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Cenedlaethol Cymru

Welsh Healthcare Associated Infections
Programme (WHAIP)
Rhaglen Heintiau sy'n Gysylltiedig a Gofal
Iechyd Cymru (RHGGIC)

**CRITICAL CARE SURVEILLANCE:
CENTRAL VENOUS CATHETER RELATED
INFECTIONS
ALL WALES
ANNUAL REPORT
2008**

Includes data from 01/09/07 – 31/12/08



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Index	
Summary	2
Introduction	3
<u>Results</u>	4
Form returns	4
Completion Rates	4
SECTION 1. HELICS defined CVC infection rate for all Wales	5
Overall CVC infection rate	5
Incidence of CVC infections by infection type	5
Incidence of CVC infections by month	5
SECTION 2. Incidence of CVC infection by hospital location of line insertion	7
SECTION 3. Incidence of CVC infection by line insertion site	8
SECTION 4. Incidence of CVC infection by organism	9
Conclusions	10
References	11
Acknowledgements	12

Summary

- This is the first annual report covering the mandatory critical care surveillance in Wales (2008). The report covers central venous catheter (CVC) related infections associated with critical care as defined utilising HELICS criteria.
- A total of 6616 forms were received for the period 01/09/2007 – 31/12/2008. 6521 (99%) of forms could be further analysed for determining the CVC infection rate.
- All data items on the CVC forms were excellently completed. The line removal dates were on occasion missing. This was due to the patient being discharged from critical care with a line still in place.
- To date, we do not yet have compliance of the Trusts with the surveillance and we are also currently validating the data across Wales. The results provided for all Wales should therefore be treated with caution until such information is gathered and made available.
- A total of 68 infections were recorded by the surveillance with 49% (33 infections) meeting HELICS infection criteria. An overall infection rate of 0.9 per 1000 catheter days was noted for the period 01/09/2007 – 31/12/2008. The mean all Wales rate was also 0.9 per 1000 catheter days with a median of 1.2 per 1000 catheter days (Trust rates varied from 0.0 – 1.9 per 1000 catheter days).
- The overall infection rate broken down by infection type was 0.5, 0.05 and 0.32 per 1000 catheter days for CRI 1, CRI 2 and CRI 3 infections, respectively. The majority of infections noted were categorised as local infections (CRI 1) or bloodstream infections (CRI 3).
- The overall monthly CVC infection rate for all Wales varied from 0.0 to 1.7 per 1000 catheter days for the 16 month period. It was observed that the number of CRI 3 infections increased whilst the number of CRI 1 infections decreased in the second 8 months of data collection (when comparing numbers over the 16 month period).
- Approximately 60% of CVC lines were inserted on critical care and approximately 30% in theatre. The majority of line infections were associated with lines inserted on critical care. Of the 33 HELICS infections, 22 were attributed to critical care, 8 to theatre, 2 to other hospital locations and 1 to A&E.
- 75% of lines were inserted in the jugular vein, 14% in the femoral vein and 10% in the subclavian vein. The majority of CVC infections were associated with the jugular vein (27), whilst 5 and 1 infections were noted with the femoral and subclavian, respectively. It should be noted that line insertion site practice does differ between Trusts in Wales.
- Coagulase negative *Staphylococci* were associated with the highest number of HELICS defined CVC infections in Wales. A total of 7 infections were noted with 4 attributed to lines inserted on critical care. Six infections were identified as mixed culture. Other organisms identified included *Enterococcus sp.*, other Gram negative and other Gram positive organisms, *Candida sp.*, MRSA (Flucloxacillin resistant), *Stenotrophomonas maltophilia*, *Enterobacter sp.*, *Klebsiella sp.*, other yeast and *Pseudomonas sp.*
- **This report provides infection rates for all Wales, allowing comparisons to be made with critical care schemes in other countries. Care should be taken when interpreting such results due to the possible differences in methodology utilised. However, in Wales it is important to ensure that inter-unit comparisons are made over time utilising both bi-monthly and annual reports provided. This will ensure that the units can monitor their own performance over time.**

Introduction

The Welsh Healthcare Associated Infection Programme (WHAIP) was established in 1996. The aims of the programme are to develop an evidential base for control of healthcare associated infections in Wales, identify preventable aspects and audit compliance with agreed practices.

In September 2004, the Welsh Assembly Government launched 'Healthcare Associated Infections – A strategy for hospitals in Wales'. One of the strategic objectives within this strategy was for Trusts to adopt comprehensive surveillance programmes including infections in ICU (Part 2 – framework tables, page 14)¹. Consequently, WAG instructed the WHAIP to develop and support the implementation of ICU infection surveillance in NHS hospitals in Wales. During 2005 – 2006, the National Leadership and Innovation Agency for Healthcare (NLIAH), through the Welsh Critical Care Improvement Programme (WCCIP), launched care bundles for the insertion and maintenance of central venous catheters on ICU and also care bundles to prevent ventilator associated pneumonia.

The surveillance of central venous catheter (CVC) related infections became mandatory in Wales on the 1st September 2007. The WHAIP team collaborated with the NLIAH group to develop ICU surveillance in Wales utilising HELICS defined infection criteria². The surveillance will serve to provide useful infection data for critical care clinicians and infection control practitioners as well as serving as an outcome measure for the care bundles. Before being made mandatory, surveillance of CVC infections associated with critical care units was undertaken voluntary by all hospitals in Wales.

Patients admitted to ICU are at 5 to 10 times higher risk of acquiring a nosocomial infection due to both intrinsic and extrinsic risk factors, and because the ICU is often the epicentre of emerging nosocomial infection problems in the hospital². CVC bloodstream infections are one of the most common nosocomial infections in ICUs, where they can prolong the ICU stay, be associated with substantial mortality and related costs (both financial and in quality of care)³. However, it is well-known that up to 70% of these infections are preventable⁴. It has been suggested that by combining a number of evidence based interventions in a 'care bundle' and administering these interventions to every critical care patient (every day of their stay), these risks to the patient may be significantly lowered. Promotion of care bundles have been made by the Institute for Health Improvement and Centre for Disease Control in the USA and by the Modernisation Agency and Department of Health in the UK³.

This is the first national report on CVC infections associated with critical care units in Wales. The data presented here is a summary of information provided by the seven Trusts for the first 16 months of the surveillance (1st September 07 – 31st December 2008). The report includes data captured using strict HELICS defined criteria and thus includes infections associated with critical care units only. The surveillance incorporates data collected by intensivists and their teams using the internationally agreed definitions, allowing Welsh data to be compared with and be incorporated into other international databases, such as the HELICS European SSI database / ECDC². The purpose of the surveillance in the early years of data collection is to provide an initial baseline infection rate to assist Trusts in monitoring both their system of data collection and to aid with reducing infection over time.

Since the mandatory start date the surveillance has undergone many changes including amendments to the form and definition criteria. Some changes have been due to discussions with Pan Celtic colleagues but the majority have been as a result of feedback from critical care teams across Wales. It is inevitable that some changes will occur during the initial stages of the surveillance and the WHAIP team is grateful for your continued patience and understanding.

Results

Form Returns

Table 1 Form returns for All Wales for patients with lines inserted for the period 01/09/2007 - 31/12/2008

Number of forms received* for critical care patients with lines inserted**	Number of valid forms***	Percentage of valid forms
6616	6521	99.0

* Forms where the insertion date has been completed

** Excludes short term patient records (i.e. the patient has to be on critical care longer than 2 days) and those records where the line has not been in situ for a minimum 48 hours

*** Valid forms include forms where insertion date, admission to critical care date and (removal or discharge date) are completed

Completion Rates

Table 2 Percentage completion of data items on the CVC Surveillance forms for All Wales for the period* 01/09/2007 - 31/12/2008

Number of forms received**: **6616**

Question	Number completed	Number expected	Completion rate %
Age	6542	6616	98.9
Sex	6596	6616	99.7
Date of admission to hospital	6523	6616	98.6
Date of admission to critical care	6574	6616	99.4
Site of CVC insertion	6567	6616	99.3
Hospital location of CVC insertion	6529	6616	98.7
CVC removal date	5752	6616	86.9
Date of discharge from critical care***	1889	1889	100.0

* Time period is based on the insertion date. Therefore only records with Insertion date completed are included in this report

** Excludes short term patient records (i.e. the patient has to be on critical care longer than 2 days) and those records where the line has not been in situ for a minimum 48 hours

*** Excludes records where the patient has not yet been discharged from critical care

Key Summary Points

- 6616 forms were received for the period 01/09/07 – 31/12/08 with 99% valid for data analysis.
- All data items on the form were excellently completed.
- The completion rate for the CVC removal data was lower than for all other fields as some of the patients still had their line inserted on discharge from critical care thus preventing this date from being completed.

SECTION 1. HELICS defined CVC infection rate for All Wales

Overall CVC infection rate

Table 1.1 Overall HELICS defined CVC infection rate for All Wales for the period 01/09/2007 - 31/12/2008

Total number of infections recorded*: 68

Number and percentage of infections that meet the HELICS defined criteria: 33 (49%)

Number of infections	Number of critical care catheter days**	Infection rate*** (per 1000 critical care catheter days)
33	37897	0.9

The mean all Wales rate was also 0.9 per 1000 catheter days with a median of 1.2 per 1000 catheter days (Trust rates varied from 0.0 – 1.9 per 1000 catheter days).

Incidence of CVC infections by infection type

Table 1.2 Breakdown of HELICS defined CVC infection rate by infection type for All Wales for the period 01/09/2007 - 31/12/2008

Infection type	Number of infections	Infection rate*** (per 1000 critical care catheter days)
CRI1	19	0.50
CRI2	2	0.05
CRI3	12	0.32

*Where microbiological and clinical signs provided enable an infection to be deemed either as HELICS CVC infection or as a locally defined CVC associated infection

** Only catheter days up to discharge of patient from critical care are included. Number of critical care catheter days calculated = removal date - insertion date + 1 (unless the insertion date precedes the admission to critical care date i.e insertion date is replaced by admission to critical care date, or if the removal date succeeds discharge date from critical care then removal date is replaced by discharge date)

*** Calculation of infection rate = total number of HELICS infections / number of critical care catheter days * 1000

Incidence of CVC infections by month

Figure 1.1 HELICS defined CVC infection rate by month for All Wales for the period 01/09/2007 - 31/12/2008

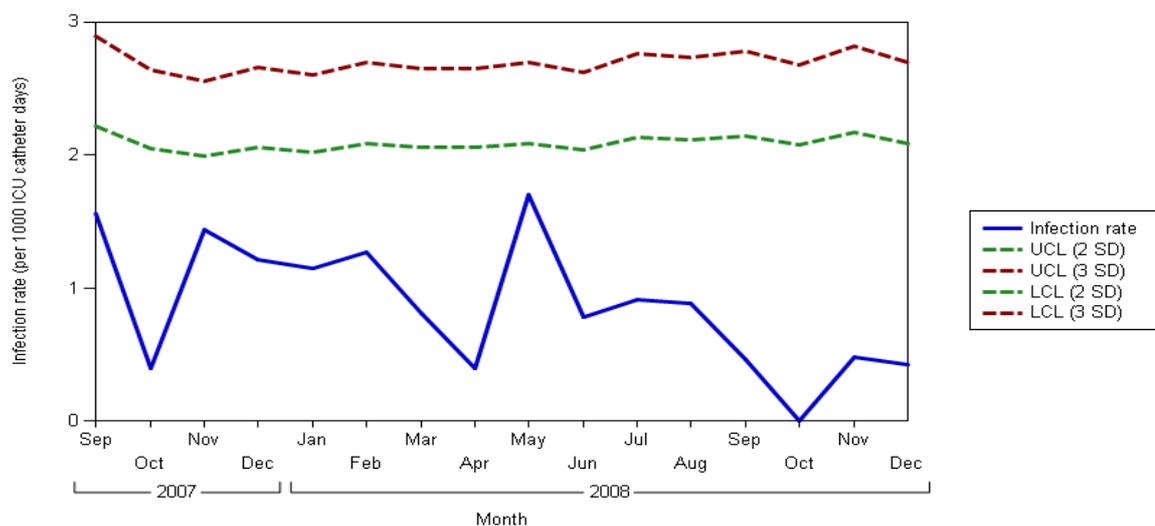
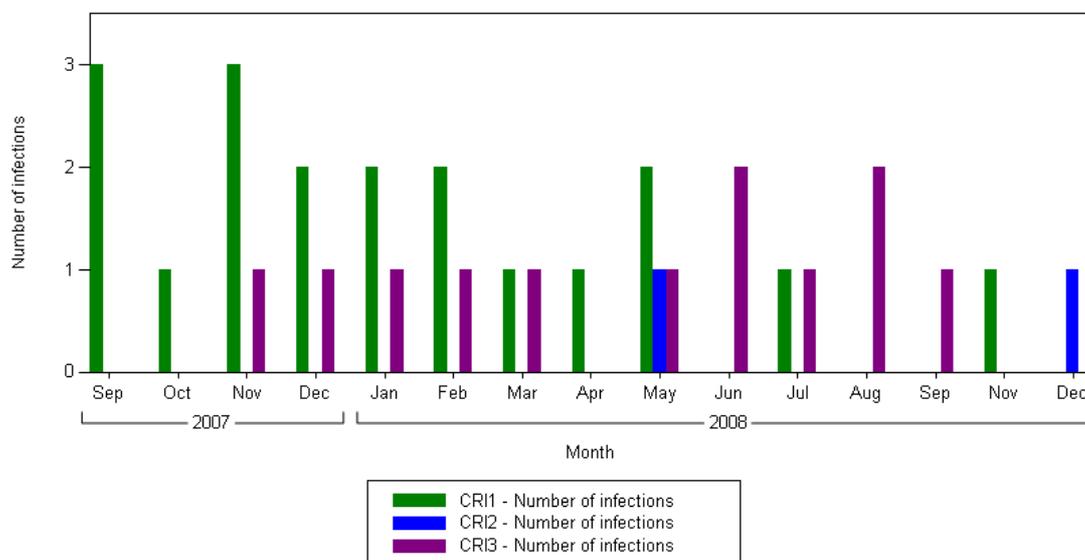


Figure 1.2 Numbers of HELICS defined CVC infections by month and infection type for All Wales for the period 01/09/2007 – 31/12/2008

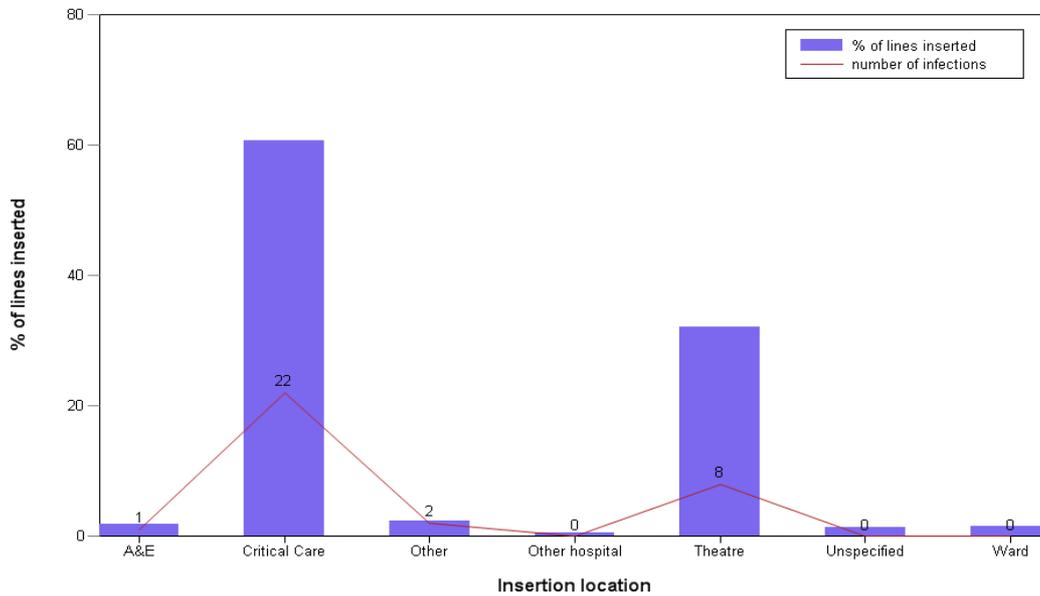


Key Summary Points

- The total number of infections recorded by the surveillance for the period 01/09/07 – 31/12/08 was 68 however, only 49% of these met with the HELICS defined infection criteria.
- A HELICS defined CVC infection rate of 0.9 per 1000 ICU catheter days was noted for the period 01/09/07 – 31/12/08.
- The mean all Wales infection rates was also 0.9 per 1000 critical care catheter days with a median of 1.2 per 1000 catheter days.
- To date, we do not yet have compliance of the Trusts with the surveillance and we are also currently validating the data across Wales. The results provided for all Wales should therefore be treated with caution until such information is gathered and made available.
- The purpose of the all Wales rate provided in this report is to allow comparisons with rates across other countries.
- The overall monthly infection rate varied from 0.0 to 1.7 per 1000 critical care catheter days over the 16 month period. During this time the infection rate remained 'in control' as all rates were shown to be below the upper control limits (UCL) at 2 standard deviations (2 SD) and 3 standard deviations (3 SD) above the mean rate.
- The majority of infections noted were categorised as either CRI 1 (local infections) or CRI 3 infections (bloodstream infections).
- Infection rates of 0.5, 0.05 and 0.32 were noted for CRI 1, CRI2 and CRI 3 infections, respectively over the 16 month period.
- From figure 1.2 the number of CRI 3 infections increased whilst the number of CRI 1 infections decreased in the second 8 months of the surveillance when comparing the numbers over the 16 month period.

SECTION 2. Incidence of CVC infection by hospital location of line insertion

Figure 2.1 Percentage of CVC insertions and numbers of HELICS defined CVC infections by insertion location for All Wales for the period 01/09/2007 – 31/12/2008

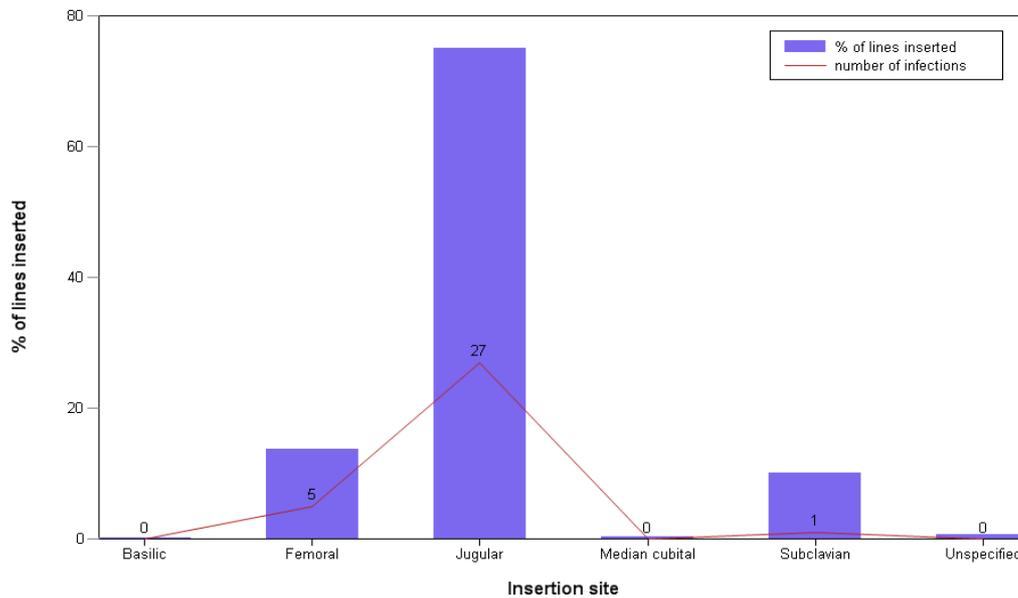


Key Summary Points

- The majority of lines were inserted on critical care (approximately 60%) and in theatre (approximately 30%).
- The majority of CVC infections were associated with lines inserted on critical care.
- Of the 33 HELICS infections noted, 22 were attributed to lines inserted on critical care, 8 to lines inserted in theatre, 2 other hospital locations and 1 in A & E.

SECTION 3. Incidence of CVC infection by line insertion site

Figure 3.1 Percentage of CVC insertions and numbers of HELICS defined CVC infections by insertion site for All Wales for the period 01/09/2007 – 31/12/2008

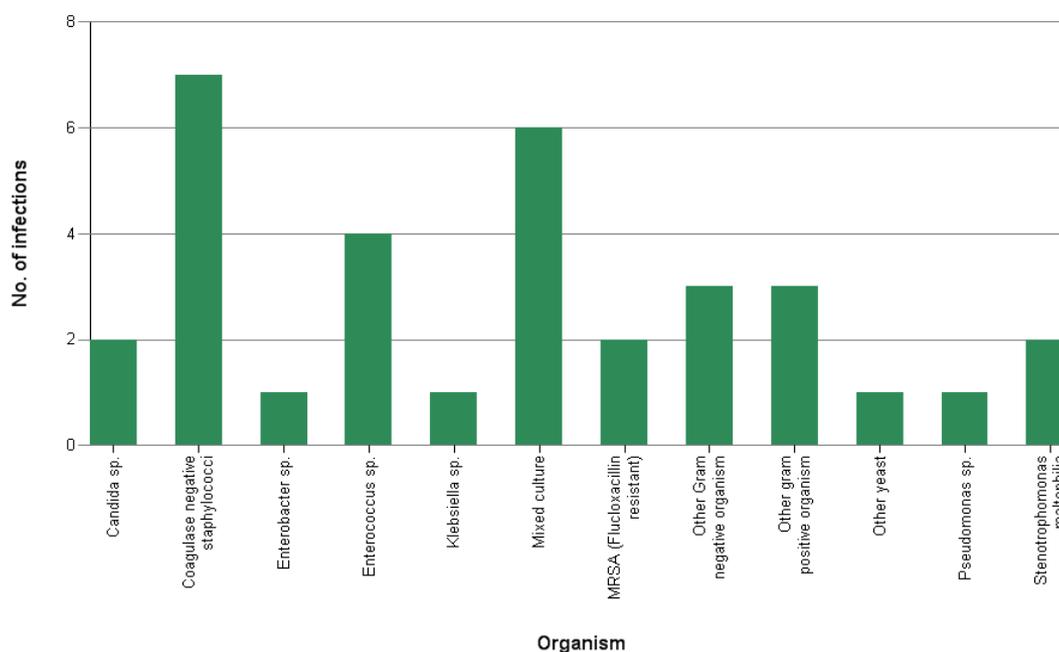


Key Summary Points

- The majority of lines were inserted in the jugular vein (75%) whilst 14% and 10% of lines were inserted into the femoral and subclavian veins, respectively.
- The majority of CVC infections were associated with lines inserted in the jugular vein (27).
- 5 infections were associated with lines inserted into the femoral vein and 1 infection with line insertions into the subclavian vein.
- It was noted that the line insertion site practice differed between Trusts in Wales.

SECTION 4. Incidence of CVC infection by organism

Figure 4.1 Numbers of HELICS defined CVC infections by organism for All Wales for the period 01/09/2007 – 31/12/2008



Key Summary Points

- Coagulase negative *Staphylococci* were associated with the highest number of HELICS defined CVC infections. A total of 7 infections were noted with 4 of these attributed to lines inserted on critical care.
- 6 of the infections identified were noted as mixed culture. Classification of infections as mixed culture within this surveillance must be treated with caution. Some Trusts will provide a result from one of the organisms grown from the mixed culture (if known) whilst others will not separate the organisms, resulting in a 'mixed culture' being quoted.
- 4 of the infections were identified as *Enterococcus sp.*, 3 as other Gram negative organisms and 3 as other Gram positive organisms.
- *Candida sp.*, MRSA (Flucloxacillin resistant) and *Stenotrophomonas maltophilia* accounted for 2 infections each.
- *Enterobacter sp.*, *Klebsiella sp.*, other yeast and *Pseudomonas sp.* accounted for 1 infection each.

Conclusions

The Welsh critical care infection surveillance scheme provides the critical care teams with an indication of the current Welsh CVC infection rate and details of possible risk factors associated with line insertion / line maintenance.

The data provided in this annual report highlights the main results obtained from the data collected and is intended to provide 'head-line' rates only. A more in-depth review of the data will be published in due course.

In particular, the surveillance for 2007/2008 has identified the hospital location where the majority of lines are inserted and the number of infections associated with the insertion location. The majority of lines were inserted on critical care where the highest infection rate was also noted. The surveillance has also provided an indication into the organisms associated with infection and this in turn may be linked with line insertion / maintenance locally as well as with antibiotic prescribing.

The jugular was the vein most often utilised for inserting a line. This was followed by the femoral vein. There has been much debate into the site of line insertion in the literature and the infection risks associated with the insertion site (jugular versus the subclavian vein for example)^{5,6}. It should be noted that there are currently different practices in Wales for the site of line insertion. Although more data are required, this surveillance should provide an indication into the most common site for line insertion and hence the widespread practice in Wales with corresponding infection rates.

The overall CVC infection rate (utilising HELICS criteria) was 0.9 per 1000 catheter days for the first 16 months of the surveillance. The rates should be interpreted with some caution as we cannot be sure that all data is being collected by the surveillance scheme. To date we have been unable to provide figures for Trust compliance with the scheme. We are currently arranging visits to each site to validate the data collected and importantly to gain a better indication of the percentage of data captured. The all Wales rate provided in this report should be compared with other countries and used as a benchmark for Wales as more data are collected. However, the literature searched to date does not seem to provide many rates overall but instead concentrates on bloodstream infections and or rates by ICU specialty. Catheter-related bloodstream infections range from approximately 1.23 to 4.2 in the literature^{7,8}. However the latter is preliminary data until a full literature search is undertaken. In addition, careful interpretation of results is required when comparing countries. A full description of the methodology is required to search for potential differences in data collection methods and interpretation of infections. For example, many countries utilise the CDC definitions instead of HELICS.

This all-Wales report should be used alongside reports from critical care schemes in other countries. However, Trusts should utilise the bi-monthly and Trust annual reports to compare their own unit rates over time. Continuation of this scheme is required with an indication of surveillance compliance to ensure an accurate all Wales CVC infection rate is calculated and for accurate all Wales and unit comparison of rates over time.

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