POINT PREVALENCE SURVEY OF HEALTHCARE ASSOCIATED INFECTIONS, MEDICAL DEVICE USAGE AND ANTIMICROBIAL USAGE

2011 REPORT

ALL WALES

Author: Welsh Healthcare Associated Infection and Antimicrobial Resistance Programmes

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EXECUTIVE SUMMARY

- Antimicrobial Resistance (AMR) and Healthcare Associated Infections (HAI) are an increasingly important human health hazard across Europe. For example, resistance in *Escherichia coli,* the most common cause of bloodstream infections (BSI) and urinary tract infections (UTI), is increasing throughout Europe for all antimicrobials under surveillance. The surveillance of infections on critical care units across Europe also shows a high proportion of organisms of the Enterobacteriaceae group that are resistant to broad spectrum antibiotics such as the third generation cephalosporins[1].

- Surveillance of HAI is recognised as a key component of programmes to reduce the incidence of these infections[2] and across the United Kingdom (UK), as well as in many European countries, surveillance programmes are well established. These national programmes are made up of incidence surveillance in the main, necessarily focussing on specific organisms or high risk units such as critical care, as incidence surveys can be very costly and time-consuming to conduct.

- Prevalence surveys, offer a relatively rapid method to provide a snapshot of the burden of disease and contributory factors, which can then be used to focus interventional programmes to reduce the burden of disease. The limitations of such surveys must however be borne in mind. Prevalence surveys collect data at one particular point in time and may not represent the prevalence at all other times in the same hospital, or at different times of year, such as seasonal variations. Also, despite standardised training, there may be variations in the interpretation of definitions and the availability of data items necessary for the fulfilment of definitions, between data collecting teams and hospitals.

- Results at the local (hospital) level should be interpreted carefully taking into account confidence intervals, which are influenced by the hospital size (number of patients) and the frequency of the event (relatively wider intervals for rare events). The evaluation of the effects of interventions in between two repeated surveys are more likely to be more meaningful for interventions where important improvement can be expected (e.g. introduction of antimicrobial use stop-orders, control of an epidemic of specific HAIs).

- The European Centre for Disease Prevention and Control (ECDC) is co-ordinating the first Europe wide point prevalence survey (PPS) of Antimicrobial Usage (AMU), HAI and Medical Device Usage (MDU) during 2011/12. The protocol including definitions and training materials were all developed centrally by ECDC and provide a standardised approach to conducting a point prevalence survey for use in all European member states[3].

- The aim of the survey is to collect information on the burden of HAI, MDU and AMU in acute hospitals across Europe in a standardised manner. The protocol was piloted in 2010 with 66 hospitals from across the EU participating[4]; Wales participated in the pilot work, contributing data from one Health Board - Hywel Dda Health Board. The main Europe wide PPS opened to voluntary engagement in spring 2011 with data being collected in three time slots; Spring 2011, Autumn 2011 and Spring 2012.

- All Health Boards and Trusts who manage in-patients in Wales participated in the study in Autumn 2011, collecting data during November. This coincided with the previously arranged antimicrobial usage survey that occurs annually in Wales during November. This is the largest survey of its kind conducted in Wales.

- The ECDC survey requires data collection from acute sector hospitals only, but allows for the inclusion of a wider range of hospitals at the local / national level. In Wales it was appropriate to collect data across the range of hospitals incorporated within our Health Boards and Trusts. Data were therefore collected from our acute and community hospitals and data are presented for Wales, for the acute sector and for the non-acute sector. Only acute sector data will be entered into the European dataset.

- The Welsh Antimicrobial Resistance Programme (WARP) and the Welsh Healthcare Associated Infection Programme (WHAIP) of Public Health Wales co-ordinated the survey in Wales. Training was provided through learning sessions and on-site training, using the training materials provided by ECDC. A paper based method of data collection was utilised.

Results – Demographics:

- All Health Boards (7) and Trusts (1) providing in-patient care in Wales participated in the survey, with a total of 9094 patients included in the survey.

- 75% of the patients surveyed were being cared for within acute hospitals; 25% in community hospitals.

- Within the ECDC protocol, acute hospitals were categorised as primary, secondary, tertiary or specialised. The majority of acute hospitals in Wales were either secondary (13) or tertiary (4).

- The surveyed patient population consisted of 55.5% females (54.3% in the acute sector and 58.6% in the non-acute sector). Approximately two thirds of patients were ≥65 years of age (66.3%) with an overall median age for females of 77 years, and 72 years for males. A similar demographic distribution was found in both the acute and non-acute sector.

Results – Healthcare Associated Infections (HAI):

- Overall in Wales 4.0% of the patients surveyed (362/9094) had HAI(s) as defined using the ECDC survey protocol definitions. Prevalence was higher in the acute sector (4.3%) as compared to the non-acute sector (3.2%), but this difference was not statistically significant.

- Within the acute sector the prevalence of HAI in secondary hospitals was 4.0% and 4.5% in tertiary hospitals (ECDC defined categorisation).

- Overall the prevalence of HAI was significantly (p<0.01) higher in males (5.2%) as compared with females (3.8%) in the acute sector only.

- The prevalence of HAI was significantly higher (p <0.05) in the 65 – 79 year age group as compared with all other age groups, this was true for Wales and the acute sector, whilst significance (p<0.01) was shown in the over 80 age group in the non-acute sector.

- UTIs (20.9%) and surgical site infections (SSI) (19.6%) were the commonest HAI identified in the survey overall, followed by gastro-intestinal (GI) infections (11.5%), pneumonia (11%), and BSIs (8.9%).

- Within the acute sector the top five types of HAI were SSIs (23.7%), UTIs (16.7%), pneumonia (12.3%), GI infections (11.7%) and BSIs (11%). For the non-acute sector they were UTIs (36.1%), infections of eyes / ear nose and throat (14.5%), skin and soft tissue infections (12.1%), lower respiratory tract infections (LRT) (12.1%) and GI infections (10.8%).

- At the time of the survey 17% of patients were reported to have had surgery during their current admission to hospital. Of these 3.1% were documented to have a SSI as defined by the survey protocol.

- The highest burden of HAI was seen in the specialty of intensive care (12.8%)

- The prevalence of *Clostridium difficile* in Wales was 0.5% (42/9094); 0.5% in the acute sector and 0.3% in the non-acute sector.

- The prevalence of Meticillin Resistant *Staphylococcus aureus* (MRSA) BSIs was 0.1% across Wales (5/9094). All cases were identified in the acute sector.

Results – Medical Device Usage:

- Overall 37.0% of patients surveyed (3369/9094) had one or more medical devices in-situ; 45.9% (3026/6588) of patients in the acute sector and 13.7% (343/2506) of patients in the non-acute sector.

- Overall 26% of the patients surveyed had a peripheral cannula (PVC) in situ, 17.3% had a urinary catheter (UC), 4.1% had a central venous catheter (CVC) and 2.3% of patients were intubated. Within the acute sector: 34.9% PVC, 19.2% UC, 5.1% CVC, 2.5% intubated; Non-acute sector 12.1% UC, 2.6% PVC, 1.8% intubated, 1.6% CVC.

- 50.0% of the UTIs identified within the survey using the ECDC HAI definitions were associated with the use of a UC. Catheter associated UTIs accounted for 10.4% of all the defined HAI identified within the survey.

Results - Antimicrobial usage:

- Overall 27.4% (2494/9094) of patients surveyed were prescribed one or more antimicrobial. Usage was higher (32.7%) in the acute sector than the non-acute sector (13.5%).
- Usage overall and in the acute sector was greatest in the 65-79 years age group; 32.4% and 37.9% of patients respectively. Usage in the non-acute sector was greatest in the 80+ age group; 15.7%.

- Of patients receiving at least one antimicrobial, 68.8% received a single agent, 25.6% received two, and 5.6% received between three and eight agents.

- Overall the commonest antimicrobials used were combinations of penicillins incl. beta-lactamase inhibitors (e.g. co-amoxiclav) (32.0% of patients), imidazole derivatives (e.g. metronidazole) (12.7%), beta-lactamase resistant penicillins (e.g. flucloxacillin) (9.2%), and macrolides (e.g. clarithromycin) (8.5%). In non-acute hospitals the commonest agents used were trimethoprim and derivatives (22.2% of patients) and combinations of penicillins incl. beta-lactamase inhibitors (16.3%).

- Overall 48.4% of antimicrobials were given for a community-acquired infection, 31.1% for hospital-acquired infection, and 15.1% for medical or surgical prophylaxis.

- Overall 8.8% of patients surveyed were being treated for a hospital acquired infection only, as deemed by the prescriber, but only 4.0% of patients were considered to have a HAI as defined by the HAI case definitions within the survey. This may be in part because the application of the HAI prevalence definitions results in a degree of under-reporting of HAI, but may also confirm that antimicrobials are over prescribed.

- Overall in the acute sector the commonest sites of infection requiring antimicrobials were respiratory (24.1%), skin, soft tissue, bone and joints (16.3%), and urinary tract (UT) (12.5%). In the non-acute sector the commonest sites were the UT (23.3%), skin, soft tissue, bone and joints (19.7%), and respiratory (18.7%).

SUMMARY – Conclusions

- **Overall across NHS Healthcare Organisations in Wales:**
  - **The prevalence of HAI was 4.0%.**
  - **37.0% of patients had one or more medical devices in situ.**
  - **27.4% of patients were prescribed antimicrobials.**

- This is the largest survey of its kind to be conducted in Wales to date.

- These data should be used in conjunction with the recently published HAI framework of actions for Wales, Commitment to purpose: Eliminating preventable healthcare associated infections (HCAI)[5], to focus healthcare organisations' quality improvement plans for managing HAIs, medical devices and the use of antimicrobials.

- Efforts should be made to focus interventions in the areas that have the highest burden of HAIs, MDU and AMU.

- For the first time, detailed information is provided for the non-acute sector. This is a useful baseline for organisations to consider as they develop action plans to respond to the HAI action plan commitment to purpose, across the Health Boards.

- These data can be used to support the 1000 lives plus programme work to reduce the risks associated with medical devices.

Health Boards and Trusts in Wales will be provided with further analyses and support from the WARP and WHAIP teams of Public Health Wales to support the use of these data for improvement / action plan development.

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GLOSSARY

ABMUHB	Abertawe Bro Morgannwg University Health Board
ABVHB	Aneurin Bevan Health Board
ALL	All Health Boards and Trusts in Wales
AM	Antimicrobial
AMR	Antimicrobial resistance
AMU	Antimicrobial Usage
BCUHB	Betsi Cadwaladr University Health Board
BSI	Bloodstream Infection
CAUTI	Catheter Associated Urinary Tract Infection
CDAD	*Clostridium difficile* associated Disease
CDC	Centers for Disease Control and Prevention
CI	Confidence Intervals
CNO	Chief Nursing Officer
CNS	Central nervous system
CRI	Catheter Related Infection
CRI-CVC	Catheter Related Infection (Central Venous Catheter)
CRI-PVC	Catheter Related Infection (Peripheral Vascular Cannula)
CVC	Central Venous Catheter
CVS	Cardiovascular system
CWTHB	Cwm Taf Health Board
C&VUHB	Cardiff & Vale University Health Board
DH	Department of Health
ECDC	European Centre for Disease Prevention and Control
ENT	Ear, nose, throat
ESAC	European Surveillance of Antimicrobial Consumption
GI	Gastrointestinal
GUOB	Genitourinary system/obstetrics
HAI	Healthcare Associated Infection
HALT	Healthcare Associated Infections in Long-term Care Facilities
HDHB	Hywel Dda Health Board
HDU	High Dependency Unit
IC	Infection Control
IPCN	Infection Prevention Control Nurse
IPCT	Infection Prevention Control Team
ICU	Intensive Care Unit
LRT	Lower Respiratory Tract
MDU	Medical device usage
MRSA	Meticillin Resistant *Staphylococcus aureus*
ND	Systemic infection
NHSN / non-NHSN	National Healthcare Safety Network
POWHB	Powys Teaching Health Board
PPS	Point Prevalence Survey
PVC	Peripheral Vascular Cannula
OMR	Optical Mark Reader
Other	Includes psychiatrics, rehabilitation, and wards with the combination of specialties (mixed wards)
RESP	Respiratory infection
SCBU	Includes all levels of Special Care Baby Units (neonatal units)
SIGN	Scottish Intercollegiate Evidence Network
SSI	Surgical Site Infection
SSTBJ	Skin, soft tissue, bone & joint infection
UC	Urinary Catheter
UT	Urinary Tract
UTI	Urinary Tract Infection
VAP	Ventilator Associated Pneumonia
VELTR	Velindre NHS Trust
WARP	Welsh Antimicrobial Resistance Programme
WG	Welsh Government
WHAIP	Welsh Healthcare Associated Infection Programme

INTRODUCTION

Over the last thirty years multiple surveys of the prevalence of HAI have been conducted across European countries[6-10]. Due to differences in methodology and definitions it has however been difficult to compare the burden of HAI across Europe.

In the UK there have been three previous national prevalence surveys of HAI, the first in 1980[11]; the second in 1993/4[12] and the third in 2006[13]. In Wales there have also been three previous annual point prevalence surveys of antimicrobial usage between 2008 and 2010[14].

The Council of the European Union in a [Council Recommendation of 9 June 2009 on patient safety, including the prevention and control of healthcare associated infections (2009/C 51/01)](), stipulated that at a national or regional level surveillance of HAI should be strengthened by organising prevalence surveys at regular intervals, as appropriate. It also recommended using, where appropriate, surveillance methods and indicators as recommended by the ECDC and case definitions as agreed upon at Community level. In response to this recommendation and to also integrate the main variables of the European Surveillance of Antimicrobial Consumption (ESAC) point prevalence survey (PPS), the ECDC protocol for point prevalence surveys (PPS) of healthcare-associated infections (HAI) and antimicrobial use in acute sector hospitals was developed.

The protocol for the ECDC point prevalence survey of HAI and antimicrobial use in acute sector hospitals was developed between 2009 and 2011. The protocol was piloted from June to October 2010 in 66 hospitals from 23 European countries, including nearly 20 000 patients[4]. Wales contributed to the pilot project, by testing the protocol within the Hywel Dda Health Board during 2010.

The objectives of the survey are:

- To estimate the total burden of HAI, MDU and AMU
- To describe patients, invasive procedures, infections and prescribed antimicrobials
- To disseminate results to those who need to know at local, regional, national and EU level.
- To provide a standardised tool for hospitals to identify targets for quality improvement.

Within the ECDC protocol[3] each country was free to organise its own system for data collection and processing and also allowed to include a broader range of hospitals beyond the acute sector. In Wales it was appropriate, that as the Health Boards are responsible for community hospitals as well as acute sector hospitals, data collection would be carried out across the range of hospitals found within the Health Boards and Trusts of Wales. The survey was voluntary, but all Health Boards and Trusts in Wales, with responsibility for in-patients, participated.

This report presents the results of the PPS of HAI, MDU and AMU, co-ordinated by the WARP and the WHAIP teams of Public Health Wales NHS Trust, and conducted by Health Boards and Trusts in Wales according to the ECDC protocol in November 2011.

METHODS

Study design:

The pilot ECDC PPS protocol[4] was finalised and launched for piloting between June and October 2010. The final protocol for the full-scale PPS across Europe was decided during various meetings from October 2010 to November 2011[3]. It was agreed that all European Member States would perform a first national point prevalence survey before the summer of 2012 and that at least one repeated national PPS would be organised every 5 years after that.

In Wales the Welsh Government supported the engagement of NHS Wales in the survey and encouraged all the healthcare organisations to participate. Public Health Wales was asked to co-ordinate the survey.

Antimicrobial usage point prevalence surveys have been undertaken in Wales annually since 2008 during November, to coincide with the Antimicrobial Awareness Day. There were also well developed plans to conduct a specific ECDC prevalence survey of antimicrobial use in paediatric services during November. With agreement from ECDC the joint prevalence survey of HAI, MDU and AMU was conducted in Wales during November 2011.

Protocol:

The protocol for use in Wales was modified from the ECDC protocol[3], to reflect the local arrangements for data collection and data transfer. Full details can be found on the WHAIP web page[15]:
(http://howis.wales.nhs.uk/sites3/page.cfm?orgid=379&pid=47179).

Training and support:

A member of the WHAIP attended ECDC "train the trainer" sessions on the protocol. Training materials were prepared on behalf of ECDC by the Health Protection Agency, England and shared for use at local training sessions. Two regional training days were organised by the Public Health Wales programme teams for Infection Prevention and Control teams, Antimicrobial Pharmacists/Ward Pharmacists and ward staff. On-site training was also provided. Members of the WHAIP team provided support (answering queries or on-site support) throughout the prevalence survey period.

Data Definitions:

The definitions used are detailed within the protocol for the survey[3,15]. Key points to note are:

HAI data:

Data were collected for patients who had an active HAI present on the day of the survey.

- A HAI infection **was active** when signs and symptoms fulfilled the survey definitions of HAI **and were** present on the survey date

    or

- Signs and symptoms that fulfilled the survey definitions of HAI were present in the past and the patient **was still** receiving treatment for that HAI on the survey date.

In addition there were specific guides to the time frames within which infections had to present – please see detail in the protocol.

Medical device usage data:

All patients surveyed, were assessed for the presence of medical devices. The presence of UCs, PVCs, CVCs and intubation was noted. Intubation included any patients with tracheostomies in situ, and not necessarily ventilated.

Device-associated HAI was defined as a HAI in a patient with a (relevant) device that was used within the 48-hour period (7 days for UTI) before onset of infection (even intermittently). The notion device-associated is only used for pneumonia, BSI and UTI.

Antimicrobial usage data:

Data were collected on all patients receiving an antimicrobial at the time of the survey. "Antimicrobial" within this prevalence survey refers to systemic (oral and parenteral) antibacterials, antifungals and TB therapy but excludes antivirals and all topical agents with the exception of oral suspensions of Nystatin. In previous antimicrobial use PPS' in Wales oral suspensions of Nystatin have been classed as topical antifungals, but are classed as oral antifungals by ECDC for this survey.

The route of antimicrobial administration, indication for the antimicrobial treatment and the diagnosis were recorded. The indications were listed as;

- **CI**: community-acquired infection
- **LI**: infection acquired in long-term care facility (e.g. nursing home) or chronic care hospital
- **HI** : acute hospital-acquired infection
- **SP1, 2, 3** Surgical prophylaxis
- **MP**: medical prophylaxis
- **O**: other indication (e.g. erythromycin use as a prokinetic agent)

The definition of acute hospital acquired infection for the antimicrobial usage data set did not include the requirement for the HAI definitions of the HAI prevalence part of the survey to be fulfilled, but simply to record if the prescribing clinician considered treatment to be for an infection acquired in hospital and presenting >48 hours after admission to that hospital.

The diagnoses for which the antimicrobials were being used to treat were grouped by anatomical site.

Data Collection and management:

A paper based data collection method was utilised. Data collection forms were prepared by the WHAIP team, Public Health Wales, based on the model forms provided within the ECDC protocol[3.] A copy of the forms can be found in Appendix IV.

Ward staff, Antimicrobial Pharmacists, Infection Prevention and Control teams and Ward Pharmacists were involved in data collection across all the Health Boards and Trusts. Data were extracted from a number of sources available on the ward at the time of the survey. These included nursing notes, temperature charts, medical notes, drug charts, surgical notes, wound charts, stool charts, care plans and laboratory reports (e.g. microbiology results and other relevant charts).

Data forms were scanned using an Optical Mark Reader (Read Soft Forms). Electronic files created were loaded into an SQL server database®. The data were quality checked using a built-in validation routine within the database. Predefined reports were then generated and additional checks carried out by the WHAIP and WARP teams.

Data Analysis:

Data were analysed at an all Wales level, acute sector and non-acute sector. The acute sector analysis excluded long term psychiatric care. The latter specialty was included in the non-acute sector analysis. In addition some analysis was carried out using ECDC categorisation of primary, secondary, tertiary and specialised hospitals (Appendix III).

Descriptive analyses were carried out using Stata Version 9®. The prevalence of HAI, antimicrobial prescribing and the comparative data (2006 vs 2011 prevalence survey) were calculated with 95% confidence intervals (CI) using the Wilson Score method[16]. Comparisons of prevalences were carried out using estimations to assess overlapping confidence intervals. Chi-squared tests were also carried out to examine the relationship between age / sex of patients and HAI and presented as an odds ratio (OR). An OR of 1 indicates equal odds, <1 lower odds and >1 higher odds of HAI. In addition p-values (p) were calculated to test whether observations had reached statistical significance. Values of $p < 0.05$ were considered significant.

To enable a comparison of the 2011 survey with the 2006 survey the 2011 data were stratified to exclude paediatric and rehabilitation specialties. Comparisons were made between the overall prevalence of HAI, prevalence by HAI type, device utilisation and specialty data (classified at the ward level).

Validation was conducted to check for inter-observer variation between hospital staff carrying out the survey. Forms where a HAI had been recorded and forms where no HAI were recorded were examined to check for consistency in the application of the HAI definitions. The shorter duration of data collection in 2011 created time constraints on the validation process as compared with 2006. This coupled with the lower numbers of HAI identified overall meant it was not possible to validate 10% of the records as per the 2006 survey[13].

RESULTS

During November 2011 all 7 Health boards and 1 Trust providing in-patient care in Wales participated in the point prevalence survey.

Results are presented in three chapters describing the results for Wales (Chapter 1), for the acute sector (Chapter 2) and non-acute sector (Chapter 3). A limited validation exercise was conducted and the results suggest a reasonable concordance with these results.

CHAPTER ONE – <u>ALL WALES</u>

<u>SECTION 1.1: DEMOGRAPHICS</u>

In total 86 hospitals were included and a total of 9094 patients were surveyed (6588 in the acute sector; 2506 non-acute sector). Health Boards in Wales are responsible for both acute and non-acute hospitals. Data were collected across both sectors to enable Health Boards to have a full picture of the burden of HAI, MDU and AMU across their areas of responsibility.

<u>Table 1.1a – Health Board demographics in Wales</u>

Health Boards	Number of Hospitals	Number of wards	Number of beds	Number of patients surveyed
Abertawe Bro Morgannwg University Health Board	12	109	2197	1963
Aneurin Bevan Health Board	15	77	1714	1387
Betsi Cadwaladr University Health Board	19	109	2146	1815
Cardiff and Vale University Health Board	8	87	1824	1645
Cwm Taf Health Board	8	56	1108	1026
Hywel Dda Health Board	13	71	1219	1071
Powys Teaching Health Board	10	11	171	154
Velindre NHS Trust	1	3	49	33
Wales total	**86**	**523**	**10428**	**9094**

There are 20 acute hospitals within NHS Wales. Within the ECDC survey protocol, acute sector hospitals were categorised as primary, secondary, tertiary or specialist (see Appendix III for definitions). 75% of the patients surveyed were being cared for in acute hospitals (table 1.1b).

<u>Table 1.1b – Number and percentage of patients surveyed in Wales by hospital type</u>

Hospital type*	Number of Hospitals	Number of patients surveyed	% of patients surveyed
Primary	2	91	1.0
Secondary	13	4513	49.6
Tertiary	4	2151	23.7
Specialist	1	33	0.4
Community	66	2306	25.4
Wales total	**86**	**9094**	

* Hospital type based on ECDC protocol version 4.2 (description can be found in Appendix III).

Overall the highest number of patients surveyed were on either medical or surgical wards accounting for approximately 29% and 15% of patients, respectively (Table 1.1c). The ward specialty of 'Other' accounted for approximately 39% of patients surveyed but this included multiple ward specialties.

Table 1.1c – Number and percentage of patients surveyed in Wales by ward specialty group

Ward specialty group	Number of wards	Number of patients surveyed	% of patients surveyed
Geriatrics	24	592	6.5
ICU	26	211	2.3
Medical	136	2631	28.9
Obstetrics/Gynaecology	32	506	5.6
Paediatrics	34	188	2.1
Surgical	98	1402	15.4
Other*	173	3564	39.2
Wales total	**523**	**9094**	

*Psychiatry; rehabilitation; combination of specialties (mixed ward); others not listed.

Overall a greater number of females were surveyed than males (55.5% females all Wales; 54.3% acute sector; 58.6% non acute sector). Approximately two thirds of the patient population was 65 and over (66.3%) with a median age of 75 years (median 72 years for males; 77 years for females) (Figure 1.1).

Figure 1.1 – Number of patients surveyed in Wales by age and sex
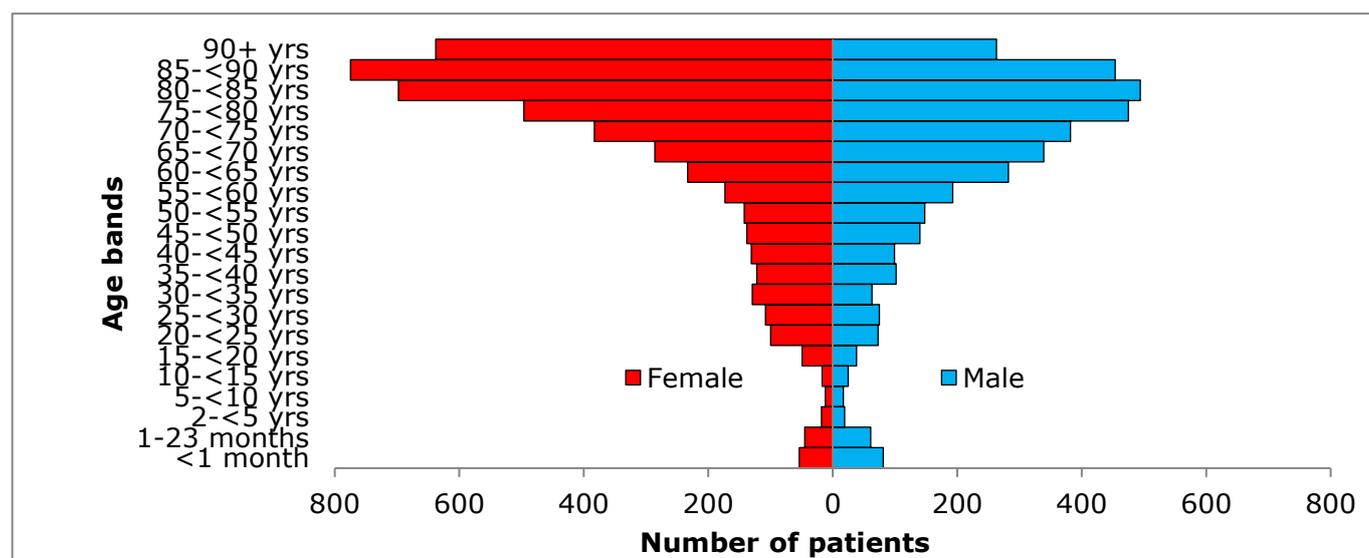
Patients were categorised into two risk factors groups. This included a risk by McCabe score, which is a severity index of the underlying medical condition of the patient and a risk based on surgery since admission to hospital. Within the survey surgery was classified using the National Healthcare Safety Network (NHSN) list of surgical procedures[17] included in the Centers for Disease Control (CDC) surveillance programme. Approximately 43% of patients were classified as having an unknown McCabe score. Unfamiliarity with this classification may have contributed to its low completion. Likewise 7.8% of patients were classified as unknown or not specified whether or not they had had surgery on this admission, which raises concerns regarding the completeness of these data. Approximately 17% of patients had surgery during their current admission.

Table 1.1d – Number and percentage of patients surveyed in Wales by risk factor

Risk factor		Number of patients surveyed	% of patients surveyed
McCabe score*	Non-fatal[1]	3734	41.1
	Ultimately fatal[2]	1061	11.7
	Rapidly fatal[3]	394	4.3
	Unknown/Not specified	3905	42.9
Surgery since admission to hospital	Non-NHSN surgery**	284	3.1
	NHSN surgery**	1287	14.2
	No surgery	6811	74.9
	Unknown/Not specified	712	7.8
Wales total		**9094**	

1:expected survival at least 5 years; 2:between 1 and 5 years; 3:expected death within 1 year.
*Severity index of underlying medical condition.
**List of surgical procedures included in the CDC surveillance program[17]

SECTION 1.2: HAI

In Wales 4.0% (95% CI 3.6 – 4.4) of patients surveyed had a HAI (as defined using the ECDC survey protocol definitions). A total of 362 patients had one or more HAI (Table 1.2a). Approximately 95% of patients had one HAI, the remainder 2 or more. The majority of HAI noted were attributed to the hospital in which patients were surveyed. This applies specifically to Wales and the acute sector, whereas HAIs in the non-acute sector were attributed to both 'Current' and 'Other hospitals', which suggests that a number of HAIs identified in the non-acute sector may actually be attributable to hospitals in the acute sector.

The prevalence of HAI in the acute sector was 4.3% (95% CI 3.8 – 4.8) – Table 2.2a. Most acute hospitals in Wales can be categorised as secondary (13) or tertiary hospitals (4) – Table 1.1b, according to the ECDC definitions (see Appendix III). The prevalence of HAI according to hospital type is shown in Table 2.5a and was 4.0% (95% CI 3.4 – 4.6) for secondary hospitals and 4.5% (95% CI 3.7 – 5.4) for tertiary hospitals. Within the non-acute sector the prevalence of HAI was 3.2% (95% CI 2.6 – 4.0) which was not significantly different from the acute sector.

The prevalence of HAI varied between Health Boards and Trusts in Wales (range 1.6% (95% CI 1.0 – 2.5) to 16.2% (95% CI 11.2 – 22.9), (see Appendix I) and between different types of hospitals within the Health Boards.

Table 1.2a – Number and prevalence of patients surveyed in Wales with a HAI

Number of patients surveyed	Number of patients with a HAI	Prevalence (%) of HAI (95% CI)*
9094	362	4.0 (3.6 – 4.4)

*95% CI – indicate the range of values within which we can be confident that the true value lies.

Table 1.2b provides the overall prevalence of HAI in Wales by intrinsic factors. When compared to females, males had a significantly higher risk of developing a HAI within the acute sector only (OR=1.40, P<0.01). An association between age and HAI was identified. The prevalence of HAI was significantly higher in the 65-79 year age group as compared with all other age groups. This was noted both for all Wales (OR=1.26, P=0.04) and in the acute sector (OR=1.46, P<0.01). Significance was shown in the over 80 age group in the non-acute sector (OR=3.03, P<0.01).

Although a higher HAI prevalence was associated with consultant specialty of ICU, results should be treated with caution due to the small numbers present and the wide 95% CI calculated. Similar results were also shown for the acute sector. In the non-acute sector the highest burden of HAI was seen under the geriatrics and medical consultant specialties.

Table 1.2b – Number and prevalence of patients surveyed in Wales with a HAI by intrinsic factors

Intrinsic factors		Number of patients surveyed	Number of patients with a HAI	Prevalence (%) of HAI (95% CI)*
Gender	Female	4767	178	3.7 (3.2 - 4.3)
	Male	3829	179	4.7 (4.1 - 5.4)
	Not specified	498	5	1.0 (0.4 - 2.3)
Age group	<1 month	159	3	1.9 (0.6 - 5.4)
	1-23 months	125	7	5.6 (2.7 – 11.1)
	2-15 years	144	2	1.4 (0.4 – 4.9)
	16-29 years	448	9	2.0 (1.1 – 3.8)
	30-49 years	960	32	3.3 (2.4 – 4.7)
	50-64 years	1221	50	4.1 (3.1 – 5.4)
	65-79 years	2494	116	4.7 (3.9 – 5.6)
	80+ years	3517	142	4.0 (3.4 – 4.7)
	Not specified	26	1	3.9 (0.7 – 18.9)
McCabe score**	Non-fatal[1]	3734	114	3.1 (2.6 – 3.7)
	Ultimately fatal[2]	1061	52	4.9 (3.8 – 6.4)
	Rapidly fatal[3]	394	23	5.8 (3.9 – 8.6)
	Unknown/Not specified	3905	173	4.4 (3.8 – 5.1)
Specialty group	Geriatrics	792	26	3.3 (2.3 – 4.8)
	ICU	102	13	12.8 (7.6 – 20.6)
	Medical	3352	140	4.2 (3.6 – 4.9)
	Obstetrics/Gynaecology	362	9	2.5 (1.3 – 4.7)
	Paediatrics	298	5	1.7 (0.7 – 3.9)
	Surgical	2224	116	5.2 (4.4 – 6.2)
	Other	1964	53	2.7 (2.1 – 3.5)

* 95% CI – indicates the range of values within which we can be 95% confident that the true value lies.
** Severity index of underlying medical condition.
1:expected survival at least 5 years; 2:between 1 and 5 years; 3:expected death within 1 year.

UTI (20.9%) and SSI (19.6%) were the commonest HAIs identified in the survey overall, followed by GI infections (11.5%). The latter infections include cases of *C. difficile* infection. Other common infections included pneumonia (11%) and BSI (8.9%) (Table 1.2c). Within the acute sector commonest infections were SSI (23.7%), UTI (16.7%) and pneumonia (12.3%) (Table 2.2c). For the non-acute sector common infections were UTI (36.1%), infections of the eyes / ear nose and throat (14.5%) and skin and soft tissue (12.1%) (Table 3.2c). Full details for the acute and non-acute sectors can be found in Chapter 2, and Chapter 3, respectively.

The prevalence of *C. difficile* was 0.5% (all Wales and acute sector); the prevalence was 0.3% in the non-acute sector. The prevalence of MRSA BSIs was 0.1%. All cases (5) were identified in the acute sector.

Of the 9094 patients 75 patients had an SSI, giving a prevalence of 0.8%. 1571 patients had surgery (NHSN or Non-NHSN)[17] documented during their current admission, 60 patients were identified with an SSI related to their current admission giving a prevalence of SSI of 3.1% for those patients who had surgery on this admission. If NHSN surgery only was considered the prevalence of SSI was 3.4%. Insufficient information was provided for classification of 15 of the 75 SSI to link them to location / type of surgery.

Table 1.2c – Number and prevalence of HAI in Wales by HAI type

Number of patients in Wales	HAI type	Number of HAI*	% of HAI	Prevalence (%) of HAI by type
9094		382		
	UTI	80	20.9	0.9
	SSI	75	19.6	0.8
	GI infection	44	11.5	0.5
	Pneumonia	42	11.0	0.5
	BSI	34	8.9	0.4
	Skin and soft tissue infection	32	8.4	0.4
	LRT infection	25	6.5	0.3
	Eyes and ENT infection	22	5.8	0.2
	Systemic infection	8	2.1	0.1
	CRI-CVC	5	1.3	0.1
	Reproductive tract infection	4	1.0	<0.1
	Neonatal infection	3	0.8	<0.1
	CRI-PVC	3	0.8	<0.1
	Bone and joint infection	2	0.5	<0.1
	CNS infection	2	0.5	<0.1
	CVS infection	1	0.3	<0.1

* Counts the number of HAI (i.e. Patients may have multiple HAI).
Key: UTI – urinary tract infection; SSI – surgical site infection; GI – gastrointestinal; BSI – bloodstream infection; LRT – lower respiratory tract; ENT – ear - nose - throat; CRI-CVC – catheter related infection (central venous catheter); CRI-PVC – catheter related infection (peripheral vascular cannula); CNS – central nervous system; CVS – cardiovascular system.

A total of 34 HAI were BSIs. The source of the infection was unknown in over half of the cases of BSI noted, therefore the numbers of BSI with an attributable source are low and results should be treated with caution. Both CVC and UTI were the source of approximately 12% of these infections (4 infections each), one BSI was documented to be associated with a peripheral vascular cannula. (Table 1.2d).

Table 1.2d – Number and percentage of bloodstream infection in Wales by source of bloodstream infection

BSI source	Number of BSI	% of BSI
CVC	4	11.8
PVC	1	2.9
Pulmonary infection	2	5.9
UTI	4	11.8
SSI	1	2.9
Digestive tract infection	1	2.9
Skin and soft tissue infection	2	5.9
Other infection	0	0.0
Unknown/Not specified	19	55.9
Wales total	**34**	

Key: CVC – central venous catheter; PVC – peripheral vascular cannula; UTI - urinary tract infection; SSI – surgical site infection.

Microorganism prevalence by HAI type

Data fields on the types of microorganisms causing HAI were poorly completed, with only 55.1% of the known HAI types having an associated micro-organism (table not shown). *E. coli* was the commonest organism associated with UTI (19 / 39 identified microorganisms 48.7%); *Staphylococcus aureus* was the commonest organism associated with SSI (9/43 Identified microorganisms 20.9%), with Coagulase negative staphylococci also featuring commonly (8/43 18.6%); *C. difficile* was the causative organism in 41 / 43 of the GI cases that had a microorganism assigned (95.3%). The assigning of a causative organism in cases of HAI pneumonia was particularly poor, only 30.8% had the field completed; *E. coli* was the most common organism identified (4/13 – 31.0%). The causative organism field for BSIs was much more fully completed (85.3%), the commonest organism was *S. aureus* (9/29 – 31.0%).

SECTION 1.3: DEVICE UTILISATION

Of the 9094 patients surveyed in Wales, 3369 patients (37%) had one or more medical devices in situ. 1571 patients had a UC in situ, and of these 701 patients also had a PVC in situ. In the acute and non-acute sector patients 45.9% (Table 2.3a) and 13.7%, (Table 3.3a) had one or more devices in situ respectively. Table 1.3a provides the number of patients in Wales with one or more devices in situ.

The use of medical devices was highest in the acute sector (Table 2.3a), where the use of CVCs, PVCs and intubation was much more common. UCs were the most common medical device noted in the non-acute sector (12.1%) – Table 3.3a.

Table 1.3a – Number and percentage of patients surveyed in Wales by device utilisation

Number of patients surveyed	Number of patients with one or more devices in situ	Device	Number of devices in situ*	% of device utilisation
9094	3369			37.0
		UC	1571	17.3
		PVC	2368	26.0
		CVC	375	4.1
		Intubation	210	2.3

*A patient may have more than one device in situ at one time. For example, although 1571 patients had a UC in situ, 701 of these patients also had a PVC in situ.
Key: UC – urinary catheter; PVC – peripheral vascular cannula; CVC – central venous catheter.

The number of patients with a device in situ prior to onset of a HAI was captured by the survey (Table 1.3b). 50% of the UTI identified in Wales (using the ECDC HAI definitions) were associated with the use of a UC. Overall 10.5% of all the defined HAI identified within the survey were catheter associated UTIs. 23.8% of all pneumonias were ventilator associated accounting for 2.6% of all types of defined HAI. Within the acute sector 60% of UTIs were associated with the use of a UC, accounting for 10% of the total defined HAI identified (Table 2.3b). In the non-acute sector 33.3% of the UTIs were catheter associated accounting for 12.1% of the defined HAI identified (Table 3.3b). Within the acute sector 24.3% of the pneumonias identified were ventilator associated and 20% were classed as ventilator associated within the non-acute sector, (3.0% and 1.2% of the total defined HAI in the acute and non-acute sectors respectively). The definition of an intubated patient within this survey included any patients with tracheostomies in situ, and not necessarily ventilated, which may explain the classification of some pneumonias as ventilator associated in the non-acute sector.

Table 1.3b – Number and percentage of HAI in Wales with a device in situ prior to onset by HAI type

Total number of HAI in Wales	HAI type	Number of HAI	HAI with device in situ prior to onset	% of total HAI
383				
	UTI (urinary catheter within 7 days prior to onset)	80	40	10.4
	Pneumonia (ventilated within 48 hours prior to onset)	42	10	2.6
	BSI (CVC within 48 hours prior to onset)	34	5	1.3

Key: UTI – urinary tract infection; BSI – bloodstream infection.

SECTION 1.4: ANTIMICROBIAL USAGE

Overall Prevalence of Antimicrobial Prescribing

The current point prevalence survey recorded systemic (parenteral, oral, rectal, inhalational) use of antibacterial, anti-mycobacterial, and anti-mycotic agents across the NHS in Wales. Previous antimicrobial point prevalence surveys in 2008, 2009, and 2010 did not survey all wards and used slightly different definitions, and therefore are not directly comparable to the current survey (for previous reports see website – link below)[14].
(http://howis.wales.nhs.uk/sites3/page.cfm?orgId=457&pid=20791)

Overall, 2494 of the 9094 patients (27.4%) surveyed were receiving an antimicrobial. The prevalence of prescribing was greatest within the acute sector (32.7%) compared to the non-acute sector (13.5%).

Variability was seen between Health Boards which may be due to different patient populations in different hospitals or to differences in prescribing policies. Among acute hospitals, the prevalence of antimicrobial use was greatest in Betsi Cadwaladr University Health Board (35.5%) and lowest in Abertawe Bro Morgannwg University Health Board (27.9%). Among non-acute hospitals, the prevalence of antimicrobial use was greatest in Powys Teaching Health Board (23.4%) and lowest in Hywel Dda Health Board (6.7%).

Figure 1.4 - Prevalence of antimicrobial prescribing in Wales by indication (with 95% Confidence intervals)

Community acquired infection 12.8 (12.1 - 13.5)

Hospital acquired infection 8.8 (8.2 - 9.4)

Long term/intermediate care acquired infection 0.3 (0.2- 0.4)

Surgical prophylaxis 1.1 (0.9 - 1.4)

Medical prophylaxis 2.5 (2.2 - 2.9)

Other 0.1 (0.0 - 0.2)

Not recorded 0.9 (0.8 - 1.2)

Mixed Indications 1.0 (0.8 - 1.2)

No antimicrobials 72.6 (71.6 - 73.5)
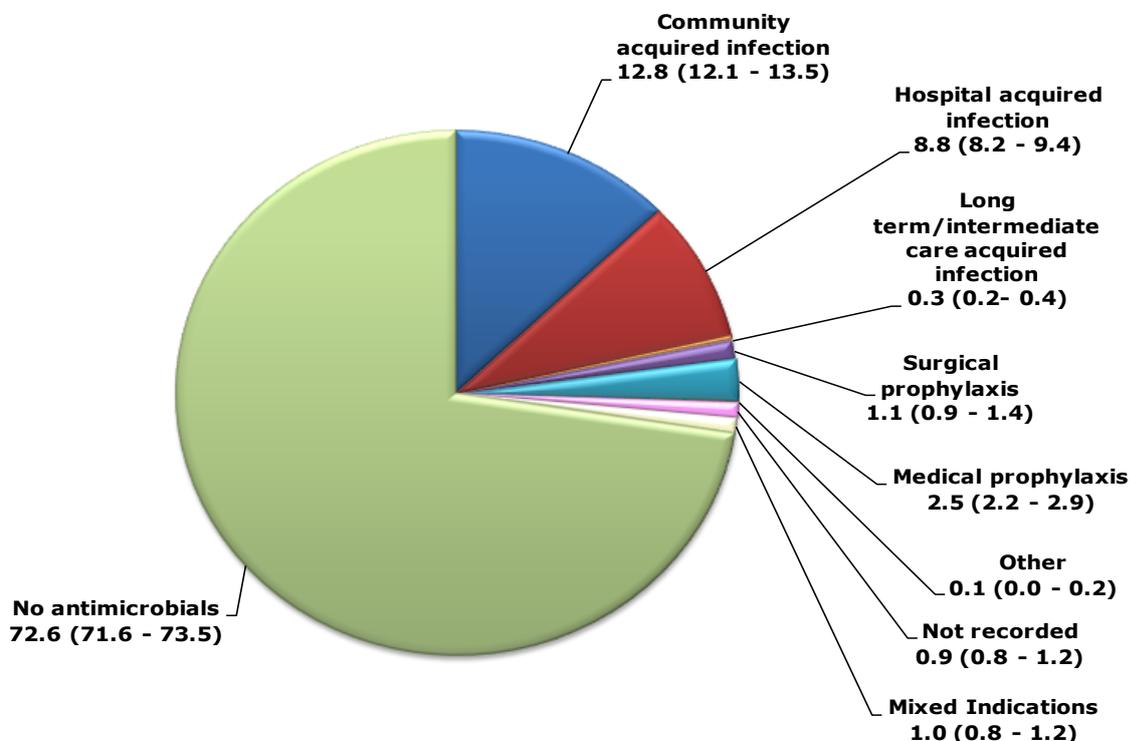
Table 1.4a - Overall prevalence of antimicrobial prescribing in Wales

Number of patients surveyed	Number of patients receiving antimicrobials	Prevalence (%) of antimicrobial prescribing (95% CI)
9094	2494	27.4 (26.5 – 28.4)

Prevalence of Antimicrobial Prescribing by Intrinsic Factors

Overall prescribing was commoner in male (30.8%) than female (27.2%) patients. This trend was seen in the acute sector (male 37.2%, female 31.8%), but reversed in the non-acute sector (male 11.9, female 15.9%).

Prescribing was commonest in the 65-79 years age group overall and in the acute sector (32.4% and 37.9% respectively), but commonest in the 80+ years group (15.7%) in the non-acute sector.

Unsurprisingly, usage was highest in the ICU specialty (55.2%), but also high in medicine (34.7%), paediatrics (32.7%), and surgery (31.4%). Usage was higher in secondary and tertiary hospitals than community and primary hospitals. The only specialist hospital, Velindre Hospital, had a high usage (51.5%) which can be explained by the particular patient group served.

Table 1.4b – Overall prevalence of antimicrobial prescribing in Wales by intrinsic factors

Intrinsic factors		Number of patients surveyed	Number of patients receiving antimicrobials	Prevalence (%) of antimicrobial prescribing (95% CI)
Gender	Female	4767	1296	27.2 (25.9 - 28.5)
	Male	3829	1178	30.8 (29.3 - 32.2)
	Not specified	498	20	4.0 (2.6 - 6.1)
Age group	<1 month	159	31	19.5 (14.1 - 26.3)
	1-23 months	125	31	24.8 (18.1 - 33.1)
	2-15 years	144	41	28.5 (21.7 - 36.3)
	16-29 years	448	94	21.0 (17.5 - 25.0)
	30-49 years	960	266	27.7 (25.0 - 30.6)
	50-64 years	1221	365	29.9 (27.4 - 32.5)
	65-79 years	2494	809	32.4 (30.6 - 34.3)
	80+ years	3517	855	24.3 (22.9 - 25.8)
	Not specified	26	2	7.7 (2.1 - 24.1)
McCabe score	Non-fatal	3734	961	25.7 (24.4 - 27.2)
	Ultimately fatal	1061	325	30.6 (27.9 - 33.5)
	Rapidly fatal	394	128	32.5 (28.1 - 37.3)
	Unknown/Not specified	3905	1080	27.7 (26.3 - 29.1)
Ward Specialty	Geriatrics	592	127	21.5 (18.3 - 24.9)
	ICU	154	85	55.2 (47.3 - 62.8)
	Medical	2631	913	34.7 (32.9 - 36.5)
	Obstetrics/Gynaecology	143	34	23.8 (17.5 - 31.4)
	Paediatrics	165	54	32.7 (26.0 - 40.2)
	SCBU/Paediatric ICU	104	28	26.9 (19.3 - 36.2)
	Surgical	1363	428	31.4 (29.0 - 33.9)
	Other	3942	825	20.9 (19.7 - 22.2)

Characteristics of Prescribed antimicrobials

Overall, of patients receiving at least one antimicrobial, 68.7% received a single agent, 25.6% received two, and 5.7% received between three and eight agents. In the non-acute sector, only 14.2% of patients received more than one agent.

Table 1.4c - Number of antimicrobials prescribed per patient in Wales

Number of antimicrobials	Number of patients (n=9094)	% of patients
0 (no antimicrobials)	6600	72.6
1	1715	18.9
2	638	7.0
3	115	1.3
4	19	0.2
5	6	0.1
8	1	0.0

Distribution of antimicrobials by antimicrobial group

Overall the commonest group of antimicrobials used was "Combinations of penicillins including beta-lactamase inhibitors" (e.g. co-amoxiclav) which was received by 32% of patients treated with an antimicrobial/s. In the non-acute sector, the commonest group was "Trimethoprim and derivatives" which were received by 22% of patients. Of note, fluoroquinolones and second-generation cephalosporins (e.g. cefuroxime) which have been restricted by some Health Boards were the 7th and 15th commonest groups respectively.

Table 1.4d - Number and percentage of patients prescribed antimicrobials in Wales

Order	Antimicrobial group	ATC4	Number of patients prescribed (n=2494)	% of patients prescribed
1	Combinations of penicillins, incl. beta-lactamase inhibitors	J01CR	797	32.0
2	Beta-lactamase resistant penicillins	J01CF	230	9.2
3	Trimethoprim and derivatives	J01EA	220	8.8
4	Macrolides	J01FA	212	8.5
5	Imidazole derivatives	J01XD	190	7.6
6	Penicillins with extended spectrum	J01CA	179	7.2
7	Fluoroquinolones	J01MA	178	7.1
8	Intestinal antiinfectives, Antibiotics	A07AA	177	7.1
9	Tetracyclines	J01AA	146	5.9
10	Carbapenems	J01DH	134	5.4
11	Glycopeptide antibacterials	J01XA	130	5.2
12	Nitroimidazole derivatives	P01AB	128	5.1
13	Beta-lactamase sensitive penicillins	J01CE	111	4.5
14	Triazole derivatives	J02AC	107	4.3
15	Second-generation cephalosporins	J01DC	96	3.8
16	Other aminoglycosides	J01GB	83	3.3
17	First-generation cephalosporins	J01DB	63	2.5
18	Third-generation cephalosporins	J01DD	57	2.3
19	Nitrofuran derivatives	J01XE	57	2.3
20	Combinations of sulfonamides and trimethoprim, incl. derivatives	J01EE	35	1.4
21	Lincosamides	J01FF	35	1.4
22	Antibiotics for treatment of TB	J04AB	34	1.4
23	Steroid antibacterials	J01XC	26	1.0
24	Other drugs for treatment of TB	J04AK	9	0.4
25	Polymyxins	J01XB	7	0.3
26	Other antibacterials	J01XX	5	0.2
27	Antimycotic, Antibiotics	J02AA	3	0.1
28	Other antimycotics for systemic use	J02AX	3	0.1
29	Hydrazides	J04AC	3	0.1
30	Combinations of drugs for treatment of TB	J04AM	3	0.1
31	Amphenicols	J01BA	2	0.1
32	Drug name not stated	J01	2	0.1

Characteristics of Antimicrobial Use

Overall 56.7% of antimicrobials were given orally, although in the non-acute sector 94.1% were given orally.

Community-acquired infection was the commonest indication (48.4%) for an antimicrobial overall followed by hospital acquired infection (31.1%). However, in the non-acute sector, hospital acquired infections were the commonest indication (53.6%).

Overall, the commonest sites of infection were respiratory tract (24.1%), skin, soft tissue, bone and joint (16.3%), and UT (12.5%). Within the acute sector, the commonest sites were respiratory tract (24.7%), skin, soft tissue, bone and joint (15.9%), and GI tract (11.9%). For the non-acute sector, the commonest sites were UT (23.3%), skin, soft tissue, bone and joint (19.7%), and respiratory tract (18.7%).

Table 1.4e - Distribution of prescriptions by characteristics of prescription in Wales

Characteristic	Indication	Number	%
Route	Parenteral	1489	43.0
Drug level	Oral	1964	56.7
	Rectal	1	0.0
	Inhalation	8	0.2
	Not specified	0	0.0
Indication	Community acquired infection (A)	1675	48.4
Drug level	Hospital acquired infection (B1-B5)	1076	31.1
	Long term/intermediate care acquired infection (B6)	39	1.1
	Surgical prophylaxis - once only (C1)	32	0.9
	Surgical prophylaxis - 24 hours (C2)	38	1.1
	Surgical prophylaxis - >24 hours (C3)	77	2.2
	Medical prophylaxis (D)	378	10.9
	Other	9	0.3
	Not specified	138	4.0
Anatomical site	CNS infection	28	0.8
Drug level	CNS prophylaxis	2	0.1
	CNS indication not specified	2	0.1
	CNS total	**32**	**0.9**
	CVS infection	33	1.0
	CVS prophylaxis	19	0.5
	CVS indication not specified	0	0.0
	CVS total	**52**	**1.5**
	ENT infection	163	4.7
	ENT prophylaxis	32	0.9
	ENT indication not specified	12	0.3
	ENT total	**207**	**6.0**
	EYE infection	0	0.0
	EYE prophylaxis	2	0.1
	EYE indication not specified	0	0.0
	EYE total	**2**	**0.1**
	GI infection	378	10.9
	GI prophylaxis	46	1.3
	GI indication not specified	16	0.5
	GI total	**440**	**12.7**
	GUOB infection	65	1.9
	GUOB prophylaxis	14	0.4
	GUOB indication not specified	2	0.1
	GUOB total	**81**	**2.3**
	ND infection	287	8.3
	ND prophylaxis	120	3.5
	ND indication not specified	19	0.5
	ND total	**425**	**12.3**
	RESP infection	833	24.1
	RESP prophylaxis	92	2.7
	RESP indication not specified	7	0.2
	RESP total	**932**	**26.9**
	SSTBJ infection	564	16.3
	SSTBJ prophylaxis	87	2.5
	SSTBJ indication not specified	20	0.6
	SSTBJ total	**671**	**19.4**
	UT infection	432	12.5
	UT prophylaxis	111	3.2
	UT indication not specified	7	0.2
	UT total	**550**	**15.9**

Key: CNS – central nervous system; CVS – cardiovascular system; ENT – ear - nose - throat; GI – gastrointestinal; GUOB – genitourinary system/obstetrics; ND – systemic; RESP – respiratory; SSTBJ – skin - soft tissue - bone & joint; UT – urinary tract.

Table 1.4f - Antimicrobial regimens prescribed as surgical prophylaxis in Wales by procedure site (patient level)

Procedure site	Antimicrobial regimens	Number of patients receiving AM regimen (n=115)	% of patients receiving AM regimen
Surgery of Cardiovascular System	Flucloxacillin	4	3.5
	Co-amoxiclav	2	1.7
	Teicoplanin	2	1.7
	Vancomycin	2	1.7
	Amoxicillin & Flucloxacillin	1	0.9
	Cefotaxime & Metronidazole	1	0.9
	Gentamicin & Vancomycin	1	0.9
	Not stated	1	0.9
ENT Surgery	Cefalexin	2	1.7
	Ceftriaxone & Metronidazole	1	0.9
	Cefuroxime	1	0.9
	Co-amoxiclav	1	0.9
	Co-amoxiclav & Metronidazole	1	0.9
Surgery of GI tract	Cefuroxime & Metronidazole	10	8.7
	Co-amoxiclav	4	3.5
	Ciprofloxacin	3	2.6
	Metronidazole	3	2.6
	Cefuroxime	2	1.7
	Cefalexin	1	0.9
	Co-amoxiclav & Metronidazole	1	0.9
	Gentamicin	1	0.9
	Vancomycin	1	0.9
Surgery of Genito-urinary tract	Co-amoxiclav	5	4.3
	Cefalexin	2	1.7
	Cefalexin & Metronidazole	1	0.9
	Cefuroxime & Metronidazole	1	0.9
Skin Soft tissue Bone & Joint Surgery	Cefuroxime	16	13.9
	Co-amoxiclav	14	12.2
	Flucloxacillin	5	4.3
	Cefuroxime & Gentamicin	4	3.5
	Erythromycin	2	1.7
	Cefuroxime & Teicoplanin	1	0.9
	Ciprofloxacin	1	0.9
	Ciprofloxacin & Co-amoxiclav	1	0.9
	Co-amoxiclav & Teicoplanin	1	0.9
	Flucloxacillin & Gentamicin	1	0.9
	Gentamicin	1	0.9
	Metronidazole	1	0.9
	Metronidazole & Teicoplanin	1	0.9
	Teicoplanin	1	0.9
Surgery of Urinary tract	Ciprofloxacin	3	2.6
	Co-amoxiclav	2	1.7
	Co-amoxiclav & Gentamicin	1	0.9
	Gentamicin	1	0.9
	Meropenem	1	0.9
	Trimethoprim	1	0.9

Table 1.4g - Distribution of Top 10 antimicrobials in Wales by key infection types (drug level)

Procedure site	Top 10 antimicrobials	Number of antimicrobials for infection (n = 2790)	% of antimicrobials for infection
Respiratory infection	Co-amoxiclav	183	6.6
	Piperacillin/Tazobactam	127	4.6
	Clarithromycin	123	4.4
	Amoxicillin	105	3.8
	Doxycycline	93	3.3
	Metronidazole	35	1.3
	Meropenem	26	0.9
	Levofloxacin	24	0.9
	Ciprofloxacin	10	0.4
	Others	107	3.8
Systemic infection	Piperacillin/Tazobactam	63	2.3
	Co-amoxiclav	42	1.5
	Meropenem	32	1.1
	Vancomycin	22	0.8
	Gentamicin	16	0.6
	Fluconazole	15	0.5
	Flucloxacillin	12	0.4
	Metronidazole	12	0.4
	Ciprofloxacin	11	0.4
	Others	62	2.2
Gastrointestinal infection	Metronidazole	141	5.1
	Co-amoxiclav	50	1.8
	Piperacillin/Tazobactam	41	1.5
	Vancomycin	38	1.4
	Cefuroxime	19	0.7
	Amoxicillin	11	0.4
	Ciprofloxacin	11	0.4
	Fluconazole	10	0.4
	Teicoplanin	10	0.4
	Others	47	1.7
Urinary tract infection	Trimethoprim	155	5.6
	Co-amoxiclav	97	3.5
	Ciprofloxacin	38	1.4
	Nitrofurantoin	32	1.1
	Cefalexin	25	0.9
	Amoxicillin	20	0.7
	Piperacillin/Tazobactam	18	0.6
	Meropenem	10	0.4
	Cefuroxime	6	0.2
	Others	31	1.1
Skin soft tissue bone & joint infection	Flucloxacillin	163	5.8
	Co-amoxiclav	55	2.0
	Metronidazole	47	1.7
	Benzylpenicillin	38	1.4
	Clindamycin	32	1.1
	Teicoplanin	25	0.9
	Ciprofloxacin	24	0.9
	Fusidic acid	22	0.8
	Vancomycin	22	0.8
	Others	136	4.9
All infections		**2790**	

Table 1.4h - Distribution of top 10 antimicrobial regimens in Wales by key infection types (patient level) – Treatment of single infections only

Procedure site	Top 10 regimens	Number of AM regimens	% regimens
Respiratory Infection only	Co-amoxiclav	183	6.6
	Piperacillin/Tazobactam	127	4.6
	Doxycycline	123	4.4
	Amoxicillin	105	3.8
	Clarithromycin & Co-amoxiclav	93	3.3
	Clarithromycin	35	1.3
	Amoxicillin & Clarithromycin	26	0.9
	Levofloxacin	24	0.9
	Clarithromycin & Piperacillin/Tazobactam	10	0.4
	Others	107	3.8
Systemic infection only	Piperacillin/Tazobactam	42	2.2
	Co-amoxiclav	35	1.8
	Meropenem	21	1.1
	Flucloxacillin	7	0.4
	Ciprofloxacin	6	0.3
	Vancomycin	6	0.3
	Amoxicillin	5	0.3
	Gentamicin & Piperacillin/Tazobactam	5	0.3
	Metronidazole & Piperacillin/Tazobactam	5	0.3
	Others	62	3.2
Gastrointestinal infection only	Metronidazole	34	1.8
	Co-amoxiclav	31	1.6
	Vancomycin	23	1.2
	Metronidazole & Piperacillin/Tazobactam	20	1.0
	Cefuroxime & Metronidazole	14	0.7
	Co-amoxiclav & Metronidazole	14	0.7
	Piperacillin/Tazobactam	13	0.7
	Ciprofloxacin	8	0.4
	Meropenem	6	0.3
	Others	54	2.8
Urinary tract infection only	Trimethoprim	146	7.6
	Co-amoxiclav	91	4.8
	Ciprofloxacin	34	1.8
	Nitrofurantoin	25	1.3
	Cefalexin	24	1.3
	Amoxicillin	19	1.0
	Piperacillin/Tazobactam	14	0.7
	Meropenem	9	0.5
	Cefuroxime	4	0.2
	Others	32	1.7
Skin soft tissue bone & joint infection only	Flucloxacillin	73	3.8
	Co-amoxiclav	33	1.7
	Benzylpenicillin & Flucloxacillin	28	1.5
	Clindamycin	20	1.0
	Flucloxacillin & Penicillin V	10	0.5
	Ciprofloxacin	9	0.5
	Flucloxacillin & Fusidic Acid	9	0.5
	Teicoplanin	9	0.5
	Flucloxacillin & Metronidazole	8	0.4
	Others	163	8.5
All infections		**1912**	

Table 1.4i - Compliance with guidance

Indicator	Compliant	Number of prescriptions	Proportion (%)
Reason recorded in notes	Yes	2599	75.1
	No	527	15.2
	Unknown	336	9.7
Length of prophylaxis	Once only (C1)	32	21.8
	24 hours (C2)	38	25.9
	>24 hours (C3)	77	52.4

CHAPTER TWO – <u>ACUTE SECTOR</u>

Previous prevalence surveys have focussed on the acute sector in the main. Therefore the data presented in this part of the report are the most comparable with prevalence surveys conducted in the acute sector previously. Data are presented in tables as for the all Wales section and are referred to and considered in the narrative of the all Wales section.

Within this chapter, sections 2 – 4 present data for the acute sector in Wales. The acute sector is defined as per the ECDC protocol[3] / Wales PPS protocol[15] to include all acute sector wards, but excluding long term care wards within acute sector facilities. Long term care psychiatric wards have therefore been excluded from this analysis – these wards have been included in the non-acute sector analysis – chapter three.

Section 2.5 presents data for the acute hospitals in Wales (including all wards physically within those hospitals) categorised according to the ECDC survey protocol[3], as primary, secondary, tertiary or specialist (see Appendix III for definitions). Data are presented showing the prevalence of HAI, MDU and AMU within these categories of acute hospitals. There are 20 acute hospitals in Wales (see Table 1.1b).

Results of this PPS are compared with the results of the 2006 prevalence survey in Section 2.6. Data from the 2011 survey is stratified to exclude paediatrics and rehabilitation specialities for comparability.

SECTION 2.1: DEMOGRAPHICS

Table 2.1a – Acute sector in Wales demographics

Number of wards	Number of beds	Number of patients surveyed
366	7701	6588

Table 2.1b – Number and percentage of patients surveyed in the acute sector in Wales by ward specialty group

Specialty group	Number of wards	Number of patients surveyed	% of patients surveyed
Geriatrics	8	236	3.6
ICU	26	211	3.2
Medical	122	2316	35.2
Obstetrics/Gynaecology	32	506	7.7
Paediatrics	34	188	2.9
Surgical	96	1338	20.3
Other*	48	1793	27.2
Acute sector total	**366**	**6588**	

*Psychiatrics; rehabilitation; combination of specialties (mixed ward); others not listed.

Figure 2.1 – Number of patients surveyed in the acute sector in Wales by age and sex
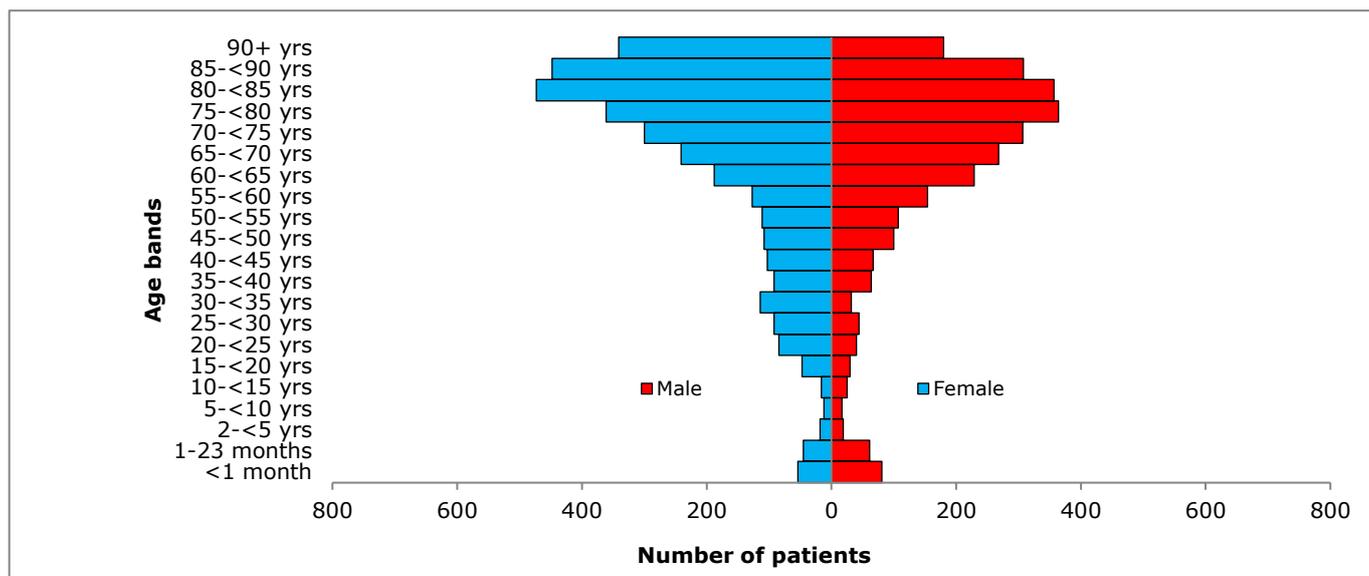
Table 2.1c – Number and percentage of patients surveyed in the acute sector in Wales by risk factor

Risk factor		Number of patients surveyed	% of patients surveyed
McCabe score*	Non-fatal[1]	2805	42.6
	Ultimately fatal[2]	711	10.8
	Rapidly fatal[3]	286	4.3
	Unknown/Not specified	2786	42.3
Surgery since admission to hospital	Non-NHSN surgery**	272	4.1
	NHSN surgery**	1208	18.3
	No surgery	4624	70.2
	Unknown/Not specified	484	7.3
Acute sector total		**6588**	

1:expected survival at least 5 years; 2:between 1 and 5 years; 3:expected death within 1 year.
*Severity index of underlying medical condition.
**List of surgical procedures included in the CDC surveillance program[17]

SECTION 2.2: HAI

Table 2.2a – Number and prevalence of patients surveyed in the acute sector in Wales with a HAI

Number of patients surveyed	Number of patients surveyed with HAI	Prevalence (%) of HAI (95% CI)*
6588	282	4.3 (3.8 - 4.8)

*95% CI – indicate the range of values within which we can be confident that the true value lies.

Table 2.2b – Number and prevalence of patients surveyed in the acute sector in Wales with a HAI by intrinsic factors

Intrinsic factors		Number of patients surveyed	Number of patients with HAI	Prevalence (%) of HAI (95% CI)*
Gender	Female	3394	128	3.8 (3.2 – 4.5)
	Male	2860	149	5.2 (4.5 – 6.1)
	Not specified	334	5	1.5 (0.6 – 3.5)
Age group	<1 month	159	3	1.9 (0.6 – 5.4)
	1-23 months	125	7	5.6 (2.7 – 11.1)
	2-15 years	143	1	0.7 (0.1 – 3.9)
	16-29 years	340	6	1.8 (0.8 – 3.8)
	30-49 years	710	31	4.4 (3.1 – 6.1)
	50-64 years	954	47	4.9 (3.7 – 6.5)
	65-79 years	1923	105	5.5 (4.5 – 6.6)
	80+ years	2209	81	3.7 (3.0 – 4.5)
	Not specified	25	1	4.0 (0.7 – 19.5)
McCabe score**	Non-fatal[1]	2805	90	3.2 (2.6 – 3.9)
	Ultimately fatal[2]	711	36	5.1 (3.7 – 6.9)
	Rapidly fatal[3]	286	20	7.0 (4.6 – 10.6)
	Unknown/Not specified	2786	136	4.9 (4.1 – 5.8)
Specialty group	Geriatrics	398	8	2.0 (1.0 – 3.9)
	ICU	102	13	12.8 (7.6 – 20.6)
	Medical	2993	125	4.2 (3.5 – 5.0)
	Obstetrics/Gynaecology	362	9	2.5 (1.3 – 4.7)
	Paediatrics	298	5	1.7 (0.7 – 3.9)
	Surgical	2145	114	5.3 (4.4 – 6.4)
	Other	290	8	2.8 (1.4 – 5.4)

*95% CI – indicate the range of values within which we can be confident that the true value lies.
*Severity index of underlying medical condition.
1:expected survival at least 5 years; 2:between 1 and 5 years; 3:expected death within 1 year.

Table 2.2c – Number and prevalence of HAI in the acute sector in Wales by HAI type

Number of patients in acute sector	HAI type	Number of HAI*	% of HAI	Prevalence (%) of HAI by type
6588		299		
	SSI	71	23.7	1.1
	UTI	50	16.7	0.8
	Pneumonia	37	12.4	0.6
	GI infection	35	11.7	0.5
	BSI	33	11.0	0.5
	Skin and soft tissue infection	22	7.4	0.3
	LRT infection	15	5.0	0.2
	Eyes and ENT infection	10	3.3	0.2
	Systemic infection	8	2.7	0.1
	CRI-CVC	5	1.7	0.1
	Reproductive tract infection	3	1.0	0.1
	Neonatal infection	3	1.0	0.1
	CRI-PVC	3	1.0	0.1
	Bone and joint infection	2	0.7	<0.1
	CNS infection	1	0.3	<0.1
	CVS infection	1	0.3	<0.1

* Counts the number of HAI (i.e. Patients may have multiple HAI).
Key: UTI – urinary tract infection; SSI – surgical site infection; GI – gastrointestinal infection; BSI – bloodstream infection; LRT – lower respiratory tract; ENT – ear - nose - throat; CRI-CVC – catheter related infection (central venous catheter); CRI-PVC – catheter related infection (peripheral vascular cannula); CNS – central nervous system; CVS – cardiovascular system.

Table 2.2d – Number and percentage of bloodstream infections in the acute sector in Wales by source of bloodstream infection

BSI source	Number of BSI	% of BSI
CVC	4	12.1
PVC	1	3.0
Pulmonary infection	2	6.1
UTI	4	12.1
SSI	1	3.0
Digestive tract infection	1	3.0
Skin and soft tissue infection	2	6.1
Other infection	0	0.0
Unknown/Not specified	18	54.5
Acute sector total	33	

Key: CVC – Central venous catheter; PVC – Peripheral vascular cannula; UTI - urinary tract infection; SSI – Surgical site infection.

SECTION 2.3: DEVICE UTILISATION

Table 2.3a – Number of patients surveyed in the acute sector in Wales by device utilisation

Number of Patients surveyed	Number of Patients with one or more device in situ	Device	Number of devices in situ	% Device utilisation
6588	3026			45.9
		UC	1268	19.2
		PVC	2302	34.9
		CVC	334	5.1
		Intubation	166	2.5

*A patient may have more than one device in situ at one time. For example, although 1268 patients had a urinary catheter in situ, 535 of these patients also had a peripheral vascular cannula in situ.
Key: UC – urinary catheter; PVC – peripheral vascular cannula; CVC – Central venous catheter.

Table 2.3b – Number and percentage of HAI in the acute sector in Wales with a device in situ prior to onset by HAI type

Total number of HAI in acute sector in Wales	HAI type	Number of HAI	HAI with device in situ prior to onset	% of total HAI
300				
	UTI (urinary catheter within 7 days prior to onset)	50	30	10.0
	Pneumonia (ventilated within 48 hours prior to onset)	37	9	3.0
	BSI (CVC within 48 hours prior to onset)	33	5	1.7

Key: UTI – urinary tract infection; BSI – bloodstream infection.

SECTION 2.4: ANTIMICROBIAL USAGE

Overall Prevalence of Antimicrobial Prescribing

Figure 2.4 - Prevalence of antimicrobial prescribing in the acute sector in Wales by indication (with 95% Confidence intervals)

Community acquired infection
16.7 (15.8 - 17.6)

Hospital acquired infection
9.4 (8.7 - 10.1)

Long term/intermediate care acquired infection
0.3 (0.2- 0.5)

Surgical prophylaxis
1.5 (1.2 - 1.4)

Medical prophylaxis
2.8 (2.4 - 3.2)

Other
0.1 (0.0 - 0.2)

Not recorded
0.8 (0.6 - 1.1)

Mixed Indications
1.2 (0.9 - 1.5)

No antimicrobials
67.3 (66.1 - 68.4)
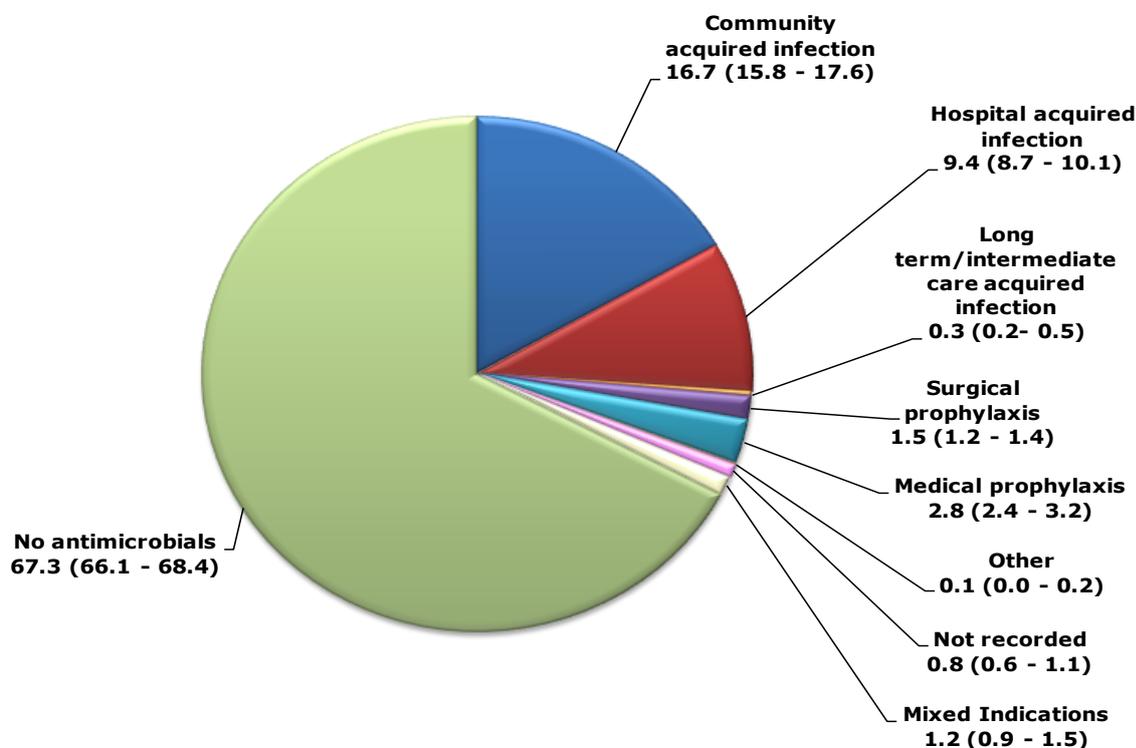
The prevalence of prescribing was greatest in the acute sector (32.7%) compared to non-acute sector (13.5%).

Table 2.4a Overall prevalence of antimicrobial prescribing in the acute sector in Wales

Number of patients surveyed	Number of patients receiving antimicrobials	Prevalence (%) of antimicrobial prescribing (95% CI)
6588	2156	32.7 (31.6 – 33.9)

Prevalence of Antimicrobial Prescribing by Intrinsic Factors

Table 2.4b – Overall prevalence of antimicrobial prescribing in the acute sector in Wales by intrinsic factors

Intrinsic factors		Number of patients surveyed	Number of patients receiving antimicrobials	Prevalence (%) of antimicrobial prescribing (95% CI)
Gender	Female	3394	1078	31.8 (30.2 - 33.4)
	Male	2860	1063	37.2 (35.4 - 39.0)
	Not specified	335	15	4.5 (2.7 - 7.3)
Age group	<1 month	159	31	19.5 (14.1 - 26.3)
	1-23 months	125	31	24.8 (18.1 – 33.0)
	2-15 years	143	40	28.0 (21.3 - 35.8)
	16-29 years	340	91	26.8 (22.3 - 31.7)
	30-49 years	710	247	34.8 (31.4 - 38.4)
	50-64 years	954	336	35.2 (32.3 - 38.3)
	65-79 years	1923	728	37.9 (35.7 - 38.0)
	80+ years	2209	650	29.4 (27.6 - 31.4)
	Not specified	25	2	8.0 (2.2 - 25.0)
McCabe score	Non-fatal	2805	850	30.3 (28.6 - 32.0)
	Ultimately fatal	711	261	36.7 (33.2 - 40.3)
	Rapidly fatal	286	102	35.7 (30.3 - 41.4)
	Unknown/Not specified	2786	943	33.8 (32.1 - 35.6)
Ward specialty	Geriatrics	236	55	23.3 (18.4 - 29.1)
	ICU	154	85	55.2 (47.3 - 62.8)
	Medical	2316	847	36.6 (34.6 - 38.6)
	Obstetrics/Gynaecology	143	34	23.8 (17.5 – 31.4)
	Paediatrics	165	54	32.7 (26.0 – 40.2)
	SCBU/Paediatric ICU	104	28	26.9 (19.3 – 36.2)
	Surgical	1299	419	32.3 (29.8 - 34.8)
	Other	2171	634	29.2 (27.3 - 31.2)

Table 2.4c Number of antimicrobials prescribed per patient in the acute sector in Wales

Number of antimicrobials	Number of patients (n=6588)	% of patients
0 (no antimicrobials)	4432	67.3
1	1425	21.6
2	593	9.0
3	112	1.7
4	19	0.3
5	6	0.1
8	1	<0.1

Distribution of antimicrobials by antimicrobial group

Table 2.4d Number and percentage of patients prescribed antimicrobials in the acute sector in Wales

Order	Antimicrobial group	ATC4	Number of patients prescribed (n=2156)	% of patients prescribed
1	Combinations of penicillins – including beta-lactamase inhibitors	J01CR	742	34.4
2	Beta-lactamase resistant penicillins	J01CF	195	9.0
3	Macrolides	J01FA	188	8.7
4	Imidazole derivatives	J01XD	188	8.7
5	Fluoroquinolones	J01MA	154	7.1
6	Intestinal antiinfectives, Antibiotics	A07AA	149	6.9
7	Penicillins with extended spectrum	J01CA	147	6.8
8	Trimethoprim and derivatives	J01EA	145	6.7
9	Carbapenems	J01DH	133	6.2
10	Glycopeptide antibacterials	J01XA	126	5.8
11	Tetracyclines	J01AA	118	5.5
12	Nitroimidazole derivatives	P01AB	108	5.0
13	Triazole derivatives	J02AC	103	4.8
14	Beta-lactamase sensitive penicillins	J01CE	97	4.5
15	Second-generation cephalosporins	J01DC	96	4.5
16	Other aminoglycosides	J01GB	82	3.8
17	Third-generation cephalosporins	J01DD	55	2.6
18	First-generation cephalosporins	J01DB	51	2.4
19	Combinations of sulfonamides and trimethoprim, incl. derivatives	J01EE	35	1.6
20	Lincosamides	J01FF	33	1.5
21	Antibiotics for treatment of TB	J04AB	33	1.5
22	Nitrofuran derivatives	J01XE	32	1.5
23	Steroid antibacterials	J01XC	26	1.2
24	Other drugs for treatment of TB	J04AK	8	0.4
25	Polymyxins	J01XB	7	0.3
26	Other antibacterials	J01XX	5	0.2
27	Antimycotic, Antibiotics	J02AA	3	0.1
28	Other antimycotics for systemic use	J02AX	3	0.1
29	Hydrazides	J04AC	3	0.1
	Combinations of drugs for treatment of TB	J04AM	3	0.1
31	Amphenicols	J01BA	2	0.1
32	Drug name not stated	J01	2	0.1

Characteristics of Antimicrobial Use

Table 2.4e Distribution of prescriptions by characteristics of prescription in the acute sector in Wales

Characteristic	Indication	Number	%
Route Drug level	Parenteral	1466	47.7
	Oral	1597	52.0
	Rectal	1	0.0
	Inhalation	8	0.3
	Not specified	0	0.0
Indication Drug level	Community acquired infection (A)	1599	52.1
	Hospital acquired infection (B1-B5)	867	28.2
	Long term/intermediate care acquired infection (B6)	38	1.2
	Surgical prophylaxis - once only (C1)	31	1.0
	Surgical prophylaxis - 24 hours (C2)	38	1.2
	Surgical prophylaxis - >24 hours (C3)	73	2.4
	Medical prophylaxis (D)	321	10.4
	Other	7	0.2
	Not specified	98	3.2
Anatomical site Drug level	CNS infection	28	0.9
	CNS prophylaxis	2	0.1
	CNS indication not specified	0	0.0
	CNS total	**30**	**1.0**
	CVS infection	33	1.1
	CVS prophylaxis	19	0.6
	CVS indication not specified	0	0.0
	CVS total	**52**	**1.7**
	ENT infection	141	4.6
	ENT prophylaxis	32	1.0
	ENT indication not specified	8	0.3
	ENT total	**181**	**5.9**
	EYE infection	0	0.0
	EYE prophylaxis	2	0.1
	EYE indication not specified	0	0.0
	EYE total	**2**	**0.1**
	GI infection	365	11.9
	GI prophylaxis	46	1.5
	GI indication not specified	15	0.5
	GI total	**426**	**13.9**
	GUOB infection	62	2.0
	GUOB prophylaxis	14	0.5
	GUOB indication not specified	2	0.1
	GUOB total	**78**	**2.5**
	ND infection	282	9.2
	ND prophylaxis	117	3.8
	ND indication not specified	18	0.6
	ND total	**416**	**13.5**
	RESP infection	760	24.7
	RESP prophylaxis	86	2.8
	RESP indication not specified	5	0.2
	RESP total	**851**	**27.7**
	SSTBJ infection	487	15.9
	SSTBJ prophylaxis	76	2.5
	SSTBJ indication not specified	12	0.4
	SSTBJ total	**575**	**18.7**
	UT infection	341	11.1
	UT prophylaxis	69	2.2
	UT indication not specified	4	0.1
	UT total	**414**	**13.5**

Table 2.4f Distribution of top 10 antimicrobial regimens in the acute sector in Wales by key infection types (patient level)

Procedure Site	Top 10 regimens	Number of AM regimens (n = 1682)	% of AM regimens
Respiratory infection only	Co-amoxiclav	108	6.4
	Piperacillin/Tazobactam	76	4.5
	Doxycycline	61	3.6
	Amoxicillin	55	3.3
	Clarithromycin & Co-amoxiclav	32	1.9
	Clarithromycin	25	1.5
	Amoxicillin & Clarithromycin	24	1.4
	Levofloxacin	16	1.0
	Clarithromycin & Piperacillin/Tazobactam	16	1.0
	Others	131	7.8
Systemic infection only	Piperacillin/Tazobactam	42	2.5
	Co-amoxiclav	35	2.1
	Meropenem	21	1.2
	Flucloxacillin	7	0.4
	Ciprofloxacin	6	0.4
	Vancomycin	6	0.4
	Amoxicillin	5	0.3
	Gentamicin & Piperacillin/Tazobactam	5	0.3
	Metronidazole & Piperacillin/Tazobactam	5	0.3
	Others	58	3.4
Gastrointestinal infection only	Metronidazole	32	1.9
	Co-amoxiclav	31	1.8
	Metronidazole & Piperacillin/Tazobactam	20	1.2
	Vancomycin	17	1.0
	Cefuroxime & Metronidazole	14	0.8
	Co-amoxiclav & Metronidazole	13	0.8
	Piperacillin/Tazobactam	13	0.8
	Ciprofloxacin	8	0.5
	Meropenem	6	0.4
	Others	53	3.2
Urinary tract infection only	Trimethoprim	100	5.9
	Co-amoxiclav	80	4.8
	Ciprofloxacin	30	1.8
	Cefalexin	19	1.1
	Nitrofurantoin	17	1.0
	Amoxicillin	14	0.8
	PipTazo	14	0.8
	Meropenem	9	0.5
	Cefuroxime	4	0.2
	Others	28	1.7
Skin soft tissue bone & joint infection only	Flucloxacillin	57	3.4
	Co-amoxiclav	27	1.6
	Benzylpenicillin & Flucloxacillin	27	1.6
	Clindamycin	20	1.2
	Flucloxacillin & Penicillin V	5	0.3
	Ciprofloxacin	5	0.3
	Flucloxacillin & Fusidic Acid	9	0.5
	Teicoplanin	9	0.5
	Flucloxacillin & Metronidazole	7	0.4
	Others	140	8.3
All infections		**1682**	

Table 2.4g Compliance with guidance in the acute sector in Wales

Indicator	Compliant	Number of prescriptions	Proportion (%)
Reason recorded in notes	Yes	2337	76.1
	No	444	14.5
	Unknown	291	9.5
Length of prophylaxis	Once only (C1)	31	21.8
	24 hours (C2)	38	26.8
	>24 hours (C3)	73	51.4

SECTION 2.5: HAI BY HOSPITAL TYPE

Within the ECDC protocol acute hospitals were categorised as primary, secondary, tertiary or specialised. The majority of acute hospitals in Wales were either secondary (13) or tertiary (4), with 179 and 96 HAIs recorded, respectively (Table 2.5a). See Appendix III for full details of the categorisations.

A higher prevalence of HAI was noted in the specialist and primary level hospitals but it should be noted that only one hospital was surveyed in the specialist hospital and two in the primary level hospital categories.

Table 2.5a – Number and prevalence of HAI in Wales by hospital type

Hospital type	Number of patients surveyed	Number of HAI	Prevalence (%) of HAI (95% CI)*
Primary	91	6	6.6 (3.1 – 13.7)
Secondary	4513	179	4.0 (3.4 – 4.6)
Tertiary	2151	96	4.5 (3.7 – 5.4)
Specialist	33	2	6.1 (1.7 – 19.6)

*95% CI – indicate the range of values within which we can be confident that the true value lies.

Table 2.5b – Number and percentage of patients surveyed in Wales by device utilisation and hospital type

Hospital type	Number of patients surveyed	Number of patients with one or more devices in situ	Device	Number of devices in situ	% Device utilisation
Primary	91	23			
			UC	21	23.1
			PVC	8	8.8
			CVC	4	4.4
			Intubation	4	4.4
Secondary	4513	1998			
			UC	802	17.8
			PVC	1576	34.9
			CVC	163	3.6
			Intubation	102	2.3
Tertiary	2151	985			
			UC	439	20.4
			PVC	702	32.6
			CVC	160	7.4
			Intubation	60	2.8
Specialist	33	23			
			UC	9	27.3
			PVC	16	48.5
			CVC	7	21.2
			Intubation	0	0.0

*A patient may have more than one device in situ at one time. For example, although 439 patients in Tertiary had a UC in situ, 153 of these patients also had a PVC in situ.
Key: UC – urinary catheter; PVC – peripheral vascular cannula; CVC – central venous catheter.

Table 2.5c – Number and prevalence of antimicrobial prescribing in Wales by hospital type

Hospital type	Number of patients surveyed	Number of patients receiving antimicrobials	Prevalence (%) of HAI (95% CI)*
Primary	91	16	17.6 (11.1 – 26.7)
Secondary	4513	1484	32.9 (31.5 – 34.3)
Tertiary	2151	659	30.6 (28.7 – 32.6)
Specialist	33	17	51.5 (35.2 – 67.5)

*95% CI – indicate the range of values within which we can be confident that the true value lies.

SECTION 2.6: 2006/2011 PPS COMPARISON

The 2006 prevalence survey was co-ordinated by the WHAIP team in Wales, using the protocol developed by the Hospital Infection Society Prevalence Survey Steering Group[13]. The patients included in the 2006 survey were adult in-patients including those on adolescent units and young people on adult wards. Patients in day-centre rehabilitation, psychiatric patients, day case patients, patients in emergency units, admissions units, paediatric units and labour suite were excluded from the survey. The 2011 survey in Wales included in-patients across the whole acute sector and non-acute sectors within NHS Wales and included all the patient groups excluded in the 2006 survey apart from day-case patients.

Within the 2006 prevalence survey HAI were defined using the Centers for Disease Control and Prevention (CDC) definitions of nosocomial infections[18]. The 2011 European PPS used a mixture of European case definitions[19,20], and CDC case definitions used by CDC's National Healthcare Safety Network (NHSN, formerly NNIS)[21].

The data from the 2011 survey has been stratified to allow for comparison with the 2006 data.

Table 2.6a – Comparison of number and prevalence of HAI (2006 and 2011)

Year	Number of patients surveyed	Number of patients with HAI	Prevalence (%) of HAI (95% CI)
2006	5734	364	6.4 (5.7 – 7.0)
2011 (stratified)	6217	271	4.4 (3.9 - 4.9)

Table 2.6b – Comparison of the prevalence of HAI by HAI type (2006 and 2011)

HAI type	2006 prevalence of HAI* (%)	2011 prevalence (%) of HAI* (stratified)
UTI	15.5	17.5
SSI	18.0	24.3
GI infection	15.5	12.5
Pneumonia	9.8	12.9
BSI	8.0	11.1
Skin and soft tissue infection	12.5	7.5
LRT infection	14.3	5.4
Eyes and ENT infection	3.0	3.6
Systemic infection	1.5	2.9
Reproductive tract infection	0.8	1.1
Bone and joint infection	1.0	0.7
CNS infection	0.3	0.4
CVS infection	0.0	0.4
Total	**5734**	**6217**

* Counts the number of HAI (i.e. Patients may have multiple HAI).
Key: UTI – urinary tract infection; SSI – Surgical site infection; GI – gastrointestinal; BSI – Bloodstream infection; LRT – Lower respiratory tract; ENT – ear - nose - throat; CRI-CVC – Catheter related infection (central venous catheter); CRI-PVC – Catheter related infection (peripheral vascular cannula); CNS – central nervous system; CVS – cardiovascular system.

Table 2.6c – Comparison of number and percentage of patients with a device in situ (2006 and 2011)

Device in situ	Number of patients surveyed	Number of patients surveyed with a device in situ	% of patients surveyed with a device in situ
UC	2006	1083	18.9
	2011 (stratified)	1226	19.7
PVC	2006	2098	36.6
	2011 (stratified)	2222	35.7
CVC	2006	229	4.0
	2011 (stratified)	312	5.0
Intubation	2006	102	1.8
	2011 (stratified)	165	2.6

Key: UC – urinary catheter; PVC – peripheral vascular cannula; CVC – central venous catheter.

Table 2.6d – Comparison of the prevalence of HAI by ward specialty (2006 and 2011)

Ward Specialty	2006 Prevalence Survey			2011 prevalence survey (stratified)		
	Number of patients surveyed	Number of HAI	Prevalence of HAI (95% CI)*	Number of patients surveyed	Number of HAI	Prevalence (%) of HAI (95% CI)*
Medical	2439	132	5.4 (4.6 - 6.4)	2316	95	4.1 (3.4 – 5.0)
Surgical	2296	139	6.1 (5.1 - 7.1)	1338	65	4.9 (3.8 – 6.1)
Intensive care	134	37	27.6 (19.4 - 37.0)	211	25	11.8 (7.9 – 17.2)
Obstetrics	420	17	4.0 (2.5 – 6.4)	506	9	1.8 (0.9 – 3.4)
Geriatrics	445	39	8.8 (6.3 – 11.9)	236	3	1.3 (0.4 – 3.7)
Mixed ward	-	-	-	1610	74	4.6 (3.7 – 5.8)
Total	**5734**	**364**	6.4 (5.7 – 7.0)	**6217**	**271**	**4.4 (3.9 – 4.9)**

CHAPTER THREE - NON-ACUTE SECTOR

Chapter one gives the results for all Wales including some results for and comparisons with the non-acute (and acute) sector. The detailed results for the non-acute sector are given below. Hospitals in the non-acute sector are generally smaller than those in the acute sector and in some cases very small, e.g. having fewer than ten in-patient beds. Because of these low numbers the results below are given in aggregate form and not by individual hospital. In addition, where the numbers in the results are small e.g. some HAI results, any percentage estimates should be treated with caution as the confidence intervals will be wide and consequently the confidence in the estimate will be low.

Unlike the acute sector this is the first time that a prevalence survey has been conducted in non-acute hospitals across Wales. Powys Teaching Health Board did not collect data during the 2006 survey as all their provision was considered non-acute. This is therefore the first time that Powys Teaching Health Board has collected data for a point prevalence survey of HAI, MDU and AMU.

SECTION 3.1: DEMOGRAPHICS

Table 3.1a – Non-acute sector in Wales demographics

Number of wards	Number of beds	Number of patients surveyed
157	2727	2506

Table 3.1b – Number and percentage of patients surveyed in the non-acute sector in Wales by ward specialty group

Specialty group	Number of wards	Number of patients surveyed	% of patients surveyed
Geriatrics	16	356	14.2
Medical	14	315	12.6
Surgical	2	64	2.6
Other*	125	1771	70.7
Non-acute sector total	**177**	**2506**	

*Psychiatrics; rehabilitation; combination of specialties (mixed ward); others not listed.

Figure 3.1 – Number of patients surveyed in the non-acute sector in Wales by age and sex
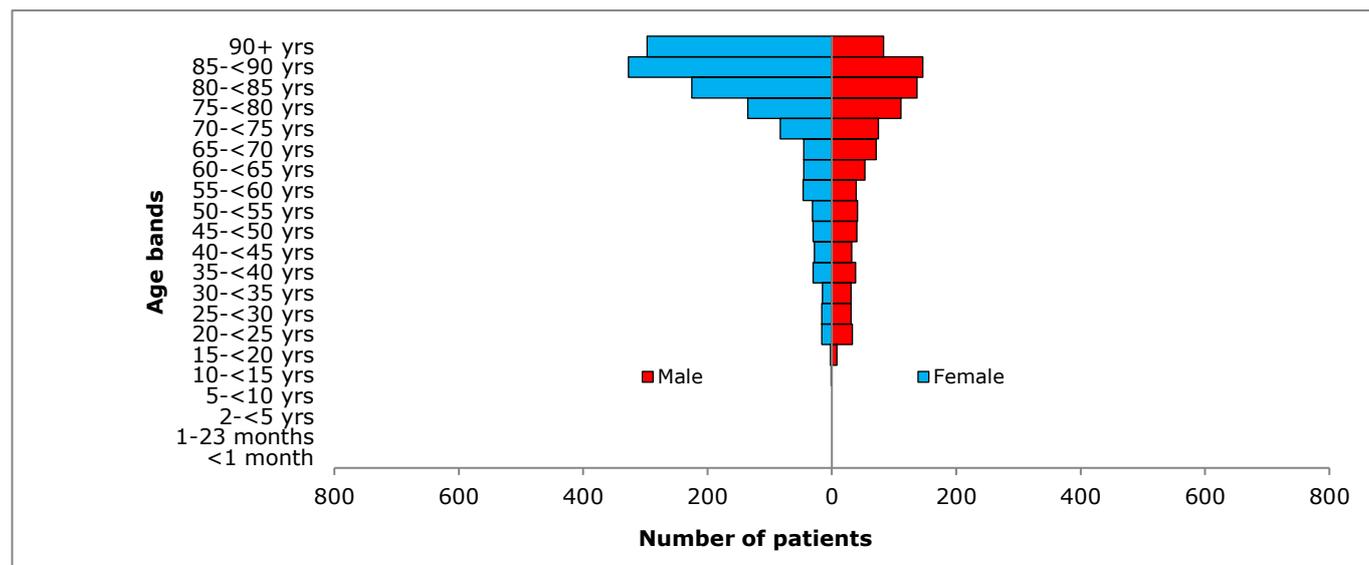

Table 3.1c – Number and percentage of patients surveyed in the non-acute sector in Wales by risk factor

Risk factor		Number of patients surveyed	% of patients surveyed
McCabe score*	Non-fatal[1]	929	37.1
	Ultimately fatal[2]	350	14.0
	Rapidly fatal[3]	108	4.3
	Unknown/Not specified	1119	44.7
Surgery since admission to hospital	Non-NHSN surgery**	12	0.5
	NHSN surgery**	79	3.2
	No surgery	2187	87.3
	Unknown/Not specified	228	9.1

1:expected survival at least 5 years; 2:between 1 and 5 years; 3:expected death within 1 year.
*Severity index of underlying medical condition.
**List of surgical procedures included in the CDC surveillance program[17]

SECTION 3.2: HAI

Table 3.2a – Number and prevalence of patients surveyed in the non-acute sector in Wales with HAI

Number of patients surveyed	Number of patients surveyed with HAI	Prevalence (%) of HAI (95% CI)*
2506	80	3.2 (2.6 – 4.0)

*95% CI – indicate the range of values within which we can be confident that the true value lies.

Table 3.2b – Number and prevalence of patients surveyed in the non-acute sector in Wales with HAI by intrinsic factors

Intrinsic factors		Number of patients surveyed	Number of patients with HAI	Prevalence (%) of HAI (95% CI)*
Gender	Female	1373	50	3.6 (2.8 – 4.8)
	Male	969	30	3.1 (2.2 – 4.4)
	Not specified	164	0	0.0 (0.0 – 2.3)
Age group	<1 month	0		
	1-23 months	0		
	2-15 years	1	1	100.0 (20.7 – 100.0)
	16-29 years	108	3	2.8 (1.0 – 7.9)
	30-49 years	250	1	0.4 (0.1 – 2.2)
	50-64 years	267	3	1.1 (0.4 – 3.3)
	65-79 years	571	11	1.9 (1.1 – 3.4)
	80+ years	1308	61	4.7 (3.7 – 6.0)
	Not specified	1	0	0.0 (0.0 – 79.4)
McCabe score*	Non-fatal	929[1]	24	2.6 (1.7 – 3.8)
	Ultimately fatal	350[2]	16	4.6 (2.8 – 7.3)
	Rapidly fatal	108[3]	3	2.8 (1.0 – 7.9)
	Unknown/Not specified	1119	37	3.3 (2.4 – 4.5)
Specialty group	Geriatrics	394	18	4.6 (2.9 – 7.1)
	Medical	359	15	4.2 (2.6 – 6.8)
	Surgical	79	2	2.5 (0.7 – 8.8)
	Other	1674	45	2.7 (2.0 – 3.6)

*95% CI – indicate the range of values within which we can be confident that the true value lies.
*Severity index of underlying medical condition.
1:expected survival at least 5 years; 2:between 1 and 5 years; 3:expected death within 1 year.

Table 3.2c – Number and prevalence of HAI in the non-acute sector in Wales by HAI type

Number of patients in the non-acute sector	HAI type	Number of HAI*	% of HAI	Prevalence (%) of HAI by type
2506		83		
	UTI	30	36.1	1.2
	SSI	4	4.8	0.2
	GI infection	9	10.8	0.4
	Pneumonia	5	6.0	0.2
	BSI	1	1.2	<0.1
	Skin and soft tissue infection	10	12.1	0.4
	LRT infection	10	12.1	0.4
	Eyes and ENT infection	12	14.5	0.5
	Reproductive infection	1	1.2	<0.1
	CNS infection	1	1.2	<0.1

* Counts the number of HAI (i.e. Patients may have multiple HAI).
Key: UTI – urinary tract infection; SSI – surgical site infection; GI – gastrointestinal; BSI – bloodstream infection; LRT – lower respiratory tract; ENT – ear - nose - throat; CRI-CVC – catheter related infection (central venous catheter); CRI-PVC – catheter related infection (peripheral vascular cannula); CNS – central nervous system; CVS – cardiovascular system.

SECTION 3.3: DEVICE UTILISATION

Table 3.3a – Number of patients surveyed in the non-acute sector in Wales by device utilisation

Number of patients surveyed	Number of patients with one or more devices in situ	Device	Number of devices in situ*	% of device utilisation
2506	343			13.7
		UC	303	12.1
		PVC	66	2.6
		CVC	41	1.6
		Intubation	44	1.8

*A patient may have more than one device in situ at one time. For example, although 303 patients had a urinary catheter in situ, 11 of these patients also had a peripheral vascular cannula in situ.
Key: UC – urinary catheter; PVC – peripheral vascular cannula; CVC – Central venous catheter.

Table 3.3b – Number of and percentage of device related HAI in the non-acute sector in Wales with a device in situ prior to onset by HAI type

Total number of HAI in non-acute sector in Wales	HAI type	Number of HAI	HAI with device in situ prior to onset	% of total HAI
80				
	UTI (urinary catheter within 7 days prior to onset)	30	10	12.1
	Pneumonia (ventilated within 48 hours prior to onset)	5	1	1.2
	BSI (CVC within 48 hours prior to onset)	1	0	0.0

Key: UTI – urinary tract infection; BSI – bloodstream infection.

SECTION 3.4: ANTIMICROBIAL USAGE

Overall Prevalence of Antimicrobial Prescribing

Overall, 2494 of the 9094 patients (27.4%) surveyed were receiving an antimicrobial. The prevalence of prescribing was greatest in the acute sector (32.7%) compared to the non-acute sector (13.5%).

Among non-acute hospitals, the prevalence of antimicrobial use was greatest in Powys Teaching Health Board (23.4%) and lowest in Hywel Dda Health Board (6.7%).

Figure 3.4 Prevalence of antimicrobial prescribing in the non-acute sector in Wales by indication (with 95% Confidence intervals)
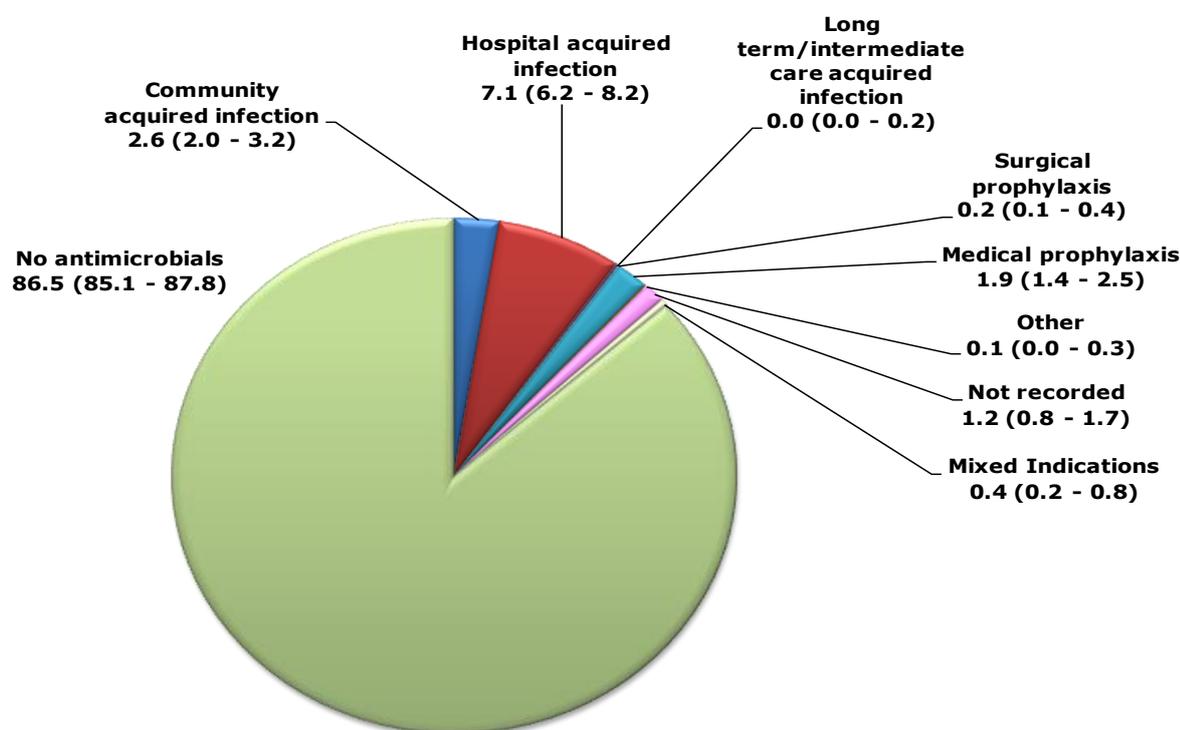

Hospital acquired infection
7.1 (6.2 - 8.2)

Long term/intermediate care acquired infection
0.0 (0.0 - 0.2)

Community acquired infection
2.6 (2.0 - 3.2)

Surgical prophylaxis
0.2 (0.1 - 0.4)

No antimicrobials
86.5 (85.1 - 87.8)

Medical prophylaxis
1.9 (1.4 - 2.5)

Other
0.1 (0.0 - 0.3)

Not recorded
1.2 (0.8 - 1.7)

Mixed Indications
0.4 (0.2 - 0.8)

Table 3.4a Overall prevalence of antimicrobial prescribing in the non-acute sector in Wales

Number of patients surveyed	Number of patients receiving antimicrobials	Prevalence (%) of antimicrobial prescribing (95% CI)
2506	338	13.5 (12.2 – 14.9)

Prevalence of Antimicrobial Prescribing by Intrinsic Factors

Table 3.4b – Overall prevalence of antimicrobial prescribing in the non-acute sector in Wales by intrinsic factors

Intrinsic factors		Number of patients surveyed	Number of patients receiving antimicrobials	Prevalence (%) of antimicrobial prescribing (95% CI)
Gender	Female	1373	218	15.9 (14.0 - 17.9)
	Male	969	115	11.9 (10.0 - 14.1)
	Not specified	164	5	3.0 (1.3 - 6.9)
Age group	<1 month	0		
	1-23 months	0		
	2-15 years	1	1	100.0 (20.7 – 100.0)
	16-29 years	108	3	2.8 (0.9 - 7.9)
	30-49 years	250	19	7.6 (4.9 - 11.6)
	50-64 years	267	29	10.9 (7.7 - 15.2)
	65-79 years	571	81	14.2 (11.6 - 17.3)
	80+ years	1308	206	15.7 (13.8 - 17.7)
	Not specified	1	0	0.0 (0.0 - 79.3)
McCabe score	Non-fatal	929	111	25.8 (24.4 - 27.2)
	Ultimately fatal	350	64	30.6 (27.9 - 33.4)
	Rapidly fatal	108	26	32.5 (28.1 - 37.3)
	Unknown/Not specified	1119	137	27.7 (26.3 - 29.1)
Ward specialty	Geriatrics	356	72	20.2 (16.4 - 24.7)
	Medical	315	66	21.0 (16.8 - 25.8)
	Surgical	64	9	14.1 (7.6 - 24.6)
	Other	1771	191	10.8 (9.4 - 12.3)

Characteristics of Prescribed antimicrobials

Table 3.4c Number of antimicrobials prescribed per patient in the non-acute sector in Wales

Number of Antimicrobials	Number of patients	% of patients
0 (no antimicrobials)	2168	86.5
1	290	11.6
2	45	1.8
3	3	0.1

Distribution of antimicrobials by antimicrobial group

In the non-acute sector, the commonest group was "Trimethoprim and derivatives" which were received by 3% of patients.

Table 3.4d Number and percentage of patients prescribed antimicrobials in the non-acute sector in Wales

Order	Antimicrobial group	ATC4	Number of patients prescribed	% of patients prescribed (n=338)
1	Trimethoprim and derivatives	J01EA	75	22.2
2	Combinations of penicillins - including beta-lactamase inhibitors	J01CR	55	16.3
3	Beta-lactamase resistant penicillins	J01CF	35	10.4
4	Penicillins with extended spectrum	J01CA	32	9.5
5	Intestinal anti-infectives - Antibiotics	A07AA	28	8.3
6	Tetracyclines	J01AA	28	8.3
7	Nitrofuran derivatives	J01XE	25	7.4
8	Macrolides	J01FA	24	7.1
9	Fluoroquinolones	J01MA	24	7.1
10	Nitroimidazole derivatives	P01AB	20	5.9
11	Beta-lactamase sensitive penicillins	J01CE	14	4.1
12	First-generation cephalosporins	J01DB	12	3.6
13	Glycopeptide antibacterials	J01XA	4	1.2
14	Triazole derivatives	J02AC	4	1.2
15	Third-generation cephalosporins	J01DD	2	0.6
16	Lincosamides	J01FF	2	0.6
17	Imidazole derivatives	J01XD	2	0.6
18	Carbapenems	J01DH	1	0.3
19	Other aminoglycosides	J01GB	1	0.3
20	Antibiotics for treatment of tuberculosis	J04AB	1	0.3
21	Other drugs for treatment of tuberculosis	J04AK	1	0.3

Characteristics of Antimicrobial Use

Table 3.4e Distribution of prescriptions by characteristics of prescription in the non-acute sector in Wales

Characteristic	Indication	Number	%
Route Drug level	Parenteral	23	5.9
	Oral	367	94.1
	Rectal	0	0.0
	Inhalation	0	0.0
	Not specified	0	0.0
Indication Drug level	Community acquired infection (A)	76	19.5
	Hospital acquired infection (B1-B5)	209	53.6
	Long term/intermediate care acquired infection (B6)	1	0.3
	Surgical prophylaxis - once only (C1)	1	0.3
	Surgical prophylaxis - 24 hours (C2)	0	0.0
	Surgical prophylaxis - >24 hours (C3)	4	1.0
	Medical prophylaxis (D)	57	14.6
	Other	2	0.5
	Not specified	40	10.3
Anatomical site Drug level	CNS infection	0	0.0
	CNS prophylaxis	0	0.0
	CNS indication not specified	0	0.0
	CNS total	**0**	**0.0**
	CVS infection	0	0.0
	CVS prophylaxis	0	0.0
	CVS indication not specified	0	0.0
	CVS total	**0**	**0.0**
	ENT infection	22	5.6
	ENT prophylaxis	0	0.0
	ENT indication not specified	4	1.0
	ENT total	**26**	**6.7**
	EYE infection	0	0.0
	EYE prophylaxis	0	0.0
	EYE indication not specified	0	0.0
	EYE total	**0**	**0.0**
	GI infection	13	3.3
	GI prophylaxis	0	0.0
	GI indication not specified	1	0.3
	GI total	**14**	**3.6**
	GUOB infection	3	0.8
	GUOB prophylaxis	0	0.0
	GUOB indication not specified	0	0.0
	GUOB total	**3**	**0.8**
	ND infection	5	1.3
	ND prophylaxis	3	0.8
	ND indication not specified	1	0.3
	ND total	**9**	**2.3**
	RESP infection	73	18.7
	RESP prophylaxis	6	1.5
	RESP indication not specified	2	0.5
	RESP total	**81**	**20.8**
	SSTBJ infection	77	19.7
	SSTBJ prophylaxis	11	2.8
	SSTBJ indication not specified	8	2.1
	SSTBJ total	**96**	**24.6**
	UT infection	91	23.3
	UT prophylaxis	42	10.8
	UT indication not specified	3	0.8
	UT total	**136**	**34.9**

Table 3.4f Distribution of Top 10 antimicrobial regimens in the non-acute sector in Wales by key infection types (patient level)

Procedure site	Top 10 regimens	Number of AM regimens	% of AM regimens for infection
Respiratory infection only	Co-amoxiclav	16	7.0
	Doxycycline	16	7.0
	Amoxicillin	14	6.1
	Clarithromycin	5	2.2
	Piperacillin/Tazobactam	2	0.9
	Ciprofloxacin	2	0.9
	Amoxicillin & Metronidazole	2	0.9
	Levofloxacin	1	0.4
	Amoxicillin & Clarithromycin	1	0.4
	Others	6	2.6
Urinary tract infection only	Trimethoprim	46	20.1
	Co-amoxiclav	11	4.8
	Nitrofurantoin	8	3.5
	Cefalexin	5	2.2
	Amoxicillin	5	2.2
	Ciprofloxacin	4	1.7
	Cefotaxime	1	0.4
	Doxycycline	1	0.4
	Metronidazole	1	0.4
	Nitrofurantoin & Pivmecillinam	1	0.4
Skin soft tissue bone & joint infection only	Flucloxacillin	16	7.0
	Co-amoxiclav	6	2.6
	Flucloxacillin & Penicillin V	5	2.2
	Metronidazole	5	2.2
	Erythromycin	3	1.3
	Amoxicillin	2	0.9
	Doxycycline	2	0.9
	Flucloxacillin & Metronidazole	1	0.4
	Co-amoxiclav & Flucloxacillin	1	0.4
	Others	15	6.6
All infections		**229**	

Table 3.4g Compliance with guidance in the non-acute sector in Wales

Indicator	Compliant	Number of prescriptions	Proportion (%)
Reason recorded in notes	Yes	262	67.2
	No	83	21.3
	Unknown	45	11.5
Length of prophylaxis	Once only (C1)	1	20.0
	24 hours (C2)	0	0.0
	>24 hours (C3)	4	80.0

DISCUSSION

This report presents the results of the national point prevalence survey of HAI, MDU and AMU 2011. The survey was conducted in Wales using the ECDC protocol during November 2011 and included 9094 patients.

The protocol for the ECDC point prevalence survey was developed between 2009 and 2011 and piloted between June and October 2010[4]. The survey opened to voluntary engagement in Spring 2011 with data being collected across European Member States in three time slots; Spring 2011, Autumn 2011 and Spring 2012.

The aims of the survey are
- To estimate the total burden of HAI, MDU and AMU
- To describe patients, invasive procedures, infections and prescribed antimicrobials
- To disseminate results to those who need to know at local, regional, national and EU level.
- To provide a standardised tool for hospitals to identify targets for quality improvement.

In Wales we have previously contributed to UK national prevalence surveys of HAI, the most recent of which was carried out in 2006[13], additionally since 2008 an annual point prevalence survey of antimicrobial usage has been carried out[14]. This 2011 PPS was the first time in Wales that a point prevalence survey of both HAI and AMU had been conducted together to a standardised European protocol.

Previously conducted prevalence surveys of HAI and AMU have only included the acute sector, excluding paediatric services. As already described, engagement in the PPS was voluntary but, in Wales, all NHS Health Boards and Trusts that manage in-patients agreed to participate. This gives the most comprehensive assessment of the burden of HAI, MDU and AMU in Wales to date. For the first time this includes paediatric services as well as all community hospitals, thus allowing the inclusion of data on the non-acute sector for the first time in Wales.

Surveillance for HAI and AMU is conducted on an ongoing basis in Wales[14,22]. For HAI this comprises mandatory incidence surveillance of organism specific infections e.g. bacteraemia caused by *S. aureus* and infections caused by *C. difficile* and of specific infection types including SSI and CVC associated BSIs. However, these methods do not monitor routinely the overall burden of HAI in Wales.

In contrast to incidence surveys, prevalence surveys provide a relatively rapid and cost-effective method to collect information on the overall burden of disease, device usage and antimicrobial usage; however there are important limitations to note:

- Prevalence surveys are a snapshot at one particular point in time and may not represent the prevalence at all other times in the same hospital, or at different times of year, such as seasonal variations.
- Despite standardised training there may be variations in the interpretation of definitions and the availability of data items necessary for the fulfilment of definitions, between data collecting teams and hospitals.

Despite these limitations PPS data are very valuable as they give the best available estimate of the total burden of HAI, AMU and MDU to inform the targeting of appropriate quality improvement plans and interventions.

Demographics:

The NHS in Wales has changed over recent years with the formation of Health Boards in 2009. The Health Boards have a broad remit across both acute and non-acute sectors of healthcare in Wales, it was therefore appropriate to include non-acute sector hospitals in this survey to ensure that information was provided to the NHS in Wales to inform the development of quality improvement plans for HAI, MDU and AMU across all their areas of responsibility.

All Health Boards (7) and Trusts (1) providing in-patient care in Wales participated in the survey, 75% of patients were being cared for in the acute sector. This was the largest PPS ever conducted in Wales, overall 9094 patients in 86 hospitals comprising 523 wards were included in the survey, compared with just over 5000 patients included in the 2006 PPS. The population surveyed was a largely elderly one; 66.3% were ≥65 years; additionally 55.5%of those surveyed were female, these results are consistent with the findings of other similar surveys.[9,13]

Prevalence of HAI:

Overall in Wales the prevalence of HAI was 4.0% (95% CI 3.6 – 4.4); the prevalence in hospitals within the acute sector was 4.3% (95% CI 3.8 – 4.8) with a prevalence of 3.9% (95% CI 3.4 – 4.5) for secondary hospitals and 4.5% (95% CI 3.7 – 5.4) for tertiary hospitals (hospital types as defined by the ECDC surveillance protocol). Within the non-acute sector the prevalence of HAI was 3.2% (95% CI 2.6 – 4.0) which was not significantly different from the acute sector.

These results for Wales compare favourably with the findings of the ECDC pilot point prevalence survey results. The pilot was conducted between June and October 2010 and included 66 hospitals from across Europe; data from one Health Board in Wales was included in the pilot survey. HAI prevalence reported in the pilot was 7.1%[4], which is significantly higher than the Wales prevalence of 4.0%.

Comparing these results with the 2006 prevalence survey, the overall prevalence of HAI in the acute sector in Wales appears to be lower in 2011 versus 2006. It should be noted that the 2006 survey was conducted using a different protocol and definitions and included a more limited group of patients. With regard to the difference in definitions a recent study suggests that there is a high degree of concordance between the CDC definitions used in 2006 and ECDC definitions used for the current survey[23]. Taking the differing definitions into account and adjusting the 2011 data to be as comparable as possible the data suggest that there is a significant reduction in the prevalence of HAI within the acute sector in Wales since 2006; 6.4% (95% CI 5.8 – 7.0) in 2006 and 4.3% (95% CI 3.8 – 4.8) in 2011.
Whilst SSI and UTI remain the two most common HAI in the most recent survey vs the 2006 survey, reductions were seen in the prevalence of LRT infections and GI disease. The former may be related to changes in the application of the definitions of pneumonia and LRT infections in the 2011 PPS, the latter to reductions in *C.*

difficile disease. Data were not collected for the non-acute sector in 2006 hence the data collected this time will provide a baseline for future reference and comparisons, and provide the NHS in Wales with an estimate of the total burden of HAI, MDU and AMU across all the Health Boards.

The prevalence of HAI was significantly higher (p<0.05) in the 65 – 79 year age group as compared to all other age groups, this was true for Wales and the acute sector, whilst significance (p<0.01) was shown in the over 80 year age group in the non-acute sector. These findings are similar to a recently published analysis of the relationship between increasing age and prevalence of HAI, based on the results of the Scottish prevalence survey 2005/6[24]

Detailed results for each Health Board and Trust in Wales are provided in Appendix I. The prevalence of HAI varies across the Health Boards and Trusts of Wales (range 1.6% (1.0 – 2.5) to 16.2% (11.2 – 22.9)), there is also variation between hospitals within the Health Boards. There is no significant difference in the prevalence of HAI between hospital types as defined by the ECDC protocol (acute hospitals only). The suggestion, albeit non-significant of a higher prevalence of HAI in tertiary hospitals compared with secondary may be due to the complexity of patients treated within them. There is however variation seen between hospitals of similar type, which may suggest that there are further opportunities to investigate these differences and focus interventions and reap more benefits for patients. These data should be used to inform Infection Prevention and Control Teams and clinical services about areas that could be identified for prioritisation.

The commonest types of HAI identified in this 2011 PPS were UTIs (20.9%), SSIs (19.6%), gastro-intestinal infections (11.5%), pneumonia (11%) and BSIs (8.9%); SSIs were most common in the acute sector, whilst UTIs was the predominant HAI type in the non-acute sector. When compared with the findings of the 2006 survey it can be seen that SSI was the most common HAI type in 2006, reflecting the finding in the acute sector in this survey, with UTIs and GI infections accounting for 15.5% each. The proportions of SSI and UTI have increased in the most recent survey relative to a decrease in the GI infections from 15.5% to 11.5% of the total.

Results of the ECDC pilot PPS survey[4] found that pneumonia was the most common HAI (22%), followed by SSIs (19%) and UTIs (17%).

The prevalence of *C. difficile* identified within the 2011 PPS was 0.5%, this compares with a prevalence of 0.7 (95% CI 0.5 – 0.9) in 2006. During the period between the 2006 and current surveys Wales has seen an increase, followed by a recent marked decline in the incidence of *C. difficile*[22], thus these prevalence data confirm the findings of our ongoing national incidence surveillance.

There is further evidence from these PPS data, to support that given by ongoing incidence surveillance that efforts to reduce *C. difficile* and MRSA with the support of HAI strategy and policy from Welsh Government have been largely successful.

Data fields on the types of micro-organisms causing HAI were poorly completed, with only 55.1% of the HAI having an associated micro-organism. However there was confirmation that the commonest organism associated with UTI was *E. coli*; *S. aureus* was the commonest organism associated with SSI. *S. aureus* was also the

most common cause of BSIs, with *E. coli* the second most common. This may seem to be in contrast to the findings of the Top Ten Bacteraemia surveillance[22], which has consistently shown that *E. coli* is the commonest cause of bacteraemia in Wales, however this survey collects information on HAI whilst the Top Ten Bacteraemia collects data on the totality of bacteraemia from community as well as healthcare associated sources, hence these data are not inconsistent and suggest that community associated *E. coli* bacteraemia is a significant part of the total burden of *E. coli* bacteraemia seen. *C. difficile* was the commonest cause of GI infections within the survey.

As with findings from previous prevalence surveys it is clear that the overall burden of HAI is dominated by SSIs, UTIs, GI infections, pneumonia and BSIs. Action is already being taken in Wales to target the overall burden of HAI, the recent publication of the HCAI framework of actions - Commitment to Purpose: Eliminating Preventable Healthcare Associated Infections[5] reinforces the zero tolerance approach to preventable infections in Wales. The patient safety and quality improvement programme, 1000 Lives plus[25] is addressing many of these key issues with the introduction of interventions to reduce SSI, CVC related infections and more recently, the development of care bundles for the insertion and maintenance of UCs and PVCs. These data will assist with the baseline monitoring of our current position and will allow comparison, and an assessment of the success of the interventions, when prevalence surveys are repeated in the future using the same protocol.

Medical Device Usage:

HAIs have evolved alongside the increasing complexity of healthcare. Medical devices are a necessary part of medical care, but carry a risk of associated infection. In Wales since 2006, firstly within the 1000 Lives campaign and then within the 1000 Lives Plus programme[25], interventions have been put in place to minimise the risks of medical devices. The first intervention to be implemented was the CVC care bundle across all critical care units; this work was followed closely by interventions to reduce the incidence of ventilator associated pneumonia. More recently, care bundles for the insertion and maintenance of UCs and PVCs have been developed and are currently at the pilot stages in most Health Boards and Trusts with spread plans in place for 2012.

Some data on device usage were collected during the 2006 survey; however additional information has been collected in this current survey to include device associated infections. Little has changed it seems since 2006 in terms of the prevalence of UCs and PVCs. Within the acute sector in 2011 35.7% of patients had a PVC in place (36.6% in 2006), and 19.7% of patients had a UC in place (18.9% in 2006). There was however a significant increase in the prevalence of CVC usage; 5.0% in this survey vs 4.0% in 2006. It appears that the introduction of care bundles for the insertion and maintenance of CVCs on ICU/HDU may have reduced the prevalence of CVC on the critical care units. The increase in CVC use in the current results is within the surgical population, where it appears that whilst the numbers of surgical patients within the hospitals included in this 2011 PPS have reduced markedly as compared to the 2006 survey, those surgical patients who are in hospital appear to require more intensive interventions, including increased use of CVCs, with a consequent potential increased risk of infection.

The device associated infections identified within this survey further emphasise the importance of improving practices around insertion and maintenance of medical devices. Overall in Wales, 50% of UTIs identified using the HAI definitions were catheter associated, 60% within the acute sector and a third within the non-acute sector. These results reinforce the urgency and importance of implementing the 1000 Lives Plus UC care bundles across the whole of NHS Wales.

Of all pneumonias identified within the survey, 2.6% were associated with intubation, the definition of "intubated" included the presence of a tracheostomy, therefore patients who were not mechanically ventilated were included in this definition and hence one of these cases was attributable to the non-acute sector. These data were not captured in the prevalence survey of 2006, we cannot therefore comment on the possible influence of the care bundle to reduce ventilator associated pneumonia which has been implemented across the critical care units of Wales since 2006; however ongoing incidence surveillance of ventilator associated pneumonia in critical care has demonstrated a persistently low level of these infections.[22]

Four CVC related BSIs were identified within the survey, comprising 1.3% of all HAI types. One PVC-associated BSI was also identified, however for the majority (56%) of BSIs the source was recorded as either unknown or not able to be specified. Data from our ongoing surveillance of critical care CVC-related BSI[22] show that the number and rate of CVC infections within the speciality of critical care is very low. The potential severity of any BSI and the sheer volume of PVCs in use across our healthcare services (26% (2368 of 9094) of all patients in this survey had a PVC in situ) suggests that despite the low absolute prevalence of documented infections, action is still needed to ensure the known infection risks associated with PVC are minimised[26,27].

Antimicrobial Usage:

While the use of antimicrobial agents has revolutionised our ability to treat infections, it is associated inevitably with the risk of development and spread of antimicrobial resistance leading to infections that are increasingly difficult to treat, and antimicrobial-associated adverse events, importantly *Clostridium difficile*-associated disease (CDAD).

It has been estimated that between 20-50% of antimicrobial use, both in the community and in hospitals, is "inappropriate". This means that patients and society may be exposed to a significant unnecessary risk of resistant infections and CDAD. In addition there is a financial cost, not only in terms of unnecessary antimicrobial use, but also the additional cost of treating resistant infections and CDAD.

WARP seeks to promote optimal use of antimicrobials through sharing good practice and developing guidance through the Antimicrobial Stewardship Forum that meets twice a year and includes representatives from community and hospital pharmacy, microbiology, and infection prevention and control.

An important element of the Antimicrobial Resistance Programme work plan is the surveillance of antimicrobial use across the health service in Wales in order to enable Health Boards to benchmark use and monitor the impact of changes to

practice. Surveillance is delivered from a number of data sources including prescription data from primary care and ward stock data from secondary care. In addition, the Antimicrobial Resistance Programme has coordinated an annual Antimicrobial Usage Point Prevalence Survey since 2008. These surveys have been conducted using ESAC methods and participation has been voluntary[14].

The methods and definitions used in the current survey are very similar to previous surveys. However, small differences in methods, and differences in coverage mean that results, while qualitatively similar, should only be compared quantitatively with caution. The results from this survey are best considered in the context of previously reported information from other data sources which can be accessed via the Antimicrobial Resistance Programme website at:[14]
http://howis.wales.nhs.uk/sites3/page.cfm?orgid=457&pid=20791

Overall, 2494 of the 9094 patients (27.4%) surveyed were receiving an antimicrobial. The prevalence of prescribing was greatest in the acute sector (32.7%) compared to the non-acute sector (13.5%). The overall prevalence from previous surveys, which predominantly surveyed acute hospitals, were broadly similar (2008 – 31.0%, 2009 – 29.5%, 2010 - 32.0%) which suggests little change in gross usage over the last four years. Ward antimicrobial usage data published in "Antibacterial Resistance and Usage in Wales 2005-2010", which gives data for acute hospitals, supports the suggestion that there has been little change; use in 2005q1 (Jan-Mar) was 992 DDDs/1000 BD (Defined Daily Doses/1000 Bed Days), and use in 2010q1 (Jan-Mar) was 1005 DDDs/1000 BD.

Variability was seen between Health Boards which may be due to different patient populations in different hospitals or to differences in prescribing policies. Among acute hospitals, the prevalence of antimicrobial use was greatest in Betsi Cadwaladr University Health Board (35.5%) and lowest in Abertawe Bro Morgannwg University Health Board (27.9%). Within Health Boards there was also variability between hospitals, presumably due to different patient populations. The hospitals with the highest prevalence were Glangwili Hospital (44.4%) and Ysbyty Gwynedd (41.3%); these hospitals were among the top 3 hospitals in the 2010 survey. The high prevalence observed in Velindre Hospital (51.5%) is not surprising given the nature of this unit.

Antimicrobial use was, in general, lower in non-acute hospitals and varied between 23.4% in Powys Teaching Health Board and 6.7% in Hywel Dda Health Board. For the 21 non-acute wards surveyed in 2010, the prevalence was comparable at 19.1%. The lower prevalence of antimicrobial use in non-acute vs acute hospitals is undoubtedly due to different patient populations. A point prevalence survey of antimicrobial use in long-term care facilities (LTCF) in Wales in 2010 performed as part of the Healthcare Associated Infections in European Long-Term Care Facilities (HALT) reported a prevalence of 7.1% (personal communication). There is an overlap between the patients cared for in LTCF and non-acute hospitals, and between non-acute hospitals and acute hospitals. The results from the current survey are consistent with this.

Unsurprisingly, usage was highest in the ICU specialty (55.2%), but also high in medicine (34.7%), paediatrics (32.7%), and surgery (31.4%). These numbers are consistent with the prevalences for antibacterial use reported in the 2010 survey

(51% - ICU/SCBU, 35% - paediatrics, 31% - surgery, 28% medicine). Usage was higher in secondary and tertiary hospitals than community and primary hospitals.

Overall, of patients receiving at least one antimicrobial, 68.7% received a single agent, 25.6% received two, and 5.7% received between three and eight agents. The rate of polypharmacy (3 or more agents) is comparable to the 2010 survey which found a rate of 4.2%. In non-acute hospitals, only 14.2% of patients received more than one agent.

Overall the commonest group of antimicrobials used was "Combinations of penicillins including beta-lactamase inhibitors" (e.g. co-amoxiclav) which was received by 32% of patients treated with an antimicrobial/s. The overall distribution of specific antimicrobials is shown in Appendix II. This shows the top 5 agents to be co-amoxiclav, metronidazole, piperacillin/tazobactam, flucloxacillin, and trimethoprim. The only difference from the 2010 survey is that clarithromycin was 5th commonest at that time, and trimethoprim 8th. This probably reflects the fact that the 2010 survey did not include so many non-acute hospitals where trimethoprim is more commonly used.

Many Health Boards have instituted policies to limit the use of fluoroquinolones and second-generation cephalosporins (e.g. cefuroxime) as part of their actions to reduce *C. difficile*-associated infections. These activities are reflected in the fact that ciprofloxacin and cefuroxime were 3rd and 5th commonest agents used in the 2009 survey, but fluoroquinolones and second-generation cephalosporins were the 7th and 15th commonest groups used in the 2010 survey. In the non-acute hospitals, the commonest group was "Trimethoprim and derivatives" which were received by 22% of patients.

Overall 56.7% of antimicrobials were given orally, although in the non-acute hospitals 94.1% were given orally.

Community-acquired infection was the commonest indication (48.4%) for an antimicrobial overall followed by hospital acquired infection (31.1%). These figures are comparable with findings in previous surveys. However, in non-acute hospitals, hospital acquired infections were the commonest indication (53.6%). Overall 8.8% of patients surveyed were being treated for a hospital acquired infection, as deemed by the prescriber, but only 4.0% of patients were considered to have a HAI as defined by the HAI case definitions within the survey. This may be because the application of the HAI prevalence definitions result in a degree of under-reporting of HAI, but may also confirm that antimicrobials are over prescribed.

Overall, the commonest sites of infection were respiratory tract (24.1%), skin, soft tissue, bone and joint (16.3%), and UT (12.5). For acute hospitals, the commonest sites were respiratory tract (24.7%), skin, soft tissue, bone and joint (15.9%), and GI tract (11.9%). For non-acute hospitals, the commonest sites were UT (23.3%), skin, soft tissue, bone and joint (19.7%), and respiratory tract (18.7%).

Potential measures of quality of antimicrobial use are the recording of indication for an antimicrobial in the patient notes and the duration of surgical prescribing. Overall, the recording of indication was present on 75.1% of occasions. This is lower than the 83.5% - 83.9% observed in the 2008 – 10 surveys. Scottish Intercollegiate Evidence Network (SIGN) guidance suggests that, in general,

surgical prophylaxis is only required for a single pre-operative dose. In the current survey, it was given for 24 hours on 25.9% of occasions and for >24 hours on 52.4% of occasions. In 2010, prophylaxis was given for >24 hours on 46.3% of occasions. In that survey, a longer duration of prophylaxis was seen more commonly in cardiovascular and GI surgery. Further analysis of the current survey is required to establish the current trend.

CONCLUSION

In summary overall in Wales the prevalence of HAI was 4.0%, with 37% of patients having one or more medical devices in situ at the time of the survey. 27.4% of patients across Wales were prescribed antimicrobials at the time of the survey.

These data are consistent with the findings of previous prevalence surveys of HAI and antimicrobial usage[13,14] and when differences in definitions and patient exclusions are taken into account there may have been some improvement seen in HAI prevalence since 2006.

These data should be used in conjunction with the recently published HAI framework of actions for Wales, Commitment to purpose: Eliminating preventable healthcare associated infections (HCAI)[5], to focus healthcare organisations' quality improvement plans for managing HAIs, medical devices and the use of antimicrobials. Efforts should be made to focus interventions in the areas that have the highest burden of HAIs, MDU and AMU.

For the first time, detailed information is provided for the non-acute sector. This is a useful baseline for organisations to consider as they develop action plans to respond to the HAI action plan commitment to purpose, across the Health Boards. Whilst data at hospital level should be treated with caution and be considered in light of the numbers of patients surveyed within those hospitals and the rarity of the findings, the data are still useful to inform where interventions are required to address HAI, MDU and AMU. These data can also be used to support the 1000 Lives Plus programme work to reduce the risks associated with medical devices.

Health Boards and Trusts in Wales will be provided with further analyses and support from the WARP and WHAIP teams of Public Health Wales to support the use of these data for improvement / action plan development.

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APPENDICES

I. HEALTH BOARD RESULTS

I.I Abertawe Bro Morgannwg University Health Board (ABMUHB)

Table I.Ia – Number and prevalence of patients surveyed in acute hospitals in Abertawe Bro Morgannwg University Health Board with HAI

Acute hospital	Number of patients surveyed	Number of patients with HAI	Prevalence (%) of HAI (95% CI)*
ABMUHB total	**1963**	**47**	**2.4 (1.8 – 3.2)**
Morriston	623	15	2.4 (1.5 – 3.9)
Neath Port Talbot	191	7	3.7 (1.8 – 7.4)
Princess of Wales	475	12	2.5 (1.5 – 4.4)
Singleton	305	10	3.3 (1.8 – 5.9)

*95% CI – indicate the range of values within which we can be confident that the true value lies

Table I.Ib – Number and prevalence of HAI in acute hospitals in Abertawe Bro Morgannwg University Health Board by HAI type

HAI type	Number of HAI*	% of HAI	Prevalence (%) of HAI by type
ABMUHB total	**48**		**2.5**
UTI	9	18.8	0.5
Skin and soft tissue infection	8	16.7	0.4
SSI	8	16.7	0.4
Pneumonia	7	14.6	0.4
BSI	6	12.5	0.3
GI infection	3	6.3	0.2
LRT	3	6.3	0.2
Eyes and ENT	2	4.2	0.1
Systemic infection	2	4.2	0.1

* Counts the number of HAI (i.e. Patients may have multiple HAI).
Key: UTI – urinary tract infection; SSI – Surgical site infection; GI – gastrointestinal; BSI – Bloodstream infection; LRT – Lower respiratory tract; ENT – ear - nose - throat; CRI-CVC – Catheter related infection (central venous catheter); CRI-PVC – Catheter related infection (peripheral vascular cannula); CNS – central nervous system; CVS – cardiovascular system.

Table I.Ic – Number and percentage of patients surveyed in Abertawe Bro Morgannwg University Health Board hospitals by device utilisation

Acute hospital	Number of patients surveyed	Number of patients with one or more devices in situ	Device	Number of devices in situ*	% of device utilisation
ABMUHB total	**1963**	**676**			**34.4**
			UC	**295**	**15.0**
			PVC	**495**	**25.2**
			CVC	**59**	**3.0**
			Intubation	**21**	**1.1**
Morriston	623	328			
			UC	154	24.7
			PVC	249	40.0
			CVC	36	5.8
			Intubation	15	2.4
Neath Port Talbot	191	59			
			UC	14	7.3
			PVC	48	25.1
			CVC	2	1.0
			Intubation	0	0.0
Princess of Wales	475	157			
			UC	67	14.1
			PVC	125	26.3
			CVC	9	1.9
			Intubation	4	0.8
Singleton	305	102			
			UC	32	10.5
			PVC	71	23.3
			CVC	12	3.9
			Intubation	2	0.7

*A patient may have more than one device in situ at one time.
Key: UC – urinary catheter; PVC – peripheral vascular cannula; CVC – central venous catheter.

Table I.Id - Prevalence of antimicrobial prescribing in Abertawe Bro Morgannwg University Health Board hospitals

Hospital type	Hospital	Number of patients surveyed	Number of patients receiving antimicrobials	Prevalence (%) of prescribing (95% CI)
	ABMUHB total	**1963**	**465**	**23.7 (21.9 -25.6)**
Acute hospitals	Morriston	623	175	28.1 (24.7 - 31.7)
	Neath Port Talbot	191	45	23.6 (18.1 - 30.1)
	Princess Of Wales	475	130	27.4 (23.6 - 31.5)
	Singleton	305	82	26.9 (22.2 - 32.1)
Non-acute hospitals	Cefn Coed	92	7	7.6 (3.7 - 14.9)
	Cimla	62	9	14.5 (7.8 - 25.3)
	Gellinudd	28	0	0.0 (0.0 - 12.1)
	Glanrhyd	21	0	0.0 (0.0 - 15.5)
	Gorseinon	54	6	11.1 (5.2 - 22.2)
	Hill House	71	7	9.9 (4.9 - 19.0)
	Maesteg General	21	2	9.5 (2.7 - 28.9)
	Tonna Day	20	2	10.0 (2.8 - 30.1)

I.II Aneurin Bevan Health Board (ABVHB)

Table I.IIa – Number and prevalence of patients surveyed in acute hospitals in Aneurin Bevan Health Board with HAI

Acute hospital	Number of patients surveyed	Number of patients with HAI	Prevalence (%) of HAI (95% CI)*
ABVHB total	**1387**	**43**	**3.1 (2.3 – 4.2)**
Nevill Hall	330	18	5.5 (3.5 – 8.5)
Royal Gwent	585	16	2.7 (1.7 – 4.4)

*95% CI – indicate the range of values within which we can be confident that the true value lies

Table I.IIb – Number and prevalence of HAI in acute hospitals in Aneurin Bevan Health Board by HAI type

HAI type	Number of HAI*	% of HAI	Prevalence of HAI by type
ABVHB total	**46**		**3.3**
GI infection	11	23.9	0.8
SSI	7	15.2	0.5
UTI	7	15.2	0.5
LRT	4	8.7	0.3
Skin and soft tissue infection	4	8.7	0.3
Pneumonia	4	8.7	0.3
Systemic infection	3	6.5	0.2
BSI	2	4.3	0.1
Neonatal infection	2	4.3	0.1
Eyes and ENT	1	2.2	0.1
Bone and joint infection	1	2.2	0.1

* Counts the number of HAI (i.e. Patients may have multiple HAI).
Key: UTI – urinary tract infection; SSI – Surgical site infection; GI – gastrointestinal; BSI – Bloodstream infection; LRT – Lower respiratory tract; ENT – ear - nose - throat; CRI-CVC – Catheter related infection (central venous catheter); CRI-PVC – Catheter related infection (peripheral vascular cannula); CNS – central nervous system; CVS – cardiovascular system.

Table I.IIc – Number and percentage of patients surveyed in Aneurin Bevan Health Board acute hospitals by device utilisation

Acute hospital	Number of patients surveyed	Number of patients with one or more devices in situ	Device	Number of devices in situ*	% of device utilisation
ABVHB total	**1387**	**524**			**37.8**
			UC	**243**	**17.5**
			PVC	**348**	**25.1**
			CVC	**64**	**4.6**
			Intubation	**56**	**4.0**
Nevill Hall	330	164			
			UC	56	17.0
			PVC	137	41.5
			CVC	8	2.4
			Intubation	7	2.1
Royal Gwent	585	285			
			UC	128	21.9
			PVC	187	32.0
			CVC	56	9.6
			Intubation	49	8.4

*A patient may have more than one device in situ at one time.
Key: UC – urinary catheter; PVC – peripheral vascular cannula; CVC – central venous catheter.

Table I.IId - Prevalence of antimicrobial prescribing in Aneurin Bevan Health Board hospitals

Hospital type	Hospital	Number of patients surveyed	Number of patients receiving antimicrobials	Prevalence (%) of prescribing (95% CI)
	ABVHB total	**1387**	**390**	**28.1 (25.8 - 30.5)**
Acute hospitals	Nevill Hall	330	101	30.6 (25.9 - 35.8)
	Royal Gwent	585	207	35.4 (31.6 - 39.3)
Non-acute hospitals	Caerphilly District Miners	65	25	38.5 (27.6 - 50.6)
	Carn-y-Cefn	8	0	0.0 (0.0 - 32.4)
	Chepstow	40	6	15.0 (7.1 - 29.1)
	County	66	17	25.8 (16.7 - 37.4)
	Maindiff Court	12	0	0.0 (0.0 - 24.3)
	Monnow Vale	19	2	10.5 (2.9 - 31.4)
	Redwood	9	2	22.2 (6.3 - 54.7)
	St Cadocs	32	1	3.1 (0.6 - 15.7)
	St Woolos Community	67	6	9.0 (4.2 - 18.2)
	Talygarn	13	2	15.4 (4.3 - 42.2)
	Ty Sirhowy	19	0	0.0 (0.0 - 16.8)
	Ysbyty Aneurin Bevan	85	17	20.0 (12.9 - 29.7)
	Ystrad Mynach	37	4	10.8 (4.3 - 24.7)

I.III Betsi Cadwaladr University Health Board (BCUHB)

Table I.IIIa – Number and prevalence of patients surveyed in acute hospitals in Betsi Cadwaladr University Health Board with HAI

Acute hospital	Number of patients surveyed	Number of patients with HAI	Prevalence (%) of HAI (95% CI)*
BCUHB total	**1815**	**84**	**4.6 (3.8 – 5.7)**
Abergele	8	1	12.5 (2.2 – 47.1)
Llandudno	83	5	6.0 (2.6 – 13.3)
Wrexham Maelor	504	22	4.4 (2.9 – 6.5)
Ysbyty Glan Clwyd	475	9	1.9 (1.0 – 3.6)
Ysbyty Gywnedd	409	25	6.1 (4.2 – 8.9)

*95% CI – indicate the range of values within which we can be confident that the true value lies

Table I.IIIb – Number and prevalence of HAI in acute hospitals in Betsi Cadwaladr University Health Board by HAI type

HAI type	Number of HAI*	% of HAI	Prevalence (%) of HAI by type
BCUHB total	**88**		**4.9**
UTI	23	26.1	1.3
GI infection	18	20.5	1.0
SSI	13	14.8	0.7
Eyes and ENT	9	10.2	0.5
LRT	6	6.8	0.3
BSI	6	6.8	0.3
Skin and soft tissue infection	5	5.7	0.3
Pneumonia	2	2.3	0.1
Reproductive infection	2	2.3	0.1
CRI-PVC	2	2.3	0.1
CNS	1	1.1	0.1
Systemic infection	1	1.1	0.1

* Counts the number of HAI (i.e. Patients may have multiple HAI).
Key: UTI – urinary tract infection; SSI – surgical site infection; GI – gastrointestinal; BSI – bloodstream infection; LRT – lower respiratory tract; ENT – ear - nose - throat; CRI-CVC – catheter related infection (central venous catheter); CRI-PVC – catheter related infection (peripheral vascular cannula); CNS – central nervous system; CVS – cardiovascular system.

Table I.IIIc – Number and percentage of patients surveyed in Betsi Cadwaladr University Health Board acute hospital by device utilisation

Acute hospital	Number of patients surveyed	Number of patients with one or more devices in situ	Device	Number of devices in situ*	% of device utilisation
BCUHB total	**1815**	**674**			**37.1**
			UC	**335**	**18.5**
			PVC	**468**	**25.8**
			CVC	**41**	**2.3**
			Intubation	**20**	**1.1**
Abergele	8	2			
			UC	1	12.5
			PVC	1	12.5
			CVC	0	0.0
			Intubation	0	0.0
Llandudno General	83	21			
			UC	20	24.1
			PVC	7	8.4
			CVC	4	4.8
			Intubation	4	4.8
Wrexham Maelor	504	233			
			UC	117	23.2
			PVC	177	35.1
			CVC	8	1.6
			Intubation	5	1.0
Ysbyty Glan Clwyd	475	158			
			UC	63	13.3
			PVC	119	25.1
			CVC	11	2.3
			Intubation	3	0.6
Ysbyty Gwynedd	409	195			
			UC	70	17.1
			PVC	163	39.9
			CVC	17	4.2
			Intubation	8	2.0

*A patient may have more than one device in situ at one time.
Key: UC – urinary catheter; PVC – peripheral vascular cannula; CVC – central venous catheter.

Table I.IIId - Prevalence of antimicrobial prescribing in Betsi Cadwaladr University Health Board hospitals

Hospital type	Hospital	Number of patients surveyed	Number of patients receiving antimicrobials	Prevalence (%) of prescribing (95% CI)
	BCUHB total	**1815**	**561**	**30.9 (28.8 - 33.1)**
Acute hospitals	Abergele	8	1	12.5 (2.2 - 47.1)
	Llandudno	83	15	18.1 (11.3 - 27.7)
	Wrexham Maelor	504	169	33.5 (29.5 - 37.8)
	Ysbyty Glan Clwyd	475	140	29.5 (25.6 - 33.7)
	Ysbyty Gwynedd	409	169	41.3 (36.7 - 46.2)
Non-acute hospitals	Alltwen	15	3	20.0 (7.0 – 45.2)
	Bryn Beryl	28	11	39.3 (23.6 - 57.6)
	Chirk	29	7	24.1 (12.2 - 42.1)
	Colwyn Bay	36	7	19.4 (9.8 - 35.0)
	Deeside	42	7	16.7 (8.3 - 30.6)
	Denbigh	16	3	18.8 (6.6 - 43.0)
	Dolgellau	14	1	7.1 (1.3 - 31.5)
	Eryri	34	5	14.7 (6.4 - 30.1)
	Ffestiniog Memorial	12	2	16.7 (4.7 - 44.8)
	Holywell	20	2	10.0 (2.8 - 30.1)
	Mold	35	6	17.1 (8.1 - 32.7)
	Penley	8	1	12.5 (2.2 - 47.1)
	Penrhos Stanley	39	8	20.5 (10.8 - 35.5)
	Tywyn	8	4	50.0 (21.5 - 78.5)

I.IV Cardiff and Vale University Health Board (C&VUHB)

Table I.IVa – Number and prevalence of patients surveyed in acute hospitals in Cardiff and Vale University Health Board with HAI

Acute hospital	Number of patients surveyed	Number of patients with HAI	Prevalence (%) of HAI (95% CI)*
C&VUHB total	**1645**	**76**	**4.6 (3.7 – 5.7)**
University Hospital Llandough	361	10	2.8 (1.5 - 5.0)
University Hospital of Wales	862	61	7.1 (5.6 – 9.0)

*95% CI – indicate the range of values within which we can be confident that the true value lies.

Table I.IVb – Number and prevalence of HAI in acute hospitals in Cardiff and Vale University Health Board by HAI type

HAI type	Number of HAI*	% of HAI	Prevalence (%) of HAI by type
C&VUHB total	**81**		**4.9**
SSI	28	34.6	1.7
Pneumonia	11	13.6	0.7
UTI	10	12.3	0.6
BSI	10	12.3	0.6
GI infection	7	8.6	0.4
Skin and soft tissue infection	4	4.9	0.2
LRT	4	4.9	0.2
CRI-CVC	4	4.9	0.2
CNS	1	1.2	0.1
Neonatal infection	1	1.2	0.1
Systemic infection	1	1.2	0.1

* Counts the number of HAI (i.e. Patients may have multiple HAI).
Key: UTI – urinary tract infection; SSI – surgical site infection; GI – gastrointestinal; BSI – bloodstream infection; LRT – lower respiratory tract; ENT – ear - nose - throat; CRI-CVC – catheter related infection (central venous catheter); CRI-PVC – catheter related infection (peripheral vascular cannula); CNS – central nervous system; CVS – cardiovascular system.

Table I.IVc – Number and percentage of patients surveyed in Cardiff and Vale University Health Board acute hospitals by device utilisation

Acute hospital	Number of patients surveyed	Number of patients with one or more devices in situ	Device	Number of devices in situ*	% of device utilisation
C&VUHB	**1645**	**627**			**38.1**
			UC	**308**	**18.7**
			PVC	**412**	**25.0**
			CVC	**147**	**8.9**
			Intubation	**82**	**5.0**
University Hospital Llandough	361	116			
			UC	57	15.8
			PVC	72	19.9
			CVC	6	1.7
			Intubation	3	0.8
University Hospital of Wales	862	439			
			UC	196	22.7
			PVC	310	36.0
			CVC	106	12.3
			Intubation	40	4.6

*A patient may have more than one device in situ at one time.
Key: UC – urinary catheter; PVC – peripheral vascular cannula; CVC – central venous catheter.

Table I.IVd - Prevalence of antimicrobial prescribing in Cardiff and Vale University Health Board hospitals

Hospital type	Hospital	Number of patients surveyed	Number of patients receiving antimicrobials	Prevalence (%) of prescribing (95% CI)
	C&VUHB total	**1645**	**440**	**26.7 (24.7 - 28.9)**
Acute hospitals	University Hospital Llandough	361	111	30.7 (26.2 - 35.7)
	University Hospital of Wales	862	291	33.8 (30.7 - 37.0)
Non-acute hospitals	Barry	78	11	14.1 (8.1 - 23.5)
	Cardiff Royal Infirmary	114	3	2.6 (0.9 – 7.5)
	Llanfair Unit	54	2	3.7 (1.0 - 12.5)
	Rookwood	60	6	10.0 (4.7 - 20.1)
	St Davids	50	4	8.0 (3.2 - 18.8)
	Whitchurch	66	12	18.2 (10.7 - 29.1)

I.IV Cwm Taf Health Board (CWTHB)

Table I.Va – Number and prevalence of patients surveyed in acute sector in Cwm Taf Health Board with HAI

Acute hospital	Number of patients surveyed	Number of patients with HAI	Prevalence (%) of HAI (95% CI)*
CWTHB total	**1026**	**16**	**1.6 (1.0 – 2.5)**
Prince Charles	313	3	1.0 (0.3 – 2.8)
The Royal Glamorgan	370	9	2.4 (1.3 – 4.6)

*95% CI – indicate the range of values within which we can be confident that the true value lies

Table I.IVb – Number and prevalence of HAI in acute hospitals in Cwm Taf Health Board by HAI type

HAI type	Number of HAI*	% of HAI	Prevalence (%) of HAI by type
CWTHB total	**17**		**1.7**
SSI	6	35.3	0.6
BSI	3	17.6	0.3
LRT	2	11.8	0.2
Eyes and ENT	2	11.8	0.2
UTI	1	5.9	0.1
CRI-CVC	1	5.9	0.1
Pneumonia	1	5.9	0.1
Skin and soft tissue infection	1	5.9	0.1

* Counts the number of HAI (i.e. Patients may have multiple HAI).
Key: UTI – urinary tract infection; SSI – surgical site infection; GI – gastrointestinal; BSI – bloodstream infection; LRT – lower respiratory tract; ENT – ear - nose - throat; CRI-CVC – catheter related infection (central venous catheter); CRI-PVC – catheter related infection (peripheral venous catheter); CNS – central nervous system; CVS – cardiovascular system.

Table I.Vc – Number and percentage of patients surveyed in Cwm Taf Health Board acute hospitals by device utilisation

Acute hospital	Number of patients surveyed	Number of patients with one or more devices in situ	Device	Number of devices in situ*	% of device utilisation
CWTHB total	**1026**	**346**			**33.7**
			UC	**151**	**14.7**
			PVC	**252**	**24.6**
			CVC	**20**	**1.9**
			Intubation	**20**	**1.9**
Prince Charles	313	137			
			UC	45	14.4
			PVC	114	36.4
			CVC	4	1.3
			Intubation	9	2.9
The Royal Glamorgan	370	155			
			UC	55	14.9
			PVC	130	35.1
			CVC	11	3.0
			Intubation	6	1.6

*A patient may have more than one device in situ at one time.
Key: UC – urinary catheter; PVC – peripheral vascular cannula; CVC – central venous catheter.

Table I.Vd - Prevalence of antimicrobial prescribing in Cwm Taf Health Board hospitals

Hospital type	Hospital	Number of patients surveyed	Number of patients receiving antimicrobials	Prevalence (%) of prescribing (95% CI)
	CWTHB total	**1026**	**269**	**26.2 (23.6 - 29.0)**
Acute hospitals	Prince Charles	313	96	30.7 (25.8 - 36.0)
	The Royal Glamorgan	370	125	33.8 (29.2 - 38.7)
Non-acute hospitals	Aberdare General	67	15	22.4 (14.1 - 33.7)
	Dewi Sant	60	6	10.0 (4.7 - 20.1)
	St Tydfils	76	7	9.2 (4.5 - 17.8)
	Royal Glamorgan Mental Health	32	3	9.4 (3.2 - 24.2)
	Y Bwthyn	4	2	50.0 (15.0 - 85)
	Ysbyty Cwm Rhondda	104	15	14.4 (8.9 - 22.4)

I.VI Hywel Dda Health Board (HDHB)

Table I.VIa – Number and prevalence of patients surveyed in acute sector in Hywel Dda Health Board with HAI

Acute hospital	Number of patients surveyed	Number of patients with a HAI	Prevalence (%) of HAI (95% CI)*
CWTHB total	**1071**	**69**	**6.4 (5.1 – 8.1)**
Bronglais General	131	16	12.2 (7.7 – 18.9)
Glangwili General	270	20	7.4 (4.7 – 11.2)
Prince Philip	174	13	7.5 (4.4 – 12.4)
Withybush General	286	9	3.1 (1.7 – 5.9)

*95% CI – indicate the range of values within which we can be confident that the true value lies.
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Table I.VIb – Number and prevalence of HAI in acute hospitals in Hywel Dda Health Board by HAI type

HAI type	Number of HAI*	% of HAI	Prevalence (%) of HAI by type
CWTHB total	**74**		**6.9**
UTI	18	24.3	1.7
Pneumonia	15	20.3	1.4
SSI	13	17.6	1.2
BSI	6	8.1	0.6
Eyes and ENT	6	8.1	0.6
Skin and soft tissue infection	6	8.1	0.6
GI infection	4	5.4	0.4
CVS infection	1	1.4	0.1
LRT	1	1.4	0.1
CRI-PVC	1	1.4	0.1
Systemic infection	1	1.4	0.1
Bone and joint infection	1	1.4	0.1
Reproductive infection	1	1.4	0.1

* Counts the number of HAI (i.e. Patients may have multiple HAI).
Key: UTI – urinary tract infection; SSI – surgical site infection; GI – gastrointestinal; BSI – bloodstream infection; LRT – lower respiratory tract; ENT – ear - nose - throat; CRI-CVC – catheter related infection (central venous catheter); CRI-PVC – catheter related infection (peripheral vascular cannula); CNS – central nervous system; CVS – cardiovascular system.

Table I.VIc – Number and percentage of patients surveyed in Hywel Dda Health Board acute hospitals by device utilisation

Acute hospital	Number of patients surveyed	Number of patients with one or more devices in situ	Device	Number of devices in situ*	% of device utilisation
HDHB total	**1071**	**471**			**44.0**
			UC	**203**	**19.0**
			PVC	**376**	**35.1**
			CVC	**37**	**3.5**
			Intubation	**11**	**1.0**
Bronglais General	131	82			
			UC	35	26.7
			PVC	67	51.1
			CVC	2	1.5
			Intubation	0	0.0
Glangwili General	270	167			
			UC	82	30.4
			PVC	141	52.2
			CVC	28	10.4
			Intubation	7	2.6
Prince Philip	174	81			
			UC	28	16.1
			PVC	68	39.1
			CVC	1	0.6
			Intubation	0	0.0
Withybush General	286	125			
			UC	42	14.7
			PVC	100	35.0
			CVC	6	2.1
			Intubation	4	1.4

*A patient may have more than one device in situ at one time.
Key: UC – urinary catheter; PVC – peripheral vascular cannula; CVC – central venous catheter.

Table I.VId - Prevalence of antimicrobial prescribing in Hywel Dda Health Board hospitals

Hospital type	Hospital	Number of patients surveyed	Number of patients receiving antimicrobials	Prevalence (%) of prescribing (95% CI)
	HDHB total	**1071**	**316**	**29.5 (26.9 - 32.3)**
Acute hospitals	Bronglais General	131	50	38.2 (30.3 - 46.7)
	Glangwili General	270	120	44.4 (38.6 - 50.4)
	Prince Philip	174	51	29.3 (23.1 - 36.5)
	Withybush General	286	81	28.3 (23.4 - 33.8)
Non-acute hospitals	Afallon	12	0	0.0 (0.0 - 24.3)
	Amman Valley	25	4	16.0 (6.4 - 34.7)
	Cardigan	20	4	20.0 (8.1 - 41.6)
	Enlli	7	0	0.0 (0.0 - 35.4)
	Hafan Derwen	65	1	1.5 (0.3 - 8.2)
	Llandovery	16	1	6.3 (1.1 - 28.3)
	Mynydd Mawr	22	1	4.5 (0.8 - 21.8)
	South Pembrokeshire	31	2	6.5 (1.8 - 20.7)
	Tregaron	12	1	8.3 (1.5 - 35.4)

V.II Powys Teaching Health Board (POWTR)

Table I.VIIa – Number and prevalence of patients surveyed in Powys Teaching Health Board with HAI

Health Board	Number of patients surveyed	Number of patients with HAI	Prevalence (%) of HAI (95% CI)*
POWTR	154	25	16.2 (11.2 – 22.9)

*95% CI – indicate the range of values within which we can be confident that the true value lies.

Table I.VIIb – Number and prevalence of HAI in acute hospitals in Powys Teaching Health Board by HAI type

HAI type	Number of HAI*	% of HAI	Prevalence (%) of HAI by type
POWTR	26		16.9
UTI	12	46.2	7.8
LRT	5	19.2	3.2
Skin and soft tissue infection	4	15.4	2.6
Eyes and ENT	2	7.7	1.3
BSI	1	3.8	0.6
GI infection	1	3.8	0.6
Reproductive infection	1	3.8	0.6

* Counts the number of HAI (i.e. Patients may have multiple HAI).
Key: UTI – urinary tract infection; SSI – surgical site infection; GI – gastrointestinal; BSI – bloodstream infection; LRT – lower respiratory tract; ENT – ear - nose - throat; CRI-CVC – catheter related infection (central venous catheter); CRI-PVC – catheter related infection (peripheral vascular cannula); CNS – central nervous system; CVS – cardiovascular system.

Table I.VIIc – Number and percentage of patients surveyed in Powys Teaching Health Board by device utilisation

Acute hospital	Number of patients surveyed	Number of patients with one or more devices in situ	Device	Number of devices in situ*	% of device utilisation
POWTR total	154	28			18.2
			UC	27	17.5
			PVC	1	0.6
			CVC	0	0.0
			Intubation	0	0.0

*A patient may have more than one device in situ at one time.
Key: UC – urinary catheter; PVC – peripheral vascular cannula; CVC – central venous catheter.

Table I.VIId - Prevalence of antimicrobial prescribing in Powys Teaching Health Board hospitals

Hospital type	Hospital	Number of patients surveyed	Number of patients receiving antimicrobials	Prevalence (%) of prescribing (95% CI)
	POWTR total	**154**	**36**	**23.4 (17.4 - 30.7)**
Non-acute hospitals	Breconshire War Memorial	21	10	47.6 (28.3 - 67.6)
	Bronllys	16	2	12.5 (3.5 - 36.0)
	Builth Wells	6	0	0.0 (0.0 - 39.0)
	Knighton	10	1	10.0 (1.8 - 40.4)
	Llandrindod Wells	20	4	20.0 (8.1 - 41.6)
	Llanidloes	16	3	18.8 (6.6 - 43.0)
	Machynlleth	12	3	25.0 (8.9 - 53.2)
	Newtown	14	2	14.3 (4.0 - 39.9)
	Victoria War Memorial	21	10	47.6 (28.3 - 67.6)
	Ystradgynlais Community	18	1	5.6 (1.0 - 25.8)

I.VIII Velindre NHS Trust (VELTR)

Table I.VIIIa – Number and prevalence of patients surveyed in Velindre Health Board with HAI

Health Board	Number of patients surveyed	Number of patients with HAI	Prevalence (%) of HAI (95% CI)*
VELTR	33	2	6.1 (1.7 – 19.6)

*95% CI – indicate the range of values within which we can be confident that the true value lies.

Table I.VIIIb – Number and prevalence of HAI in acute hospitals in Velindre NHS Trust by HAI type

HAI type	Number of HAI*	% of HAI	Prevalence (%) of HAI by type
VELTR	2		6.1
Pneumonia	2	100.0	6.1

* Counts the number of HAI (i.e. Patients may have multiple HAI).
Key: UTI – urinary tract infection; SSI – surgical site infection; GI – gastrointestinal; BSI – bloodstream infection; LRT – Lower respiratory tract; ENT – ear - nose - throat; CRI-CVC – catheter related infection (central venous catheter); CRI-PVC – catheter related infection (peripheral vascular cannula); CNS – central nervous system; CVS – cardiovascular system.

Table I.VIIIc – Number and percentage of patients surveyed in Velindre NHS Trust by device utilisation

Acute hospital	Number of patients surveyed	Number of patients with one or more devices in situ	Device	Number of devices in situ*	% of device utilisation
VELTR total	33	23			69.7
			UC	9	27.3
			PVC	16	48.5
			CVC	7	21.2
			Intubation	0	0.0

*A patient may have more than one device in situ at one time.
Key: UC – urinary catheter; PVC – peripheral vascular cannula; CVC – central venous catheter.

Table I.VIIId - Prevalence of antimicrobial prescribing in Velindre NHS Trust

Hospital	Number of patients surveyed	Number of patients receiving antimicrobials	Prevalence (%) of prescribing (95% CI)
VELTR total	33	17	51.5 (35.2 - 67.5)

II. **DISTRIBUTION OF ANTIMICROBIALS BY ANTIBIOTIC NAME**

Antimicrobial name	Number of patients receiving antimicrobial	Proportion of patients receiving antimicrobial (n = 9094)
Co-amoxiclav	522	5.7
Metronidazole	318	3.5
Piperacillin/Tazobactam	275	3.0
Flucloxacillin	230	2.5
Trimethoprim	220	2.4
Amoxicillin	178	2.0
Clarithromycin	147	1.6
Ciprofloxacin	141	1.6
Nystatin	140	1.5
Doxycycline	135	1.5
Meropenem	107	1.2
Vancomycin	100	1.1
Cefuroxime	96	1.1
Fluconazole	84	0.9
Gentamicin	70	0.8
Benzylpenicillin	68	0.7
Teicoplanin	65	0.7
Cefalexin	61	0.7
Nitrofurantoin	57	0.6
Penicillin V	43	0.5
Erythromycin	37	0.4
Clindamycin	35	0.4
Co-trimoxazole	35	0.4
Rifampicin	34	0.4
Levofloxacin	33	0.4
Cefotaxime	30	0.3
Azithromycin	28	0.3
Fusidic acid	26	0.3
Imipenem/Cilastatin	21	0.2
Ceftriaxone	15	0.2
Itraconazole	14	0.2
Ceftazidime	12	0.1
Voriconazole	9	0.1
Tobramycin	8	0.1
Colistin	7	0.1
Ertapenem	6	0.1
Ethambutol	6	0.1
Amikacin	5	0.1
Linezolid	5	0.1
Amphotericin	4	<0.1
Caspofungin	3	<0.1
Isoniazid	3	<0.1
Pyrazinamide	3	<0.1
Tigecycline	3	<0.1
Cefradine	2	<0.1
Chloramphenicol	2	<0.1
Demeclocycline	2	<0.1
Minocycline	2	<0.1
Norfloxacin	2	<0.1
Not stated	2	<0.1
Rifinah	2	<0.1
Tetracycline	2	<0.1
Lymecycline	1	<0.1
Moxifloxacin	1	<0.1
Ofloxacin	1	<0.1
Oxytetracycline	1	<0.1
Pivmecillinam	1	<0.1
Rifater	1	<0.1
Rifaximin	1	<0.1

III. ECDC DEFINITION OF HOSPITAL TYPE

1. Primary:
   - often referred to as "district hospital" or "first-level referral"
   - few specialities (mainly internal medicine, obstetrics-gynaecology, paediatrics, general surgery or only general practice)
   - limited laboratory services are available for general, but not for specialized pathological analysis
   - often corresponds to general hospital without teaching function
2. Secondary:
   - often referred to as "provincial hospital"
   - highly differentiated hospital by function with five to ten clinical specialities, such as haematology, oncology, nephrology, ICU
   - takes some referrals from other (Primary) hospitals
   - often corresponds to general hospital with teaching function
3. Tertiary:
   - often referred to as "central", "regional" or "tertiary-level" hospital
   - highly specialized staff and technical equipment (ICU, haematology, transplantation, cardio-thoracic surgery, neurosurgery)
   - clinical services are highly differentiated by function
   - specialized imaging units
   - provides regional services and regularly takes referrals from other (primary and secondary) hospitals
   - often corresponds to University hospital
4. Specialised hospital:
   - Single clinical specialty, possibly with sub-specialties
   - highly specialised staff and technical equipment
   - Specify (e.g. paediatric hospital, infectious diseases hospital)

In Chapter 2 Section 5 hospitals in Wales have been categorised using the above hospital types. The list is shown below:

Primary	Secondary	Tertiary	Specialised
Abergele Llandudno General	Bronglais General Glangwili Neath Port Talbot Nevill Hall Prince Charles Prince Philip Princess Of Wales Royal Gwent The Royal Glamorgan Withybush General Wrexham Maelor Ysbyty Glan Clwyd	Morriston Singleton University Hospital Llandough University Hospital of Wales	Velindre

IV. FORMS

A1 - Ward Form

FORM A1	European Prevalence Survey of Healthcare-Associated Infections and Antimicrobial Use: Ward	2011 EXAMPLE FORM

Survey date	Hospital code	Ward code (see ward code list)	Ward specialty code (see specialty code list)	Number of beds on ward	Number of patient rooms on ward	Number of single rooms on ward	Please see back of page for definitions and instructions for form completion
2 1 1 1 1	B 4	2 6	4 4	2 6	0 2	0 4	

1000 LIVES+ / O FYWYDAU — Name of person completing form: **JOE SMITH**

	Hospital Number	DOB	Sex	Admission date to current hospital	Consult specialty (see specialty code list)	Surgery since admission 1 = No 2 = Yes NHSN 3 = Yes non NHSN 4 = Unknown	McCabe score 1 = Non fatal 2 = Ultimately fatal 3 = Rapidly fatal 4 = Unknown	Central line	Periph line	Urinary cath	Intu- bation	Anti- microb	Infection
EXAMPLE	N 5 8 3 6 7 9 2 2	2 0 0 3 7 7	☒M ☐F	1 8 0 7 1 1	1 2	3	1	☒	☐	☒	☐	☐	☐
1	N 6 1 3 8 5 1 2 7	3 0 0 7 6 6	☐M ☒F	1 5 1 1 1 1	1 0	1	1	☐	☒	☒	☐	☒	☒
2	N 7 1 4 9 2 3 1 5	1 5 0 2 4 2	☐M ☒F	1 8 1 1 1 1	0 8	2	3	☒	☐	☐	☒	☒	☒
3	N 3 5 6 1 2 3 4 8	2 1 0 4 5 6	☒M ☐F	1 6 1 1 1 1	1 0	1	1	☐	☒	☒	☐	☒	☐
4			☐M ☐F					☐	☐	☐	☐	☐	☐
5			☐M ☐F					☐	☐	☐	☐	☐	☐
6			☐M ☐F					☐	☐	☐	☐	☐	☐
7			☐M ☐F					☐	☐	☐	☐	☐	☐
8			☐M ☐F					☐	☐	☐	☐	☐	☐
9			☐M ☐F					☐	☐	☐	☐	☐	☐
10			☐M ☐F				TOTAL	☐	☐	☐	☐	☐	☐

Instructions for Form Completion

- Use a black pen
- Use crosses rather than ticks to indicate a response
- Write clearly and ensure all crosses, letters and numbers are written inside the boxes provided
- In boxes requiring text, only one letter or number should be written in each box
- Only use the codes provided
- Codes should be written in capital letters
- If an error is made please colour in the box containing the error and write the correct response in the space beside taking care not to write over adjacent boxes

Definitions and Codes

Survey date: Data from a single ward should all be collected in one day

Ward specialty code (see Specialty Code List): Main ward specialty (>80% of patients belong to this specialty). If less than 80% use specialty code 68 (combination of specialties)

Consultant specialty code (see Specialty Code List): Specialty of physician in charge of the patient, may differ from the ward specialty

Number of beds on ward: Total number of beds on the ward at the start of the survey

Number of patient rooms on ward: Total number of multi bedded rooms, bays and single rooms on the ward

Number of single rooms on ward: Total number of single rooms on the ward

Surgery since admission: Patient has undergone surgery during current hospitalisation. Surgery is defined as a procedure, where an incision is made (not just a needle puncture), with a breach of mucosa and /or skin not necessarily in the operating theatre. Answer to categories:

1 = No surgery
2 = NHSN surgery (see NHSN surgery list)
3 = Non NHSN surgery/ minimal invasive (see examples of Non NHSN surgery)
4 = Unknown

McCabe score: Classification of the severity of underlying medical conditions. Disregard the influence of acute infections, e.g in case the patient has an active HAI, estimate the score the patient had before the infection. Answer to categories:

1 = **Non-fatal disease (expected survival at least 5 years)** e.g. Diabetes, carcinoma/ Haematological malignancy with > 80% 5 year survival, inflammatory disorders, chronic GI, GU conditions, obstetrics, infections (including HIV, HCV, HBV – unless in below categories), all others.
2 = **Ultimately fatal disease (between 1 year and 5 years)** e.g. chronic leukaemias, myelomas, lymphomas, metastatic carcinoma, end stage kidney disease (without transplant) Motor neuron disease, MS non-responsive to treatment, Alzheimers/ dementia, diabetes requiring/ post amputation
3 = **Rapidly fatal disease (expected death within 1 year)** e.g. end stage haematological malignancies (unsuitable for transplant, or relapsed), heart failure (EF<25%) and end-stage liver disease (unsuitable for transplant with recalcitrant ascites, encephalopathy or varices), multiple organ failure on intensive care unit, pulmonary disease with cor pulmonale
4 = Unknown

Central vascular catheter: A central line is defined as "An intravascular catheter that terminates at or close to the heart or in one of the great vessels.: Aorta, pulmonary artery, superior vena cava, inferior vena cava, brachiocephalic veins, internal jugular veins, subclavian veins, external iliac veins, common iliac veins, common femoral veins, and in neonates, the umbilical artery/ vein.
NB: Neither the insertion site nor the type of device may be used to determine if a line qualifies as a central line. The device must terminate in one of these vessels or in or near the heart to qualify as a central line.
NB: An introducer is considered an intravascular catheter.
NB: Pacemaker wires and other nonlumened devices inserted into central blood vessels or the heart are not considered central lines, because fluids are not infused, pushed, nor withdrawn through such devices."

A2 - Antimicrobial Resistance Form

Antimicrobial Point Prevalence Survey: Patient Form | EXAMPLE FORM | EXAMPLE FORM | 2011

Please complete one form per patient - Please see back of page for codes and instructions for form completion

Hospital Code	Patient Identifier (Hospital Number)	Age (yrs)	DOB	Sex	Pharmacist Name
				☐ M ☐ F	Ward Name

	Antimicrobial (generic or brand name)	ATC Code To be completed by Antimicrobial Resistance Programme	Unit Dose (grams) Dose per administration in grams. For combination products record the total dose prescribed	Doses per day 1,2,3 or 4, continuous infusion (CI), or enter other dose. Fraction doses - every 36hrs=0.67, 48hrs=0.5, 72hrs=0.33 doses per day	Route P= Parenteral, O=Oral, R=Rectal, IN=Inhalation, IT=Intrathecal T=Topical	Diagnosis See back of page for diagnosis codes. Cross box if prophylaxis	Indication See back of page for indications codes	Reason in notes	Day of Therapy Enter number of days of therapy, or cross SD for stat doses or LT for long term prophylaxis
EXAMPLE	Cefuroxime	J 0 1 C A 0 2	1 . 5	☒1 ☐2 ☐3 ☐4 ☐CI Other doses	☒P ☐O ☐R ☐IN ☐IT ☐T ☒Prophylaxis	S B J	C 1	☒Yes ☐No	or ☒SD ☐LT
1		J O	.	☐1 ☐2 ☐3 ☐4 ☐CI Other doses	☐P ☐O ☐R ☐IN ☐IT ☐T ☐Prophylaxis			☐Yes ☐No	or ☐SD ☐LT
2		J O	.	☐1 ☐2 ☐3 ☐4 ☐CI Other doses	☐P ☐O ☐R ☐IN ☐IT ☐T ☐Prophylaxis			☐Yes ☐No	or ☐SD ☐LT
3		J O	.	☐1 ☐2 ☐3 ☐4 ☐CI Other doses	☐P ☐O ☐R ☐IN ☐IT ☐T ☐Prophylaxis			☐Yes ☐No	or ☐SD ☐LT
4		J O	.	☐1 ☐2 ☐3 ☐4 ☐CI Other doses	☐P ☐O ☐R ☐IN ☐IT ☐T ☐Prophylaxis			☐Yes ☐No	or ☐SD ☐LT
5		J O	.	☐1 ☐2 ☐3 ☐4 ☐CI Other doses	☐P ☐O ☐R ☐IN ☐IT ☐T ☐Prophylaxis			☐Yes ☐No	or ☐SD ☐LT

In case of any uncertainty in dose, diagnosis indication etc. use this box for notes **(Please do not make notes on any other part of this form)**

Local Surveillance

Antibiotic sticker used?	Patient taking proton inhibitors?	Other question?
☐Yes ☐No	☐Yes ☐No ☐Withheld	☐Yes ☐No

Instructions for Form Completion

- Use a black pen
- Use crosses rather than ticks to indicate a response
- Write clearly and ensure all crosses, letters and numbers are written inside the boxes provided
- In boxes requiring text, only one letter or number should be written in each box
- Only use the codes provided
- Codes should be written in capital letters
- Only make notes in the space provided at the bottom of the form
- If an error is made please colour in the box containing the error and write the correct response in the space beside taking care not to write over adjacent boxes

Diagnosis and Indication Codes

Diagnosis	Prophylaxis	Code
Prophylaxis for CNS (neurosurgery, meningococcal)	X	CNS
Infections of the Central Nervous System		CNS
Prophylaxis for eye operations	X	EYE
Endophthalmitis		EYE
Prophylaxis for Ear, Nose or Throat (surgery or medical)	X	ENT
Infections of ear, mouth, nose, throat or larynx		ENT
Pulmonary surgery, prophylaxis for respiratory pathogens^A	X	RES
Acute bronchitis, exacerbations of chronic bronchitis, COPD/COAD or any other respiratory tract infections other than pneumonia		BRON
Pneumonia		PNEU
Cardiac or vascular surgery, endocarditis prophylaxis	X	CVS
Cardiovascular infections: endocarditis, vascular graft		CVS
Surgery of the GI tract, liver or biliary tree, GI prophylaxis in neutropenic patients or hepatic failure	X	GI
GI infections (salmonellosis, antibiotic associated diarrhoea)		GI
Intra-abdominal sepsis including hepatobiliary		IA
Prophylaxis for plastic or orthopaedic surgery (bone or joint)	X	SBJ
Prophylaxis for skin or soft tissue e.g. leg ulcers , breast surgery	X	SST
Cellulitis, wound, deep soft tissue not involving bone		SST
Septic arthritis (including prosthetic joint), osteomyelitis		BJ
Prophylaxis for urological surgery, recurrent UTI	X	UT
Symptomatic lower urinary tract infection (e.g. cystitis)		CYS
Symptomatic upper urinary tract infection (e.g. pyelonephritis)		PYE
Asymptomatic bacteriuria		ASB
Obstetric or gynaecological infections, STD in women		OBGY
Prophylaxis for obstetric or gynaecological surgery	X	GYOB
Prostatitis, epididymo-orchitis, STD in men		GUM
Laboratory confirmed bacteriaemia		BAC
Clinical sepsis (suspected bloodstream infection without lab confirmation, result not available, no blood cultures taken or negative blood culture), excluding Febrile Neutropenia		CSEP
Febrile Neutropenia or other form of manifestation of infection in immunocompromised host (e.g. HIV) with no clear anatomical site^B	X	FN
Systemic inflammatory response with no clear anatomic site		SIRS
Completely un-defined site with no systemic inflammation		UND
Antimicrobial used for prokinetic use e.g. erythromycin		PROK

Indication			Code
A	Community acquired Infection: Symptoms start <48h after admission to hospital	Community acquired infection excluding C difficile	A1
		C difficile associated diarrhoea <48h after admission and >30 days after previous admission	A3
B	Hospital acquired infection: Symptoms start 48h after admission to hospital	Post-operative infection (within 30 days after surgery or 1 year	B1
		Other intervention related infections (IV catheter, VAP, CAPD)	B2
		C difficile associated diarrhoea >48h after admission or <30 days after previous admission	B3
		Other hospital acquired infection	B4
		Infection present on admission from another hospital	B5
		Infection present on admission from care/ nursing home	B6
C	Surgical prophylaxis	Single dose	C1
		Multiple doses within 24hrs	C2
		>1 day	C3
D	Medical prophylaxis	All medical prophylaxis	D1
O	Other Reason	Prokinetic use^C	O
U	Unknown	Indication unknown	U

^A For **post-splenectomy** cross **prophylaxis** box and use code **RES**
^B For **prophylaxis in HIV** or **neutropenic patients** cross **prophylaxis** box and use code **FN**
^C For **prokinetic use of erythromycin** use code **PROK** and **indication O**

For Antimicrobial PPS please include all patients who are receiving antimicrobials (including antifungals, antivirals, TB therapy and topical preparations)

A3 – HAI form

European Prevalence Survey of Healthcare-Associated Infections and Antimicrobial Use: HAI Form

FORM A3 — EXAMPLE FORM — **2011** — EXAMPLE FORM

One form for every patient with a healthcare-associated infection (HAI)

Hospital code	Ward code (see ward code list)	Hospital number	
B 4	1 6	■ N 6 1 3 8 5 1 2 7	Please see back of page for definitions and instructions for form completion

	HAI 1	HAI 2	HAI 3
Healthcare–associated infection (HAI) type code (see HAI code list)	4 0	5 0	
Did the patient have a relevant invasive device in situ (even intermittently) in 48hrs preceding infection (7 days for UTI)?	☒ Yes / ☐ No / ☐ Unknown	☐ Yes / ☒ No / ☐ Unknown	☐ Yes / ☐ No / ☐ Unknown
Were signs and symptoms of HAI present at admission?	☐ Yes / ☒ No	☐ Yes / ☒ No	☐ Yes / ☐ No
Date of onset (If signs and symptoms of HAI were not present at admission)	1 8 / 1 1 / 1 1	1 9 / 1 1 / 1 1	
Origin of infection	☒ Current hospital / ☐ Other hospital / ☐ Other location / ☐ Unknown	☒ Current hospital / ☐ Other hospital / ☐ Other location / ☐ Unknown	☐ Current hospital / ☐ Other hospital / ☐ Other location / ☐ Unknown
If infection type is bloodstream infection (code 50), what is the source? (see BSI source code list on back of page)		2 1	

Please complete micro organism and antimicrobial resistance codes if relevant microbiological test results are available at time of survey (do not wait or return for results)

	HAI 1	HAI 2	HAI 3
Micro organism 1 (see micro organism code list)	5 2	5 2	
Antimicrobial resistance code for micro organism 1 (see antimicrobial resistance code list on back of page)	2	2	
Micro organism 2 (see micro organism code list)			
Antimicrobial resistance code for micro organism 2 (see antimicrobial resistance code list on back of page)			
Micro organism 3 (see micro organism code list)			
Antimicrobial resistance code for micro organism 3 (see antimicrobial resistance code list on back of page)			

1000 LIVES / 1000 O FYWYDAU

Instructions for Form Completion

- Use a black pen
- Use crosses rather than ticks to indicate a response
- Write clearly and ensure all crosses, letters and numbers are written inside the boxes provided
- In boxes requiring text, only one letter or number should be written in each box
- Only use the codes provided
- Codes should be written in capital letters
- If an error is made please colour in the box containing the error and write the correct response in the space beside taking care not to write over adjacent boxes

Definitions and Codes

Did the patient have a relevant invasive device in situ in 48hrs preceding infection? - to be specified for pneumonia (codes 20-25), UTI (codes 40-42), bloodstream infection (code 50) and laboratory confirmed bloodstream infection in neonates (code 161)
Relevant invasive device must be in situ (even intermittently) in the 48 hours (7 days for UTI) before the onset of infection, i.e. intubation for pneumonia, central peripheral vascular catheter for bloodstream infections, urinary catheter for urinary tract infections
Used to apply CDC definition of device-associated infection (also see T.C. Horan et al. definitions of key terms used in the NNIS system. Am J Infect Control 1997; 25:112-6)

Date of onset: Date of onset of the infection (DD/MM/YY). Not to be recorded if signs/symptoms are present at admission. Date of first signs or symptoms of the infection; if unknown record date treatment was started for this infection or the date the first diagnostic sample was taken

Origin of the infection: Infection is associated with (1) current hospital; (2) another hospital; (3) other location or unknown. Infections may be HAI present at admission if associated with a previous stay in your hospital or when transferred from another facility

If infection type is bloodstream (BSI) what is the source? If lab-confirmed bloodstream infection, specify the origin (secondary BSI are reported as a separate HAI in addition to the primary infection if it matches the case definition)

Code	Source
	1. Related to catheter
10	Central vascular catheter, clinical relationship (e.g. symptoms improve within 48 hours after catheter removal)
11	Peripheral vascular catheter, clinical relationship (e.g. symptoms improve within 48 hours after catheter removal)
	2. Secondary to another site
20	Pulmonary infection
21	Urinary tract Infection
22	Surgical Site Infection
23	Digestive tract infection
24	Skin soft tissue
25	Other infection (e.g. meningitis, osteomyelitis etc)
	3. Unknown
30	None of the above, BSI confirmed to be of unknown origin (clinically asserted)
31	No data available

Micro-organism (see Micro-organism Code List): Collect microbiological results available on the survey date (don't wait for results not available on the survey date). Specify up to three isolated micro organisms using 1-3 digit codes (e.g. 114 = Staphylococcus aureus)

Antimicrobial resistance code: Specify sensitivity to selected antimicrobial resistance marker depending on micro-organism code - see table

Micro-organism	Antimicrobial Resistance			
Staphylococcus aureus	Oxacillin – sensitive (MSSA)	Oxacillin – resistant (MRSA)		Unknown resistance
Enterococcus sp.	Glycopeptides- sensitive	Glycopeptides- resistant		Unknown resistance
Enterobacteriaceae sp.	Cephalosporins of the 3rd generation – sensitive / Carbapenems - sensitive	Cephalosporins of the 3rd generation –resistant / Carbapenems -sensitive	Cephalosporins of the 3rd generation –resistant / Carbapenems- resistant	Unknown resistance
Pseudomonas sp.	Carbapenems -sensitive	Carbapenems- resistant		Unknown resistance
Acinetobacter sp.	Carbapenems -sensitive	Carbapenems- resistant		Unknown resistance
Resistance Code	0	1	2	9

Glycopeptides = Vancomycin, Teicoplanin
Cephalosporins of the 3rd generation = Cefotaxime, Ceftriaxone, Ceftazidime, Cefpodixime
Carbapenems = Imipenem, Meropenem, Ertapenem
Enterobacteriaceae sp = Escherichia coli, Klebsiella sp., Enterobacter sp., Proteus sp., Citrobacter sp, Serratia sp., Morganella sp.

A4 – Hospital form

European Prevalence Survey of Healthcare-Associated Infections and Antimicrobial Use: Hospital Form
One form for every hospital included in the survey

2011

EXAMPLE FORM

Hospital code: B 4

Number of acute care beds in the hospital: 4 7 6

Number of ICU hospital beds in the hospital: 1 2

Were any wards in hospital excluded from survey? ☐ No ☒ Yes - specify ward name, specialty and reason for exclusion below

A and E - day cases

_____

Number of hospital deaths/discharges **or** admissions **and** bed days for 2010/11

3 5 9 2 6 ☒ Deaths/discharges ☐ Admissions

2 0 1 2 0 8 Bed Days (Bed days = average daily occupied beds x 91.3125)

☐ Wards included in survey only ☒ All Wards

Litres of alcohol hand rub consumed in the hospital for 2010/11

1 4 0 8 4 Litres ☐ Wards included in survey only ☒ All Wards

Number of full time equivalent specialised infection control nurses at time of survey: 1 . 8

Number of full time equivalent specialized infection control doctors at time of survey: 0 . 2

Number of full time equivalent specialized antimicrobial pharmacists at time of survey: 1 . 0

Instructions for Form Completion

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