highlighted in Period 5 audit that should be targeted for improvement within a multimodal strategy include:

- **System change:** Hospitals should promote the advantages of alcohol handrub[iv] compared to soap and water. This should include facilitating ready access to alcohol hand rub at the point of care.
- **Training and education:**
  - Hand hygiene education is mandatory for all healthcare staff that interact with patients at induction and *at least* every 2 years. Agency and temporary staff need to be included in this programme, unless there is documentary evidence that they have received

[iv] Includes alcohol hand gel or foam

equivalent training prior to commencing work. Hospital should have a system of monitoring the proportion of staff that have received hand hygiene training on a regular basis.
    - On the basis of the results of the previous four audits, hand hygiene education should continue to focus on medical staff (but not to the exclusion of other groups) and the advantages of using alcohol handrub compared to soap and water.
    - Hand hygiene before a clean/aseptic procedure (moment 2) was 84.9% during Period 5, but needs to improve. Inadequate hand hygiene before these procedures can result in healthcare-acquired infection and potential morbidity and mortality.

- **Evaluation/Audit & Feedback:**
    - All hospitals should ensure that they have a trained lead auditor to perform hand hygiene audits in a standardised fashion to enable comparisons within the hospital to be made over time.
    - Hospitals should ensure that a hand hygiene training and audit programme is in place and that an action plan is developed for each ward/unit in which the hand hygiene compliance is less than the nationally set target (90% in 2013). Regular hand hygiene audits with feedback of results as per the national standard operating procedure (SOP) are an essential component of improving hand hygiene compliance.
    - Hospitals should ensure that they have a local ward/unit based hand hygiene audit programme in addition to participation in the biannual national hand hygiene audit programme.
    - Hand hygiene compliance should be monitored on a regular basis and results fed back widely to all hospital staff and presented at unit, directorate & senior management team meetings.

- **Reminders in the work place**: this includes posters, screensavers etc. See www.hse.ie/go/handhygiene for hand hygiene leaflets, videos & posters.

- **Institutional safety climate:** Visible support from senior management and a culture of hand hygiene excellence. Hospital managers of facilities where compliance is less than 80% need to foster the correct conditions to allow for the required improvements in compliance to be made.

Acknowledgements

We would like to acknowledge the commitment of the hand hygiene auditors in each hospital without whom this report would not be possible.

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Appendix 1: Limitations of Auditing Hand Hygiene with Direct Observation

The results as presented may not be reflective of healthcare worker compliance at all times. Compliance with hand hygiene is measured by trained, validated auditors observing healthcare workers undertaking patient care. It is well recognised that workers will change their behaviour if aware that they are being observed (Hawthorne effect). However, it is also known that this effect diminishes over time and that healthcare workers under observation may not be aware (due to the many competing demands on their attention) of the presence of the auditor. In addition, the purpose of auditing is to improve practice, therefore any action that improves compliance increases patient safety. Auditors are requested to give immediate feedback to ward staff following an audit, thereby increasing awareness and knowledge of hand hygiene.

All auditors measured compliance in the facility in which they work; therefore there may be an element of bias in the results. This risk of bias should be balanced by the benefits of increasing local staff knowledge and awareness of hand hygiene.

The sample size per hospital (210 opportunities) has a margin of error of nearly 7%. A larger sample size would provide proportions with a narrower margin of error especially at ward level. However, hand hygiene auditing is very labour intensive and without dedicated auditors, the time allocated must be balanced against other service needs.

The duration of, and the technique for hand hygiene, which are important elements of good practice were not measured as a mandatory component of this audit in line with the WHO protocol.