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SICS

scottish intensive care society audit group

Audit of Critical Care in Scotland 2017
Reporting on 2016

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Foreword

This report focuses on adult critical care units in Scotland during 2016. It covers; outcomes, quality indicators, activity, interventions and infection surveillance in all Intensive Care Units (ICUs) and the majority of High Dependency Units (HDUs). It is a continuation of work which has produced a continuous and ever expanding dataset since 1995.

The Scottish Intensive Care Society Audit Group (SICSAG) is a national critical care audit fully funded by the Scottish Government through the Scottish Healthcare Audits at NHS National Services Scotland. The Scottish Healthcare Audits are accountable to the Clinical Outcomes and Measures for Quality Improvements (COMQI) working group in the Scottish Government and SICSAG is also accountable to the council of the Scottish Intensive Care Society (SICS).

We exist with the stated aim of seeking to constantly improve the quality of care that is delivered to critically ill patients across Scotland by the continuous monitoring and transparent comparison of the activities and outcomes in critical care.

One of the signs of a successful programme is that other critical care areas seek to join and become part of the expansion of critical care audit in Scotland. I am pleased that this year we report for the first time on the activities of several obstetric critical care units who have joined the SICSAG programme.

The continued year on year expansion of the audit together with the increasing number of units now participating means that this year we report on the activity, interventions and outcomes of over 46,000 critically ill patients (14,908 ICU/combined units and 31,297 HDU).

To the best of our knowledge this audit remains the only one in the world which reports named ICU outcomes to this level of detail for patient, professional and public scrutiny.

We are continuing our established collaboration with Health Protection Scotland (HPS) to collect, analyse and report on Healthcare Associated Infection (HAI) surveillance across all Scottish ICUs[1]. This surveillance has now extended to include the HDUs.

Measures of success include the reporting of professionally agreed Standards and Quality Indicators across critical care in Scotland[2]. We report this year for the first time on the updated and revised minimum standards and quality indicators. Meeting these will be stretching and aspirational for many units but we hope that full engagement with this process will over time lead to significant improvements in patient care.

We will continue to support units through the ongoing transparent publication of data to inform the public and health care professionals in order to seek to improve both patient care and patient experience of critical care units across Scotland.

Crude mortality in patients who are admitted to ICU has once again improved and in 2016 has fallen to just over 13%. The Scotland wide recalibrated Standardised Mortality Ratio (SMR) has fallen to 0.9 reflecting the fact that more patients than expected are surviving their ICU stay to ultimate hospital discharge.

Patients are now more likely than ever before to survive their admission to ICU and to be discharged to other hospital wards and ultimately back to their normal residence. However, crude survival is not enough and we are now seeking to put in place process measures with the aim of measuring the quality of survival.

The continued success of the audit would not be possible without the ongoing commitment, support and hard work of the Scottish critical care clinical community.

Thanks go to all the members of the SICSAG steering group, and to Paul Smith (National Clinical Coordinator), Roselind Hall (Regional Coordinator), Clare McGeoch (Quality Assurance Manager), and particular thanks to Lorraine Smyth (Senior Information Analyst) and the network of local and regional audit team coordinators. Thanks also to Dr Jodie McCoubrey and Prof Jacqui Reilly of Health Protection Scotland.

The ongoing success and future development of this world leading critical care audit owes much to the commitment and hard work of this group of people.

The popular 2 day annual conference held in conjunction with the NRS Critical Care Specialty Group will take place this year at the Golden Jubilee Conference Hotel on 7th and 8th September 2017, details of this and further information are available at https://book.shsc.scot/sicsag.

Dr Stephen Cole

Chairman

Contents

Key findings

There are over 46,000 patient episodes reported here (14,908 ICU/combined units and 31,297 HDU).

Outcomes

- In this report no units were found to have a statistically different Standard Mortality Ratio (SMR) from the Scottish average.
- The standard SMR is 0.74 and recalibrated model is 0.90 which are both slightly decreased from 2015.

Minimum Standards & Quality Indicators

- On average in 2016 4% of ICU and 7% of HDU episodes were discharged at night (22:00 to 08:00).
- 83% of ICU and 75% of HDU patients have a daily consultant review and written management plan.
- 96% of ICU and 41% of HDUs met the new indicator for all deaths and adverse events discussed at regular clinical governance meetings.
- Average 60% of ICU and 45% of HDU nurses were trained in critical care post registration.

Activity

- The average delayed discharges (over 4 hours) was 25%for ICU and 23% for HDU resulting in over 1,000 ICU and 4,000 HDU lost patient stays.
- Average night time admissions to ICU and HDU were 25% reflecting the pressures on all units to provide unplanned care at all hours.

Interventions

- The intensity of treatment is similar to previous years with 66% of ICU/combined units requiring Level 3 care and 67% of HDU requiring Level 2 or higher care.

HAI

- The incidence of HAI in ICU during 2016 was 2.7%.
- The incidence of ventilator associated pneumonia has increased since 2014; the possible reasons for this will be investigated and fed back to the critical care community.
- Units should focus on robust data collection and local surveillance to inform infection prevention and reduce infection.
- Validation of surveillance data will identify outliers and facilitate the opportunity for units to learn from one another in terms of collecting data and reducing infection.
- Data from the Scottish Point Prevalence Study carried out in 2016 indicates that HAI should remain a priority in ICU[3].

Introduction

2016 has seen another year where SICSAG worked closely with the critical care community in Scotland to promote safe, person-centred care using data intelligence to drive improvement. It is also now the third year that we publish a collaborative report with HPS on HAI surveillance in critical care.

This report summarises data diligently collected voluntarily by the staff in each of the units reported on here. It is collected via the bespoke data collection platform WardWatcher. The format of the report is in line with last year's report starting with outcomes and the SICSAG Minimum Standards and Quality Indicators[2] activity, levels of care interventions and HAI in the units.

This is the first year we are reporting on these revised standards and indicators which are defined as being person-centred, safe, effective, evidenced-based, timely and equitable in line with the Scottish Government's Healthcare Quality Strategy for NHS Scotland[4] and the 2020 Vision for Health and Social Care[5]. We recognise that these may be aspirational in many cases but the aim is to improve patient care across the whole of Scotland for all critically ill patients. This will also be the first time we report on nursing and allied health professionals within the standards and indicators.

It is important to note that the information presented in this report is for comparative benchmarking where differences may highlight areas to inform quality improvement and not as a judgement of what is 'correct'. Where units are outliers in this report, then through the SICSAG governance policy, they are encouraged to examine their practice and develop action plans for improvement where necessary. With the heterogeneity of the units it is essential that care is taken when interpreting the control charts. Explanations of the methodology and interpretation of the charts can be found on the SICSAG web site (http://www.sicsag.scot.nhs.uk).

The codes used in the charts throughout this report can be found in the front and back flaps of paper copies, or on the last page of the electronic copy and are consistent with previous years.

HAI data collection in HDUs

In January 2016 HAI surveillance became a minimum standard for HDUs for any line infections. Normally we would then be reporting on the first year data in this annual report, however the implementation has proved to be more challenging than first anticipated.

Unlike ICUs most of the data entry in the HDUs is completed by the nursing staff with minimal medical support. In addition, in order to fully complete a suspected infection microbiology input is also necessary and this is not routinely available in many units. Added to this burden of completing the HAI surveillance is that the majority of the surveillance questions in WardWatcher do not relate directly to line infections.

Despite the small number of identified line infections national surveillance is essential for improving HAI line infection rates in critical care and so SICSAG has invested a large amount of time over the past year and a half teaching, advising and supporting the staff in the HDUs how to effectively and efficiently complete the necessary data pages in WardWatcher.

SICSAG has also been reviewing the HAI surveillance data set in the review process for the development of a new data collection platform. Whilst this scoping exercise is in the early

stages, it is hoped that this should ease the burden of manual data collection and therefore staff resources for data entry.

After such intensive training throughout all HDUs in Scotland in SICSAG we envisage that by the end of 2017 all of the units will have a system in place for the completion of their HAI data and we will be able to report on this in the 2018 annual report.

SICSAG developments

Data Set and eSICSAG

SICSAG has embarked on a review of all of the variables in the SICSAG data set that are currently available within WardWatcher. This review is part of the overall project of developing a new web-based data collection system that is currently known as eSICSAG.

The SICSAG Steering Group formed a sub-group with a wide range of stakeholders for this purpose. HAI surveillance is also part of this review of the dataset. It is expected to move to the development stage by next year.

Obstetrics HDU

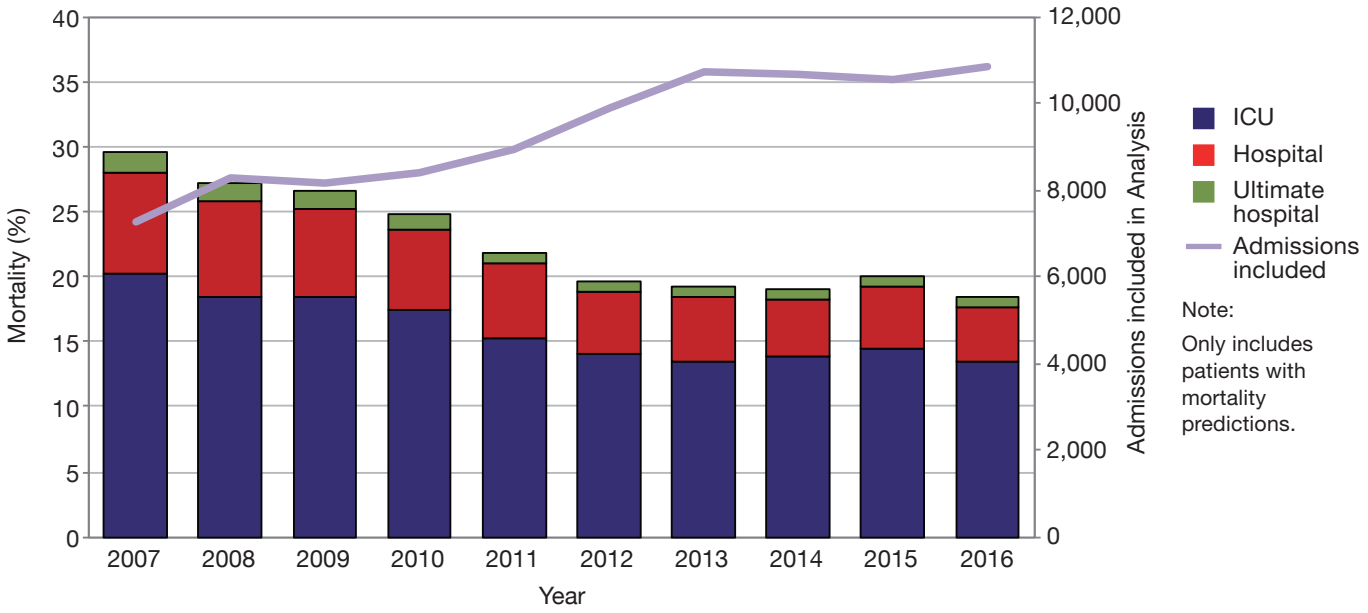
The inclusion of obstetric units into SICSAG is challenging due to its specialist nature but the process continues. SICSAG has invested resources for training, advising and supporting these units in their data collection and there is a clear need for local support for these units contributing to SICSAG as membership of the audit is voluntary. SICSAG retains a close working relationship between the Scottish Maternal critical care (SMaCC) Network (http://scottishmcc.org).

Paul Smith

National Clinical Coordinator

Section 1 Outcomes

Figure 1 Scottish crude mortality of patients in ICU and combined units (2007-2016)



Crude mortality in patients admitted to ICUs is at similar levels to previous years. In 2016 less than 20% of patients died before their ultimate discharge from hospital. It should be remembered that this is not adjusted for illness severity or case-mix, which can change over time.

Figure 2 Scottish Standardised Mortality Ratios in ICU and combined units, using the standard APACHE II model (2007-2016) and recalibrated APACHE II model (2009-2016)

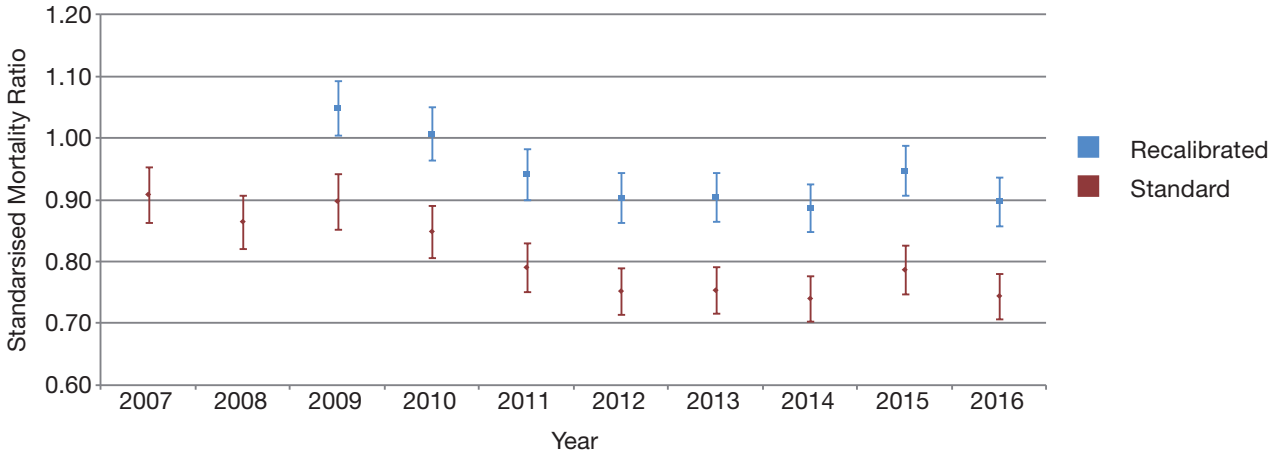


Figure 2 shows the Standardised Mortality Ratio (SMR) where the actual mortality is compared with expected mortality, using APACHE II methodology (see SICSAG website: http://www.sicsag.scot.nhs.uk). This allows for a better comparison of mortality over time as illness severity and case-mix are adjusted for.

The APACHE II scoring system was recalibrated to better reflect a Scottish population; however the standard APACHE is included here for international comparison. Both models follow a similar pattern over time, and in 2016 the SMR had decrease slightly compared to 2015, although this was not a significant difference. The standard SMR was 0.74 and the recalibrated model was 0.90.

Figure 3 Standard Mortality Ratios using recalibrated APACHE model in ICU and combined units (2016)

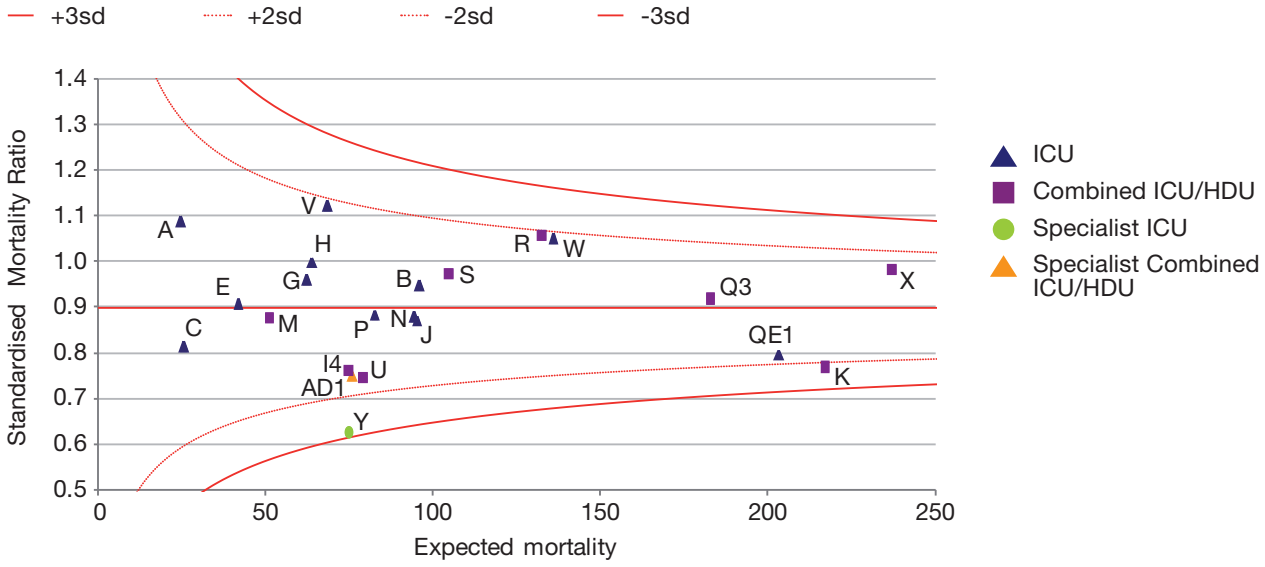
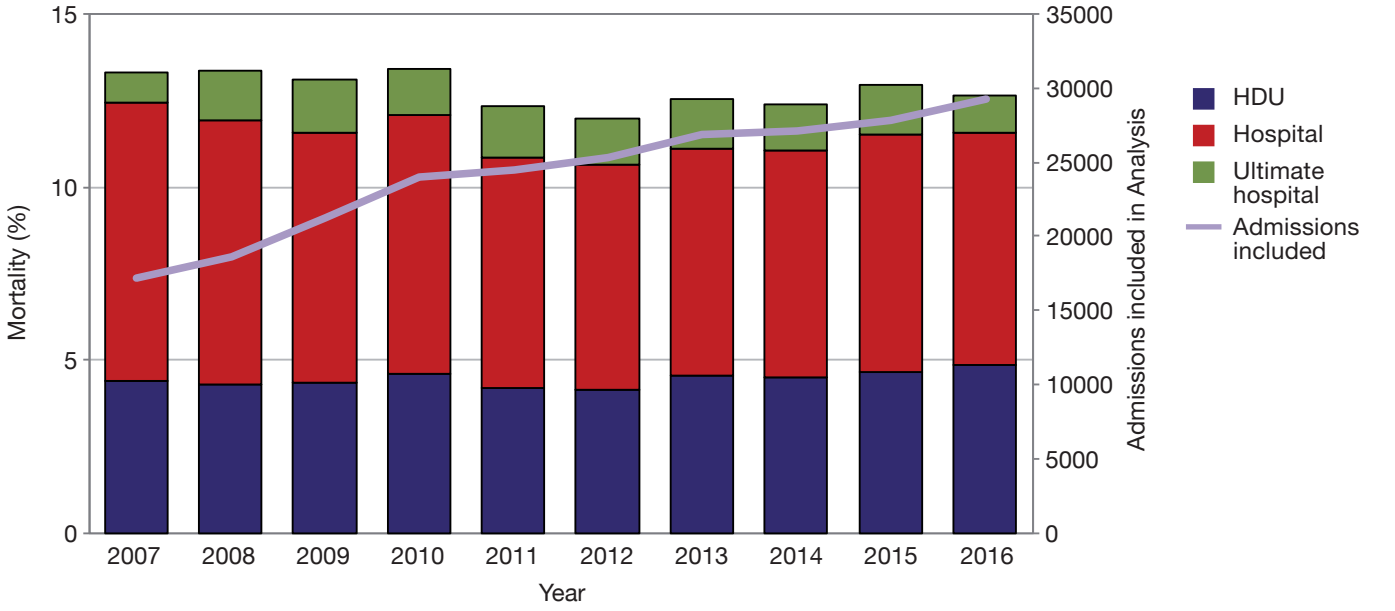


Figure 3 shows the SMR for ICU and combined units (excluding X6 (RIE CICU) and W7 (ARI CICU)), and is calculated using the recalibrated APACHE II model. No units were found to have a statistically different SMR from the Scottish average. Last year unit W (ARI ICU) was an outlier at 2 standard deviations (SD) and as a result a governance review was commissioned by the Health Board. This year unit W (ARI ICU) is not statistically different from the Scottish mean.

Figure 4 Scottish crude mortality of patients in HDUs (2007-2016)



Crude mortality in patients admitted to HDUs is at similar levels to previous years. In 2016 13% of patients died before their ultimate discharge from hospital.

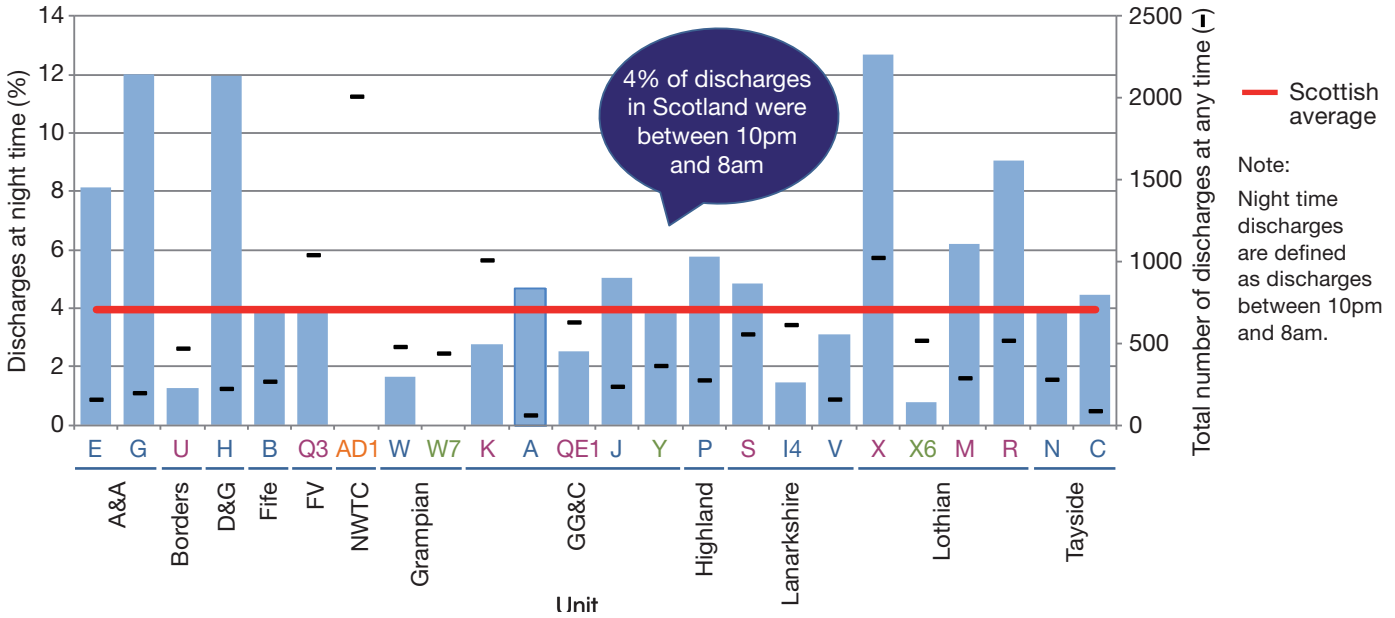
Section 2 Quality Indicators

We report this year for the first time on the updated and revised Minimum Standards and Quality Indicators[2]. Meeting these will be stretching and aspirational for many units but we hope that full engagement in this process will over time improve patient care.

2.1 Night time discharges

The definition of a 'night time discharge' changed under the latest SICSAG quality indicators. This was in an attempt to capture true discharges at night and avoid times where nursing staff changeovers were happening. Night time is defined as between 10pm and 8am.

Figure 5 Night time discharges from ICU and combined units (2016)



The average discharge at night in 2016 was 4%, represented by the red line. No unit was significantly different from the 2015 figure under the same time definitions. While some units appear much higher than the Scottish mean, when compared on a funnel plot (Figure 6) only Unit X (RIE ICU) is significantly higher than the Scottish mean. Discharges from this unit by hour of discharge in a 24 hour period are shown on Figure 7.

Figure 6 Night time discharges from ICU and combined units (2016).

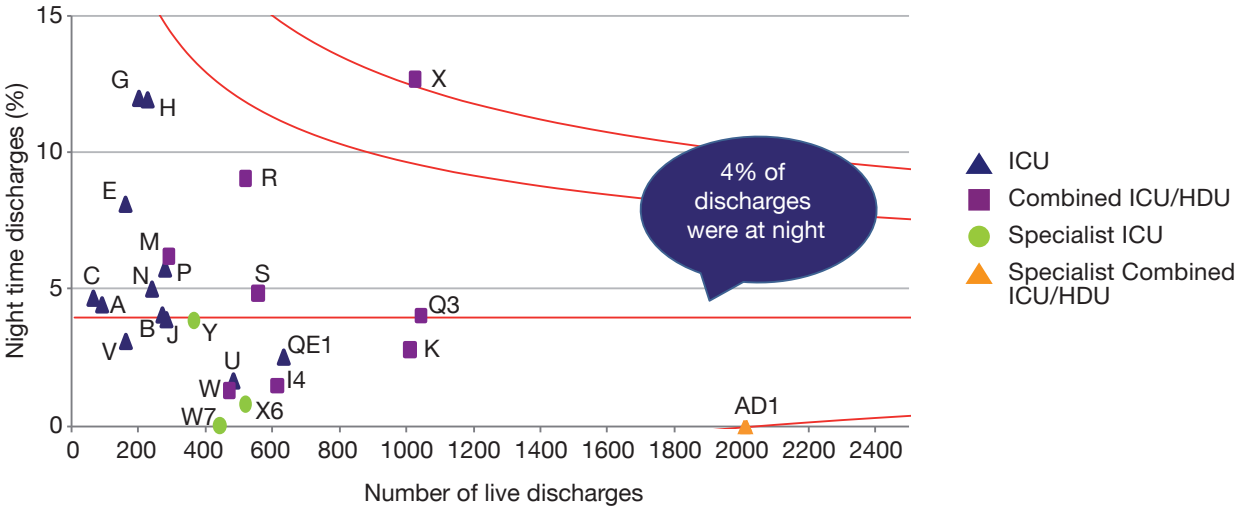
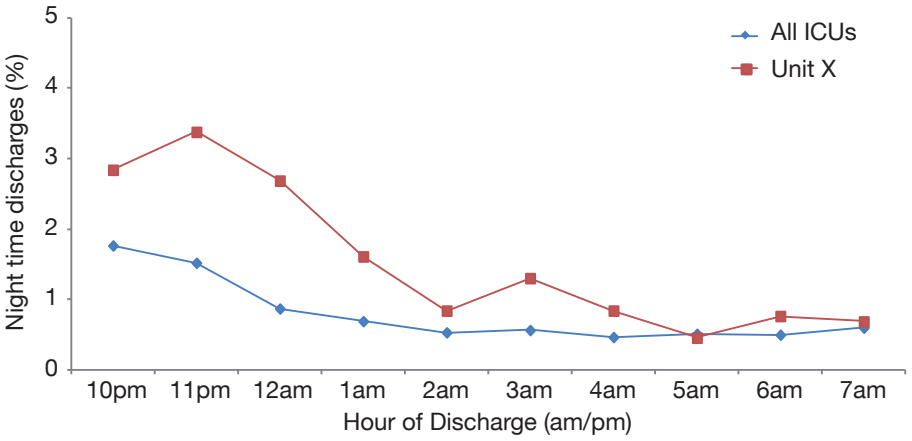
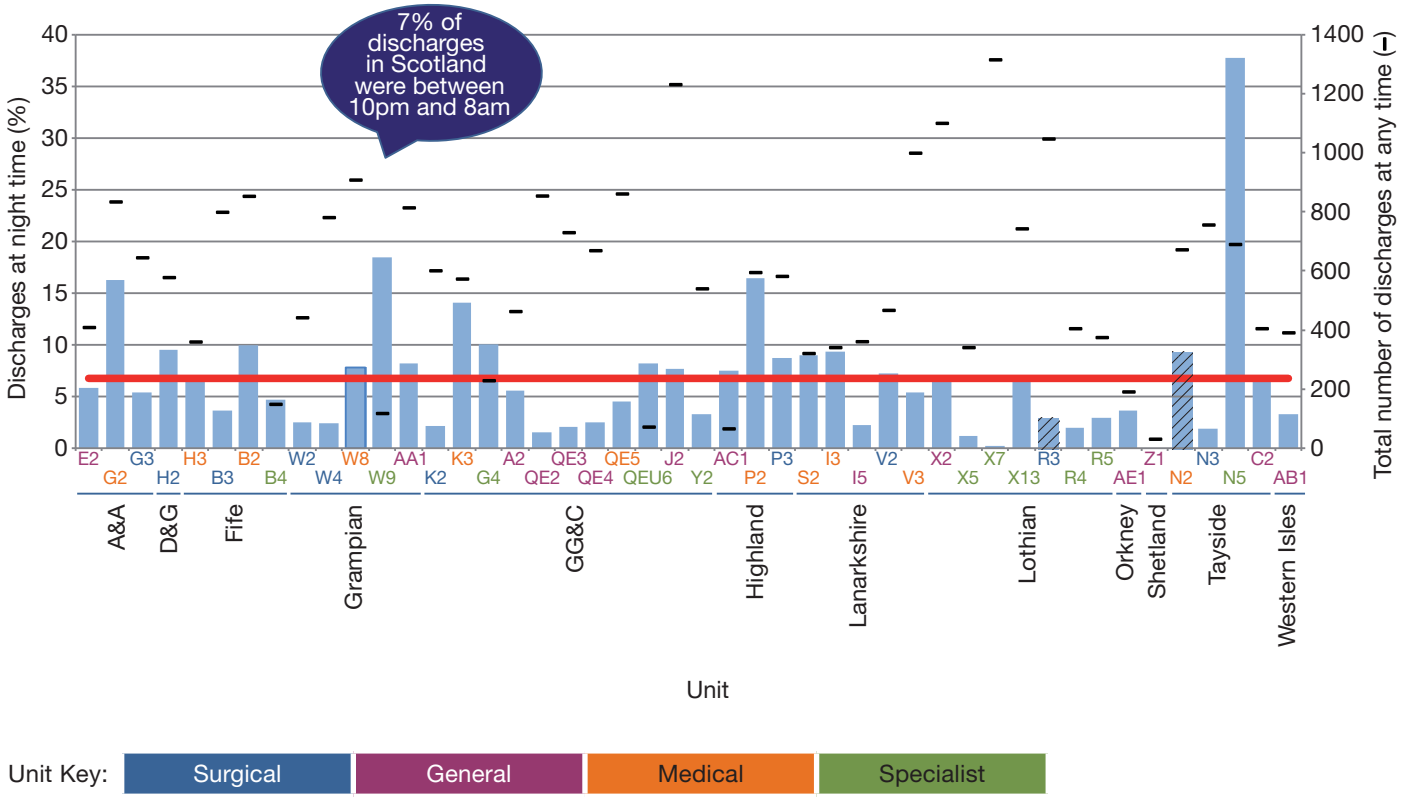


Figure 7 Pattern of night time discharges from ICU and combined units by hour of discharge (2016).



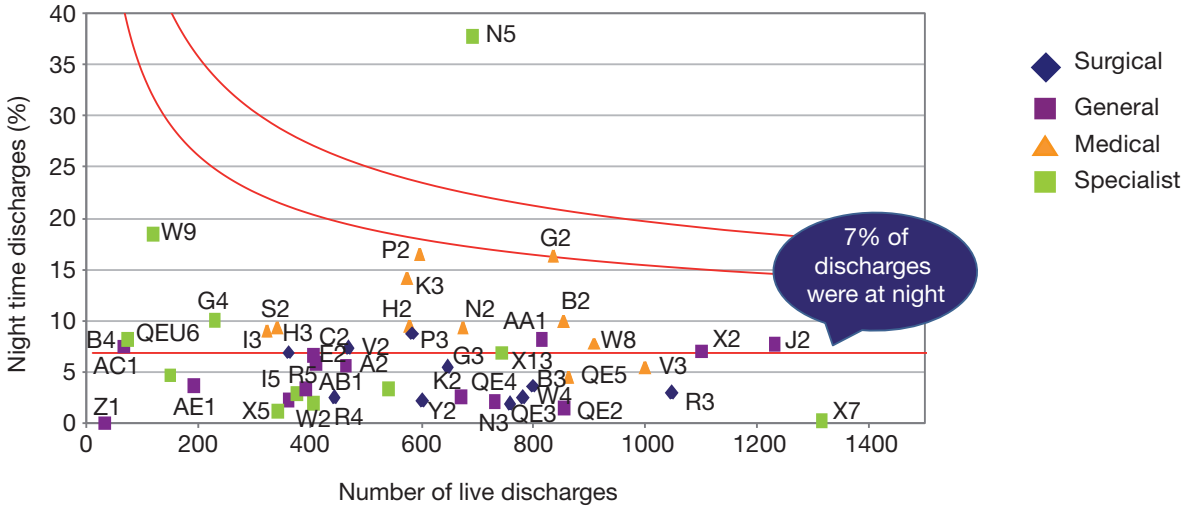
For 2016 Unit X (RIE ICU) is showing the vast majority of their patients are discharges during the day, and outwith the SICSAG quality indicator time. At night time there is a peak of discharges around 11pm. The reasons for this are probably multifactorial but it is noteworthy that Unit X (RIE ICU) was a greater than 3SD outlier for night time discharges (Figure 6), early discharges (Figure 13) and bed occupancy (Figure 21) but not for delayed discharges (Figure 28). This unit also had significantly more admissions at night time compared to other units in Scotland (Figure 26).

Figure 8 Night time discharges in HDUs (2016)



Units R3 (WGH SHDU) and N2 (NWD SHDU) have significantly less night time discharges than last year. Unit N5 (NWD OHDU) has a notably higher percentage of night time discharges than the Scottish mean, and this is reflected in the funnel plot on Figure 9.

Figure 9 Night time discharges in HDUs (2016)



Unit N5 (NWD OHDU) is significantly different from the Scottish mean. It is probable that the result for N5 reflects a different case mix compared to all the other units. Ninewells obstetric unit made a deliberate decision in 2016 to put all patients in the obstetric observation area into the WardWatcher database. This will change in 2017 and only those patients who meet the strict definitions for HDU admission will be captured. It does raise the question as to whether the night time discharge of a routine (non critically ill) obstetric patient is equally undesirable.

Figure 10 Pattern of night time discharges from HDUs by hour of discharge (2016)

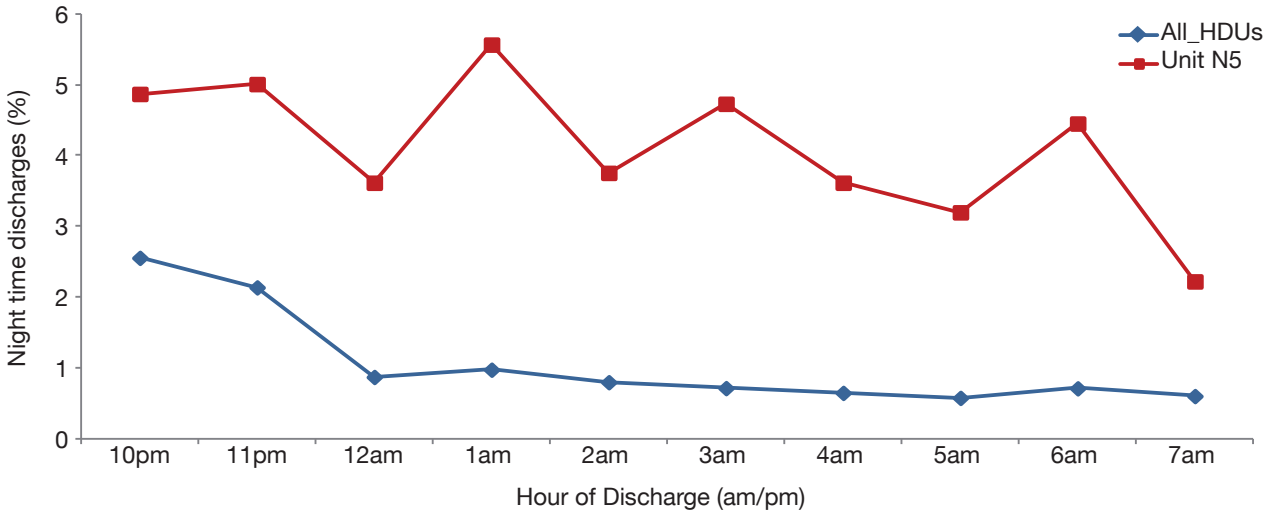


Figure 10 shows there is no 'peak' of discharge for patients, but instead there is a steady discharge of patients throughout the night, this is similar to the pattern in previous years.

2.2 Early discharges and readmissions

If patients are readmitted to the unit within 48 hours after a previous discharge, it can be an indication that the first discharge was early. The mean readmission rate in ICUs and combined units in Scotland was 1.3% - this is a similar figure to those reported in previous years.

Early discharge is defined as a transfer that is not in the best interest of a patient but necessary due to pressure on beds or staffing. Unit A (IRH ICU) had the highest percentage of early discharges at just over 13%. No units were significantly different from last year. Unit A was not found to be significantly different from the rest of Scotland, see Figure 13.

Unit X (RIE ICU) was found to have significantly more early discharges compared to the Scottish average in 2016; the main reason for this was due to a shortage of beds.

Figure 11 Readmissions with 48 hours of discharge to ICUs and combined units (2016)

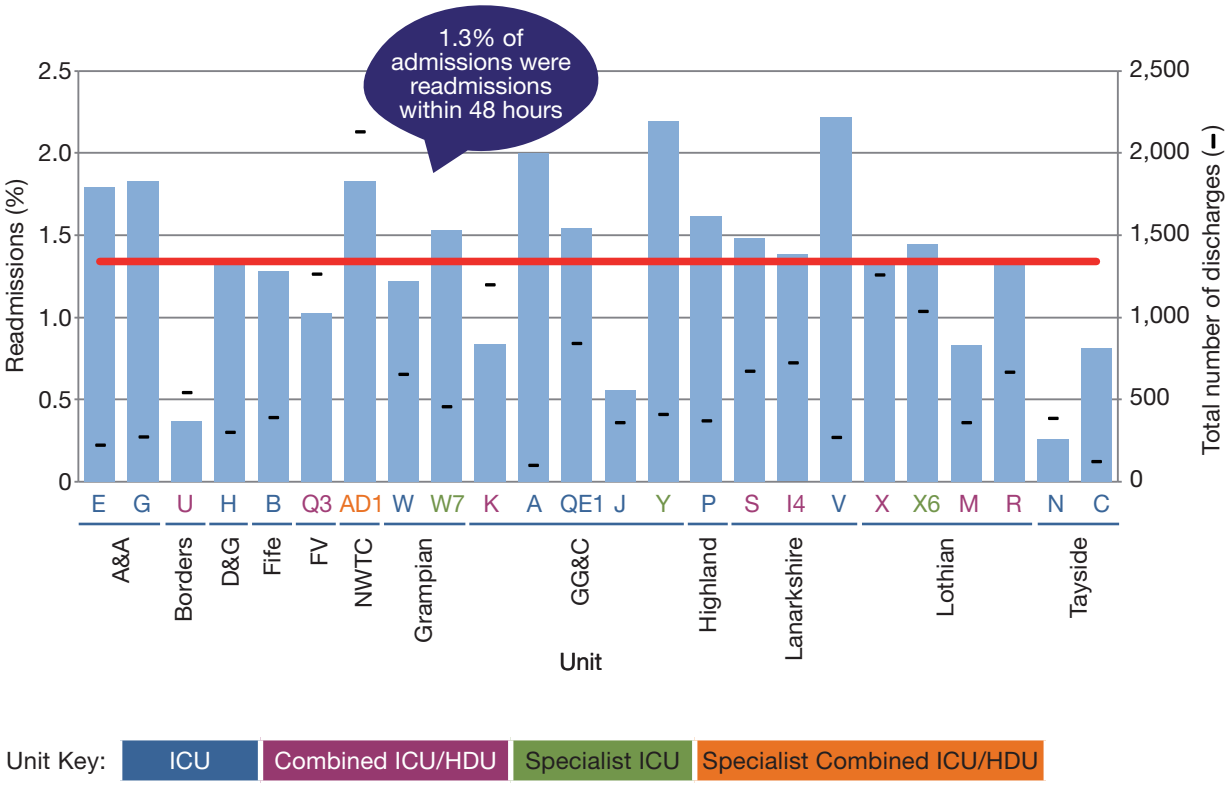


Figure 12 Early discharges in ICUs and combined units (2016)

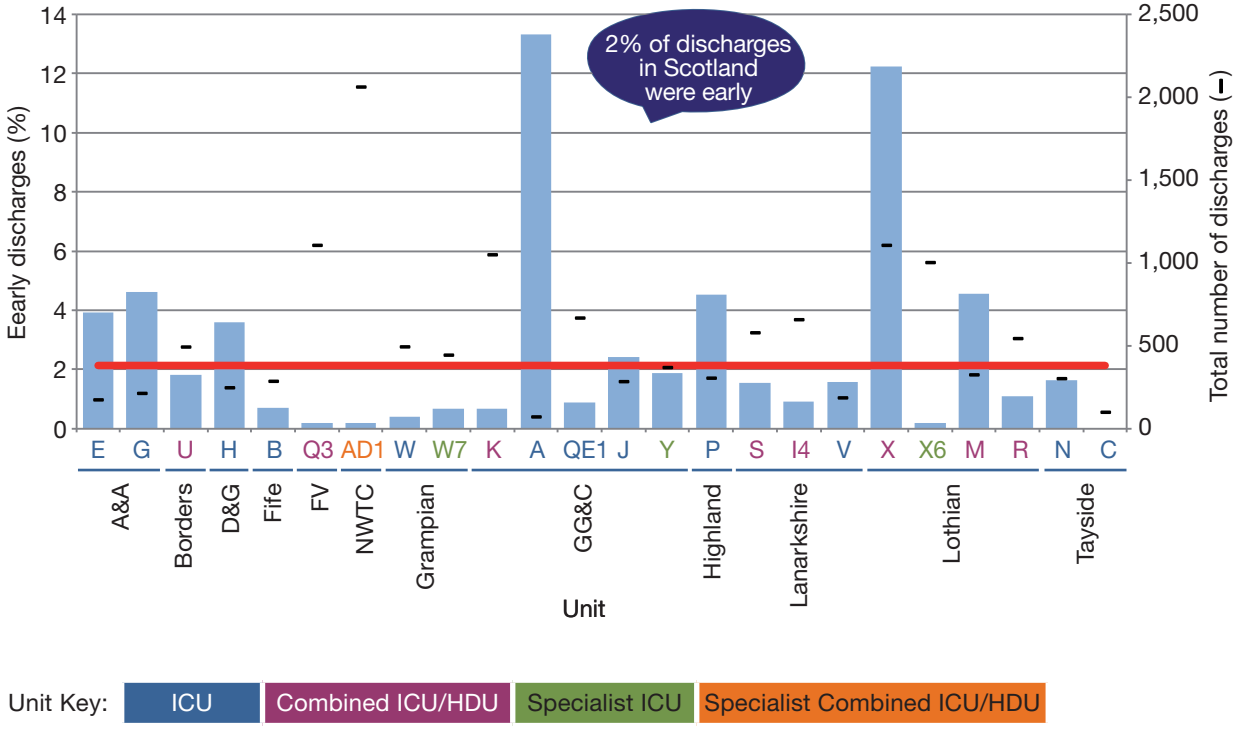
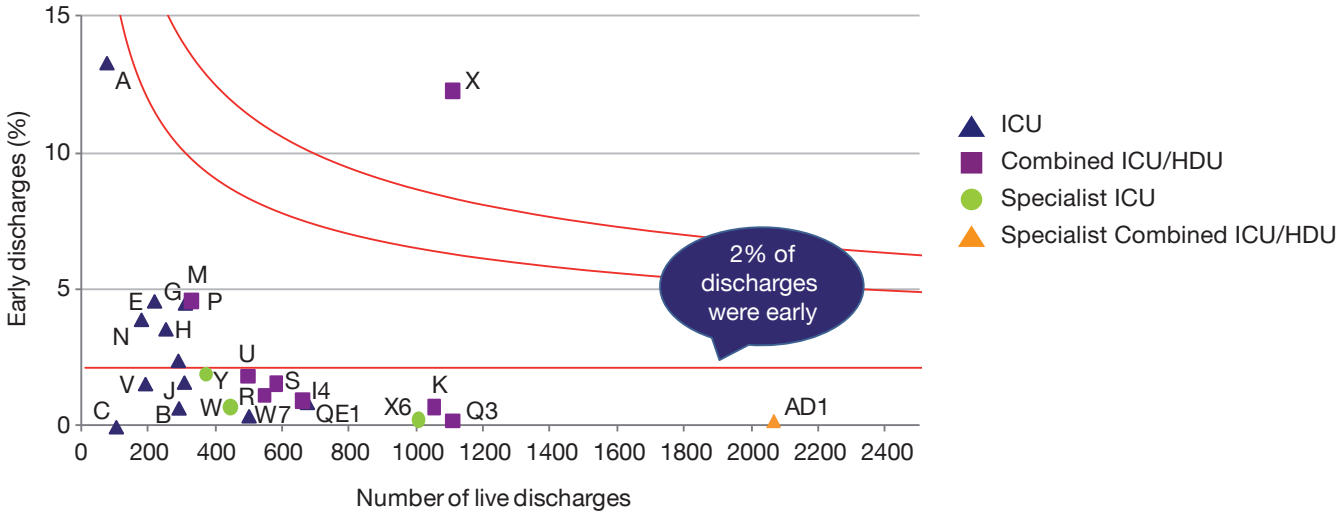


Figure 13 Early discharges in ICUs and combined units (2016)



For Unit X (RIE ICU) in 2016 the reason given for the vast majority of the early discharges was 'Shortage of beds'. This is consistent with the rest of Scotland as the main reason recorded for early discharges. High rates of early discharges are a concern as they reflect a discharge that is felt by the clinical team not to be in the patient's best interest. This is usually due to underlying pressure of beds or staff reflecting a lack of available resource.

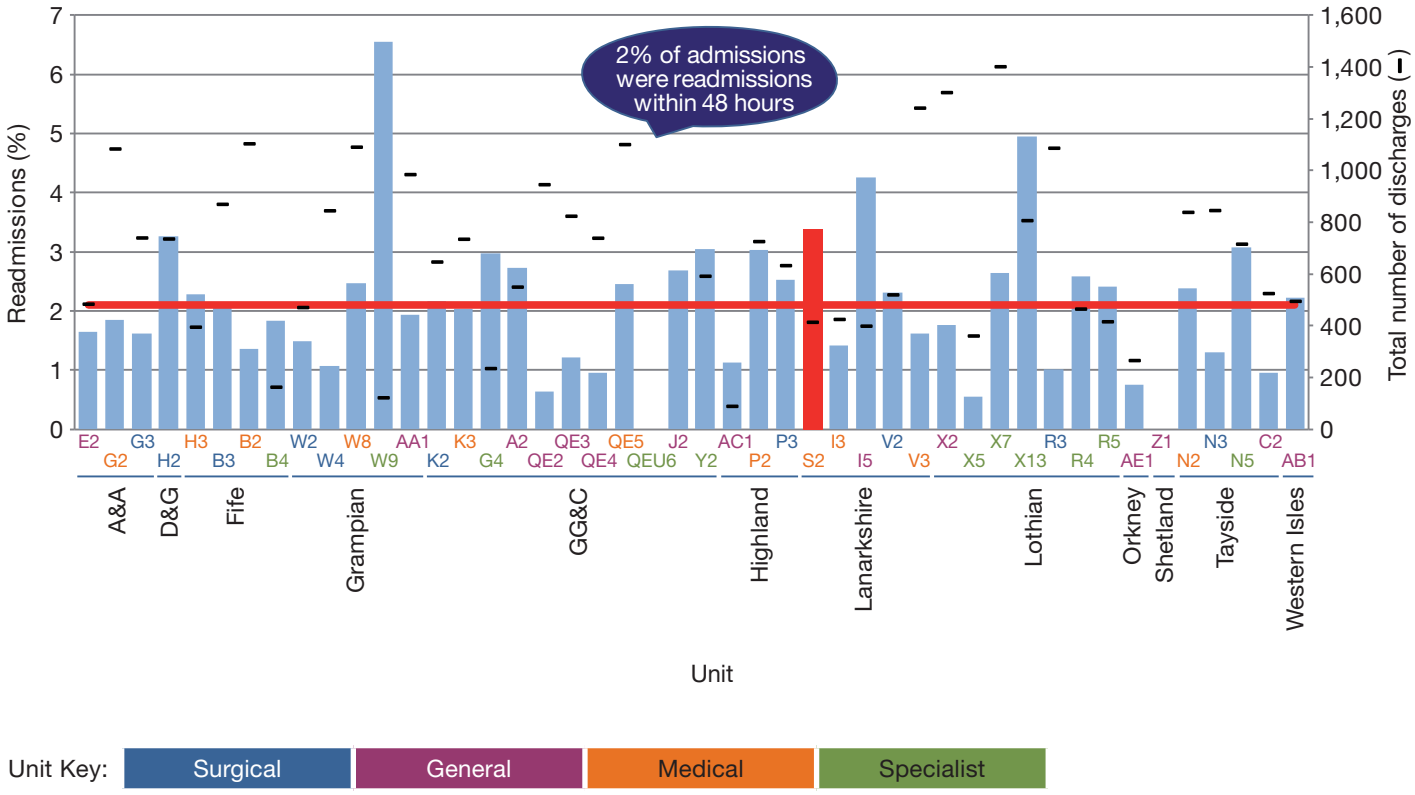
Unit A (IRH ICU) and Unit X (RIE ICU) have rates of >10% while in the overwhelming majority of units the early discharge rate is very low at <5%. While this is only statistically significant in unit X, both units should reflect carefully on this data.

The mean readmission rate in HDUs in Scotland was 2% - this is a similar figure to those reported in previous years. Unit S2 (HRM MHDU) was found to have significantly more readmissions compared to last year, however the figure for this unit was particularly low in 2015.

Early discharge is defined as a transfer that is not in the best interest of a patient but necessary due to pressure on beds or staffing. No units were significantly different from the figure reported last year.

Unit P2 (RGM MHDU) had the highest percentage of early discharges at just over 7%, as seen on Figure 16 this is an outlier to 2SD from the Scottish average. The reason given for the early discharges was shortage of beds.

Figure 14 Readmissions within 48 hours of discharge to HDUs (2016)



Unit Key: Surgical | General | Medical | Specialist

Figure 15 Early discharges in HDUs (2016)

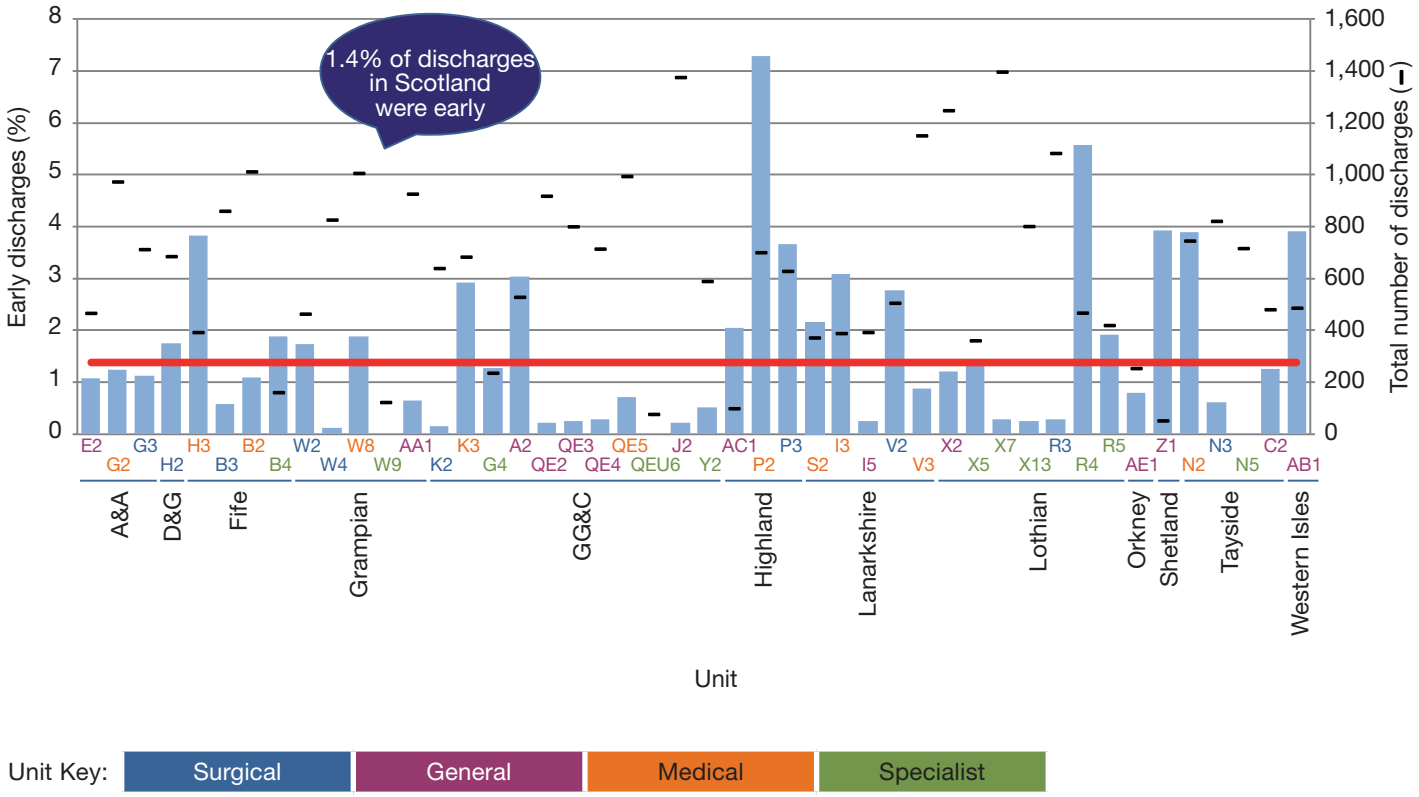
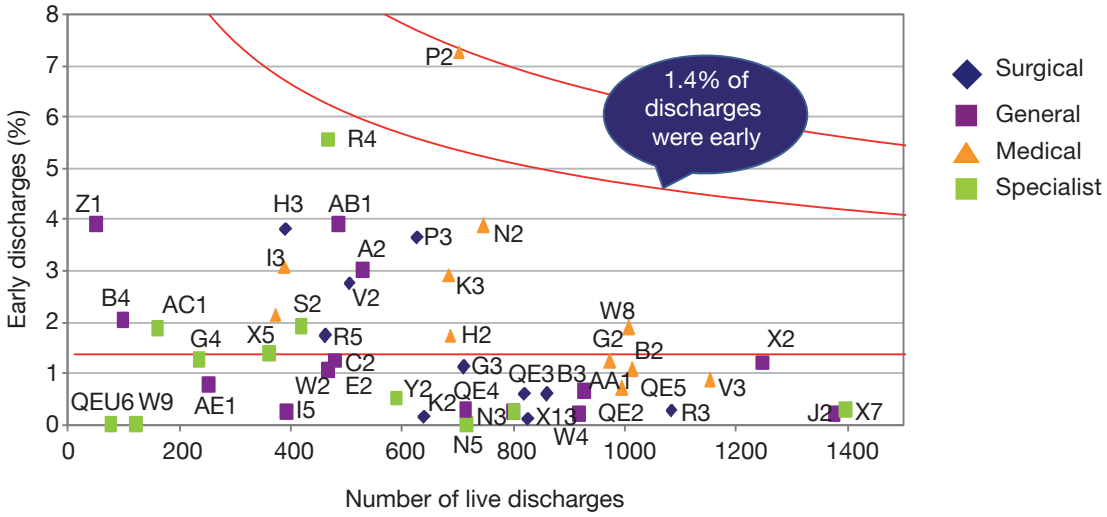


Figure 16 Early discharges in HDUs (2016)



2.3 Quality indicators and staffing summary

Table 1 Summary of ICU and combined units compliance with SICSAG Quality Indicator

	Daily consultant review and written management plan	Consultant-led twice daily ward rounds	Care bundles in place for; IAP, CVC, and PVC	Tracheostomy communication and swallowing needs assessed in Critical care	Screening for Delirium in critical care	Rehabilitation needs assessed in critical care	End of life care policy in place	Deaths and adverse events discussed at regular clinical governance meetings	A regular patient/family experience survey is undertaken in the unit
NHS Ayrshire & Arran									
Ayr ICU	Partly complies	Partly complies	Fully complies	Fully complies	Fully complies	Does not comply	Partly complies	Fully complies	Fully complies
Crosshouse ICU	Fully complies	Partly complies	Fully complies	Partly complies	Partly complies	Partly complies	Partly complies	Fully complies	Partly complies
NHS Borders									
BGH combined	Partly complies	Partly complies	Fully complies	Partly complies	Fully complies	Does not comply	Fully complies	Fully complies	Fully complies
NHS Dumfries & Galloway									
DGRI ICU	Fully complies	Partly complies	Fully complies	Fully complies	Fully complies	Does not comply	Fully complies	Fully complies	Partly complies
NHS Fife									
VHK ICU	Fully complies	Fully complies	Fully complies	Partly complies	Partly complies	Partly complies	Fully complies	Fully complies	Fully complies
NHS Forth Valley									
FVRH combined	Fully complies	Partly complies	Fully complies	Fully complies	Fully complies	Partly complies	Fully complies	Fully complies	Fully complies
NHS Grampian									
ARI ICU	Fully complies	Fully complies	Fully complies	Partly complies	Fully complies	Partly complies	Fully complies	Fully complies	Fully complies
ARI CICU	Fully complies	Partly complies	Fully complies	Fully complies	Does not comply	Does not comply	Partly complies	Fully complies	Fully complies
NHS Greater Glasgow and Clyde									
GRI combined	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies
IRH ICU	Partly complies	Partly complies	Fully complies	Fully complies	Partly complies	Does not comply	Fully complies	Fully complies	Partly complies
RAH ICU	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies	Partly complies	Fully complies	Fully complies	Fully complies
SGH NICU	Fully complies	Fully complies	Fully complies	Fully complies	Does not comply	Fully complies	Fully complies	Fully complies	Fully complies
QEU ICU	Fully complies	Partly complies	Fully complies	Partly complies	Partly complies	Fully complies	Fully complies	Fully complies	Fully complies
NHS Highland									
Raigmore ICU	Fully complies	Partly complies	Fully complies	Fully complies	Partly complies	Fully complies	Fully complies	Partly complies	Partly complies
NHS Lanarkshire									
Hairmyres combined	Partly complies	Partly complies	Fully complies	Fully complies	Fully complies	Partly complies	Fully complies	Fully complies	Fully complies
MDGH combined[1]	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies
Wishaw ICU	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies
NHS Lothian									
RIE combined	Fully complies	Fully complies	Fully complies	Partly complies	Fully complies	Partly complies	Fully complies	Fully complies	Partly complies
RIE CICU	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies	Partly complies	Fully complies	Fully complies	Fully complies
SJH combined	Fully complies	Partly complies	Fully complies	Partly complies	Fully complies	Does not comply	Fully complies	Fully complies	Fully complies
WGH combined	Fully complies	Fully complies	Fully complies	Partly complies	Partly complies	Fully complies	Fully complies	Fully complies	Fully complies

Table 1 Summary of ICU and combined units compliance with SICSAG Quality Indicator

	Daily consultant review and written management plan	Consultant-led twice daily ward rounds	Care bundles in place for; IAP, CVC, and PVC	Tracheostomy communication and swallowing needs assessed in Critical care	Screening for Delirium in critical care	Rehabilitation needs assessed in critical care	End of life care policy in place	Deaths and adverse events discussed at regular clinical governance meetings	A regular patient/family experience survey is undertaken in the unit
NHS National Waiting Times Centre									
Golden Jubilee National Hospital combined[2]	Fully complies	Fully complies	Fully complies	Partly complies	Fully complies	Partly complies	Partly complies	Fully complies	Partly complies
NHS Tayside									
Ninewells ICU	Fully complies	Fully complies	Fully complies	Does not comply	Fully complies	Does not comply	Fully complies	Fully complies	Fully complies
PRI ICU	Fully complies	Partly complies	Fully complies	Fully complies	Partly complies	Partly complies	Fully complies	Fully complies	Fully complies
Percentage of fully complying with the indicator in Scotland	83%	50%	100%	58%	63%	29%	83%	96%	75%

Notes:

1. MNK combined critical care unit opened summer 2016. In the rest of his report, the old units MNK ICU and MNK HDU that combined during 2016 will be reported with the combined unit data for the year 2016.
2. Golden Jubilee have two ICUs and two HDUs but for the purpose of this audit are reported as one combined combined.

NHS Boards

Shaded areas refer to periods with incomplete data collection

Combined Unit

Key:

NICU – Neurological ICU

CICU – Cardiovascular ICU

IAP – Intubation Associated Pneumonia

CVC – Central Venous Catheter

PVC – Peripheral Venous Cannula

Table 2 Staffing in ICUs and combined units (2016)

	Actual beds	Funded beds (Level3/2)	Trained Nurse per level 3 bed*	Percentage of total nursing are post registration trained in critical care	The period in weeks of supernumerary for new nursing starts in the unit	Patients seen every day by a critical care pharmacist	Physiotherapy is available when required
NHS Ayrshire & Arran							
Ayr ICU	5	4/0	1.6	75	4	Weekdays only	Weekdays only
Crosshouse ICU	7	5.5/0	6.6	91	8	Weekdays only	Weekdays only
NHS Borders							
BGH combined	6	5/2	6.1	50	4	Weekdays only	Weekdays only
NHS Dumfries & Galloway							
DGRI ICU	6	4/0	8.3	59	4	Everyday	Weekdays only
NHS Fife							
VHK ICU	10	9/0	6.2	29	7	Weekdays only	Everyday
NHS Forth Valley							
FVRH combined	19	7/12	0.4	55	2	Weekdays only	Everyday
NHS Grampian							
ARI ICU	16	9/2	7.0	67	2	Everyday	Everyday
ARI CICU	5	5/0	5.0	70	4	Weekdays only	Everyday
NHS Greater Glasgow and Clyde							
GRI ICU / HDU combined	20	12/8	7.5	80	3	Weekdays only	Everyday
IRH ICU	3	2/0	4.7	100	3	2 days/week	Everyday
RAH ICU	8	7/	0.0	90	3	Weekdays only	Everyday
SGH NICU	9	6/0	6.3	67	12	Weekdays only	Everyday
QEU ICU	20	18/0	3.1	75	4	Weekdays only	Everyday
NHS Highland							
Raigmore ICU	8	7/0	6.8	8.5	4	Weekdays only	Everyday
NHS Lanarkshire							
Hairmyres combined[1]	10	7/0	5.8	100	3	Weekdays only	Everyday
MDGH combined[2]	10	6/4	5.5	25	2	Weekdays only	Everyday
Wishaw ICU	5	5.3/0	5.1	41	4	Weekdays only	Everyday
NHS Lothian							
RIE combined	18	16/2	5.9	65	2	Weekdays only	Everyday
RIE CICU	12	9/8	0.5	55	1	data not supplied by unit	data not supplied by unit
SJH combined	7	3/2	6.3	42	4	Weekdays only	Weekdays only
WGH combined	16	10/6	6.3	60	3	Weekdays only	Everyday

Table 2 Staffing in ICUs and combined units (2016)

	Actual beds	Funded beds (Level3/2)	Trained Nurse per level 3 bed*	Percentage of total nursing are post registration trained in critical care	The period in weeks of supernumerary for new nursing starts in the unit	Patients seen every day by a critical care pharmacist	Physiotherapy is available when required
NHS National Waiting Times Centre							
Golden Jubilee National Hospital combined[3]	20	-	-	-	4	Weekdays only	Everyday
NHS Tayside							
Ninewells ICU	9	8/0	5.9	84	4	Weekdays only	Everyday
PRI ICU	4	3/4	2.5	50	4	Weekdays only	Everyday
Average in Scotland	-	-	-	60%	-	8%	77%

Notes:
1. Funded beds increase in winter months.
2. Monkland changed to a combined unit during 2016.
3. Available beds vary daily from Friday to Tuesday.

NHS Boards
Shaded areas refer to periods with incomplete data collection
Combined Unit

Key:
NICU – Neurological ICU
CICU – Cardiovascular ICU

Table 3. General HDU compliance with Quality Indicators (2016)

	Daily consultant review and written management plan	Consultant-led twice daily ward rounds	Care bundles in place for; IAP, CVC, and PVC	Screening for Delirium in critical care	Rehabilitation needs assessed in critical care	End of life care policy in place	Deaths and adverse events discussed at regular clinical governance meetings	A regular patient/ family experience survey is undertaken in the unit
NHS Ayrshire and Arran								
Ayr HDU	Partly complies	Does not comply	Fully complies	Fully complies	Does not comply	Partly complies	Partly complies	Fully complies
NHS Grampian								
Dr Gray's HDU	Partly complies	Does not comply	Fully complies	Fully complies	Does not comply	Partly complies	Does not comply	Partly complies
NHS Greater Glasgow and Clyde								
QEU HDU1	Fully complies	Partly complies	Fully complies	Partly complies	Partly complies	Fully complies	Partly complies	Fully complies
QEU HDU2	Fully complies	Partly complies	Fully complies	Partly complies	Partly complies	Fully complies	Partly complies	Fully complies
QEU HDU6	Fully complies	Partly complies	Fully complies	Partly complies	Partly complies	Fully complies	Partly complies	Fully complies
IRH SHDU	Partly complies	Fully complies	Fully complies	Partly complies	Does not comply	Partly complies	Fully complies	Partly complies
RAH HDU	Fully complies	Fully complies	Fully complies	Fully complies	Partly complies	Fully complies	Fully complies	Fully complies
NHS Highland								
Belford HDU	Fully complies	Partly complies	Fully complies	Partly complies	Fully complies	Fully complies	Fully complies	Partly complies
NHS Lothian								
RIE HDU	Fully complies	Fully complies	Fully complies	Partly complies	Does not comply	Fully complies	Fully complies	Partly complies
NHS Orkney								
Balfour HDU	Fully complies	Fully complies	Fully complies	Partly complies	Does not comply	Fully complies	Fully complies	Fully complies
NHS Shetland								
GBH HDU	Fully complies	Fully complies	Fully complies	Partly complies	Does not comply	Fully complies	Partly complies	Partly complies
NHS Tayside								
Perth HDU	Fully complies	Partly complies	Partly complies	Partly complies	Does not comply	Partly complies	Partly complies	Partly complies
NHS Western Isles								
WIH HDU	Fully complies	Partly complies	Fully complies	Does not comply	Does not comply	Fully complies	Fully complies	Partly complies
Percentage of fully comply-ing with the indicator in Scotland	79%	35%	93%	21%	7%	71%	43%	43%

Note:

1. MNK combined critical care Unit opened summer 2016. In the rest of his report, the old units MNK ICU and MNK HDU that combined during 2016 will be reported with the combined unit data for the year 2016.

NHS Boards

Key:
SHDU – Surgical HDU
MHDU – Medical HDU
NHDU – Neurological HDU
CHDU – Cardiothoracic HDU
RHDU – Renal HDU
OHDU – Obstetrics HDU
IAP – Intubation Associated Pneumonia
CVC – Central Venous Catheter
PVC – Peripheral Venous Cannula

Table 4 Staffing in general HDUs (2016)

	Actual beds	Funded beds (Level2/1)	Trained Nurse per level 2 bed*	Percentage of total nursing are post registration trained in critical care	The period in weeks of supernumerary for new nursing starts in the unit	Patients seen every day by a critical care pharmacist	Physiotherapy is available when required
NHS Ayrshire and Arran							
Ayr HDU	4	4/0	0.8	75	4	Weekdays only	Weekdays only
NHS Grampian							
Dr Gray's HDU	8	-	-	No data	4	No	No
NHS Greater Glasgow and Clyde							
QEU HDU	10	8/0	3.2	89	4	Weekdays only	Weekdays only
QEU HDU	10	10/0	3.2	65	4	Weekdays only	Weekdays only
QEU HDU	10	8/0	3.2	64	4	Weekdays only	Weekdays only
IRH SHDU	4	4/0	2.9	70	3	Weekdays only	Weekdays only
RAH HDU	12	12/0	3.1	90	3	Weekdays	Weekdays
NHS Highland							
Belford HDU	2	2/2	1.6	10	2	Other	Other
NHS Lothian							
RIE HDU	11	11/0	3.5	87	2	Weekdays only	Everyday
NHS Orkney							
Balfour HDU	3	2/0	5.5	9	2	Weekdays only	Other
NHS Shetland							
GBH HDU	2	No separate funding	No separate funding	0	0	Weekdays only	Weekdays only
NHS Tayside							
Perth HDU	8	8/0	3.2	73	4	Everyday	Everyday
NHS Western Isles							
WIH HDU	4	0/4	0.5	0	0	Other	Other
Percentage of fully complying with the indicator in Scotland	-	-	-	46%	-	7%	21%

Note:

* Beds are calculated as a total equivalent of funded level 2 beds. Funded level 1 beds are counted as 0.5 of a funded level 2 bed.

NHS Boards

Key:

SHDU – Surgical HDU
MHDU – Medical HDU
NHDU – Neurological HDU
CHDU – Cardiothoracic HDU
RHDU – Renal HDU
OHDU – Obstetrics HDU

Table 5 Summary of medical HDU compliance with Quality Indicators (2016)

	Daily consultant review and written management plan	Consultant-led twice daily ward rounds	Care bundles in place for; IAP, CVC, and PVC	Screening for Delirium in critical care	Rehabilitation needs assessed in critical care	End of life care policy in place	Deaths and adverse events discussed at regular clinical governance meetings	A regular patient/ family experience survey is undertaken in the unit
NHS Ayrshire and Arran								
Crosshouse MHDU	Partly complies	Fully complies	Fully complies	Partly complies	Fully complies	Fully complies	Fully complies	Fully complies
NHS Dumfries and Galloway								
DGRI MHDU	Fully complies	Partly complies	Fully complies	Partly complies	Does not comply	Fully complies	Fully complies	Partly complies
NHS Fife								
Victoria Hospital MHDU	Fully complies	Does not comply	Fully complies	Does not comply	Fully complies	Fully complies	Does not comply	Fully complies
NHS Grampian								
ARI MHDU	Fully complies	Fully complies	Fully complies	Fully complies	Partly complies	Partly complies	Fully complies	Does not comply
NHS Greater Glasgow and Clyde								
QEU MHDU	Fully complies	Partly complies	Fully complies	Fully complies	Partly complies	Fully complies	Partly complies	Fully complies
GRI MHDU	Fully complies	Fully complies	Fully complies	Fully complies	Partly complies	Fully complies	Fully complies	Fully complies
NHS Highland								
Raigmore MHDU	Fully complies	Partly complies	Fully complies	Partly complies	Does not comply	Partly complies	Partly complies	Fully complies
NHS Lanarkshire								
Hairmyres MHDU	Fully complies	Partly complies	Fully complies	Does not comply	Fully complies	Partly complies	Fully complies	Fully complies
MDGH MHDU	Fully complies	Partly complies	Fully complies	Fully complies	Fully complies	Partly complies	Fully complies	Fully complies
Wishaw MHDU	Partly complies	Partly complies	Partly complies	Does not comply	Does not comply	Fully complies	Fully complies	Fully complies
NHS Tayside								
Ninewells MHDU	Does not comply	Does not comply	Fully complies	Fully complies	Does not comply	Partly complies	Fully complies	Fully complies
Percentage of fully complying with the indicator in Scotland	73%	27%	91%	45%	36%	55%	73%	82%

NHS Boards

Key:
SHDU – Surgical HDU
MHDU – Medical HDU
NHDU – Neurological HDU
CHDU – Cardiothoracic HDU
RHDU – Renal HDU
OHDU – Obstetrics HDU
IAP – Intubation Associated Pneumonia
CVC – Central Venous Catheter
PVC – Peripheral Venous Cannula

Table 6 Staff in medical HDUs (2016)

	Actual beds	Funded beds (Level2/1)	Trained Nurse per level 2 bed*	Percentage of total nursing are post registration trained in critical care	The period in weeks of supernumerary for new nursing starts in the unit	Patients seen every day by a critical care pharmacist	Physiotherapy is available when required
NHS Ayrshire and Arran							
Crosshouse MHDU	12	8/4	2.7	41	2	Weekdays only	Weekdays only
NHS Dumfries and Galloway							
DGRI MHDU	8	8/0	3.2	4	2	Other	Everyday
NHS Fife							
Victoria Hospital MHDU	8	8/0	2.7	10	4	Everyday	Everyday
NHS Grampian							
ARI MHDU	14	8/0	0.4	90	2	Weekdays only	Weekdays only
NHS Greater Glasgow and Clyde							
QEU MHDU	9	9/0	0.4	1	4	Weekdays only	Weekdays only
GRI MHDU	8	8/0	2.4	36	1	Weekdays only	Weekdays only
NHS Highland							
Raigmore MHDU	5	5/0	3.5	0	1	Weekdays only	Weekdays only
NHS Lanarkshire							
Hairmyres MHDU	4	4/0	2.8	100	0	Other	Other
MDGH MHDU	4	4/0	2.7	0	2	Other	Other
Wishaw MHDU	12	6/6	2.8	30	2	Other	Other
NHS Tayside							
Ninewells MHDU	6	6/0	2.9	100	2	Other	Other
Percentage of fully complying with the indicator in Scotland	-	-	-	37%	-	9%	18%

Note:

* Beds are calculated as a total equivalent of funded level 2 beds. Funded level 1 beds are counted as 0.5 of a funded level 2 bed.

NHS Boards

Key:

SHDU – Surgical HDU
MHDU – Medical HDU
NHDU – Neurological HDU
CHDU – Cardiothoracic HDU
RHDU – Renal HDU
OHDU – Obstetrics HDU

Table 7 Surgical HDU compliance with Quality Indicators (2016)

	Daily consultant review and written management plan	Consultant-led twice daily ward rounds	Care bundles in place for; IAP, CVC, and PVC	Screening for Delirium in critical care	Rehabilitation needs assessed in critical care	End of life care policy in place	Deaths and adverse events discussed at regular clinical governance meetings	A regular patient/ family experience survey is undertaken in the unit
NHS Ayrshire and Arran								
Crosshouse SHDU	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies	Partly complies	Fully complies
NHS Dumfries and Galloway								
DGRI SHDU	Fully complies	Partly complies	Fully complies	Fully complies	Does not comply	Fully complies	Partly complies	Partly complies
NHS Fife								
Victoria Hospital SHDU	Partly complies	Does not comply	Fully complies	Partly complies	Does not comply	Fully complies	Fully complies	Fully complies
NHS Grampian								
ARI SHDU (Ward 503)	Partly complies	Partly complies	Fully complies	Fully complies	Partly complies	Partly complies	Fully complies	Does not comply
ARI SHDU (Ward 506)	Partly complies	Partly complies	Fully complies	Fully complies	Partly complies	Partly complies	Fully complies	Does not comply
NHS Greater Glasgow and Clyde								
GRI SHDU	Fully complies	Partly complies	Fully complies	Partly complies	Fully complies	Fully complies	Fully complies	Partly complies
NHS Highland								
Raigmore SHDU	Fully complies	Partly complies	Fully complies	Does not comply	Partly complies	Fully complies	Fully complies	Fully complies
NHS Lanarkshire								
MDGH Level 1	Fully complies	Partly complies	Fully complies	Does not comply	Does not comply	Fully complies	Partly complies	Partly complies
Wishaw SHDU	Fully complies	Partly complies	Fully complies	Partly complies	Does not comply	Fully complies	Fully complies	Partly complies
NHS Lothian								
WGH SHDU	Partly complies	Partly complies	Fully complies	Partly complies	Does not comply	Partly complies	Fully complies	Fully complies
NHS Tayside								
Ninewells SHDU	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies	Fully complies	Partly complies	Fully complies
Percentage of fully complying with the indicator in Scotland	60%	20%	100%	50%	30%	70%	70%	50%

NHS Boards

Key:
SHDU – Surgical HDU
MHDU – Medical HDU
NHDU – Neurological HDU
CHDU – Cardiothoracic HDU
RHDU – Renal HDU
OHDU – Obstetrics HDU
IAP – Intubation Associated Pneumonia
CVC – Central Venous Catheter
PVC – Peripheral Venous Cannula

Table 8 Staffing in surgical HDUs (2016)

	Actual beds	Funded beds (Level2/1)	Trained Nurse per level 2 bed*	Percentage of total nursing are post registration trained in critical care	The period in weeks of supernumerary for new nursing starts in the unit	Patients seen every day by a critical care pharmacist	Physiotherapy is available when required
NHS Ayrshire and Arran							
Crosshouse SHDU	12	12/0	2.5	60	2	Weekdays only	Weekdays only
NHS Dumfries and Galloway							
DGRI SHDU	4	4/0	4.2	42	1	Weekdays only	Everyday
NHS Fife							
Victoria Hospital SHDU	10	8/8	1.9	75	6	Weekdays only	Everyday
NHS Grampian							
ARI SHDU (Ward 503)	8	6/0	2.9	35	2	Weekdays only	Weekdays only
ARI SHDU (Ward 506)	8	8/0	2.6	15	2	Weekdays only	Weekdays only
NHS Greater Glasgow and Clyde							
GRI SHDU	8	8/0	3.6	70	4	Weekdays only	Weekdays only
NHS Highland							
Raigmore SHDU	6	6/0	2.9	50	3	Everyday	Everyday
NHS Lanarkshire							
MDGH L1	6	0/6	2.7	20	2	Weekdays only	Everyday
Wishaw SHDU	7	6.7/0	2.6	41	4	Weekdays only	Everyday
NHS Lothian							
WGH SHDU	10	6/4	2.9	90	2	Weekdays only	Weekdays only
NHS Tayside							
Ninewells SHDU	10	10/0	3.5	93	4	Everyday	Everyday
Percentage of fully complying with the indicator in Scotland	-	-	-	57%	-	20%	50%

Note:

* Beds are calculated as a total equivalent of funded level 2 beds. Funded level 1 beds are counted as 0.5 of a funded level 2 bed.

NHS Boards

Key:

SHDU – Surgical HDU
MHDU – Medical HDU
NHDU – Neurological HDU
CHDU – Cardiothoracic HDU
RHDU – Renal HDU
OHDU – Obstetrics HDU

Table 9 Summary of specialist HDUs compliance with SICSAG Quality Indicators

	Daily consultant review and written management plan	Consultant-led twice daily ward rounds	Care bundles in place for; IAP, CVC, and PVC	Screening for Delirium in critical care	Rehabilitation needs assessed in critical care	End of life care policy in place	Deaths and adverse events discussed at regular clinical governance meetings	A regular patient/ family experience survey is undertaken in the unit
NHS Fife								
Victoria Hospital RHDU	Fully complies	Partly complies	Fully complies	Does not comply	Fully complies	Partly complies	Fully complies	Fully complies
NHS Grampian								
ARI OHDU	Fully complies	Fully complies	Does not comply	Does not comply	Does not comply	Partly complies	Fully complies	Partly complies
NHS Greater Glasgow and Clyde								
GRI OHDU	Fully complies	Fully complies	Fully complies	Does not comply	Does not comply	Partly complies	Partly complies	Fully complies
QEU OHDU	Fully complies	Fully complies	Fully complies	Does not comply	Does not comply	Partly complies	Fully complies	Does not comply
SGH NHDU	Fully complies	Partly complies	Fully complies	Fully complies	Partly complies	Partly complies	Fully complies	Fully complies
NHS Lothian								
RIE Vascular (Level 1)	Fully complies	Does not comply	Partly complies	Partly complies	Partly complies	Fully complies	Fully complies	Fully complies
RIE CHDU	Fully complies	Fully complies	Fully complies	Fully complies	Partly complies	Fully complies	Fully complies	Fully complies
RIE RTHDU	Fully complies	Partly complies	Fully complies	Partly complies	Does not comply	Partly complies	Fully complies	Does not comply
WGH NHDU	Partly complies	Does not comply	Does not comply	Does not comply	Partly complies	Partly complies	Partly complies	Partly complies
NHS Tayside								
Ninewells OHDU	Fully complies	Fully complies	Fully complies	Does not comply	Does not comply	Partly complies	Fully complies	Does not comply
Percentage of fully complying with the indicator in Scotland	90%	50%	70%	20%	10%	20%	80%	50%

NHS Boards	Key: SHDU – Surgical HDU MHDU – Medical HDU NHDU – Neurological HDU CHDU – Cardiothoracic HDU RHDU – Renal HDU OHDU – Obstetrics HDU IAP – Intubation Associated Pneumonia CVC – Central Venous Catheter PVC – Peripheral Venous Cannula

Table 10 Staffing levels in specialist HDUs

	Actual beds	Funded beds (Level2/1)	Trained Nurse per level 2 bed*	Percentage of total nursing are post registration trained in critical care	The period in weeks of supernumerary for new nursing starts in the unit	Patients seen every day by a critical care pharmacist	Physiotherapy is available when required
NHS Fife							
Victoria Hospital RHDU	3	3/0	0.0	33	NO NEW STARTS	Weekdays	Weekdays
NHS Grampian							
ARI OHDU	1	1/0	53.5	23	2	Other	Other
NHS Greater Glasgow and Clyde							
GRI OHDU	2	0/2	0.0	0	0	Other	Other
QEU OHDU	2	8/0	0.0	0	0	Not applicable	Not applicable
SGH NHDU	6	6/0	3.0	94	4	Weekdays only	Everyday
NHS Lothian							
RIE Vascular (Level 1)	4	0/4	0.0	0	0	Other	Other
RIE CHDU	10	8/0	3.8	56	2	Weekdays only	Everyday
RIE RTHDU	12	12/0	3.2	50	4	Weekdays only	Weekdays only
WGH NHDU	7	4/3	3.4	0.6	2	weekday Neurosciences pharmacist	No
NHS Tayside							
Ninewells OHDU	2	1/0	1.0	100	0	Other	Other
Percentage of fully complying with the indicator in Scotland	-	-	-	39%	-	0%	11%

Note:

* Beds are calculated as a total equivalent of funded level 2 beds. Funded level 1 beds are counted as 0.5 of a funded level 2 bed.

NHS Boards

Key:

SHDU – Surgical HDU
MHDU – Medical HDU
NHDU – Neurological HDU
CHDU – Cardiothoracic HDU
RHDU – Renal HDU
OHDU – Obstetrics HDU

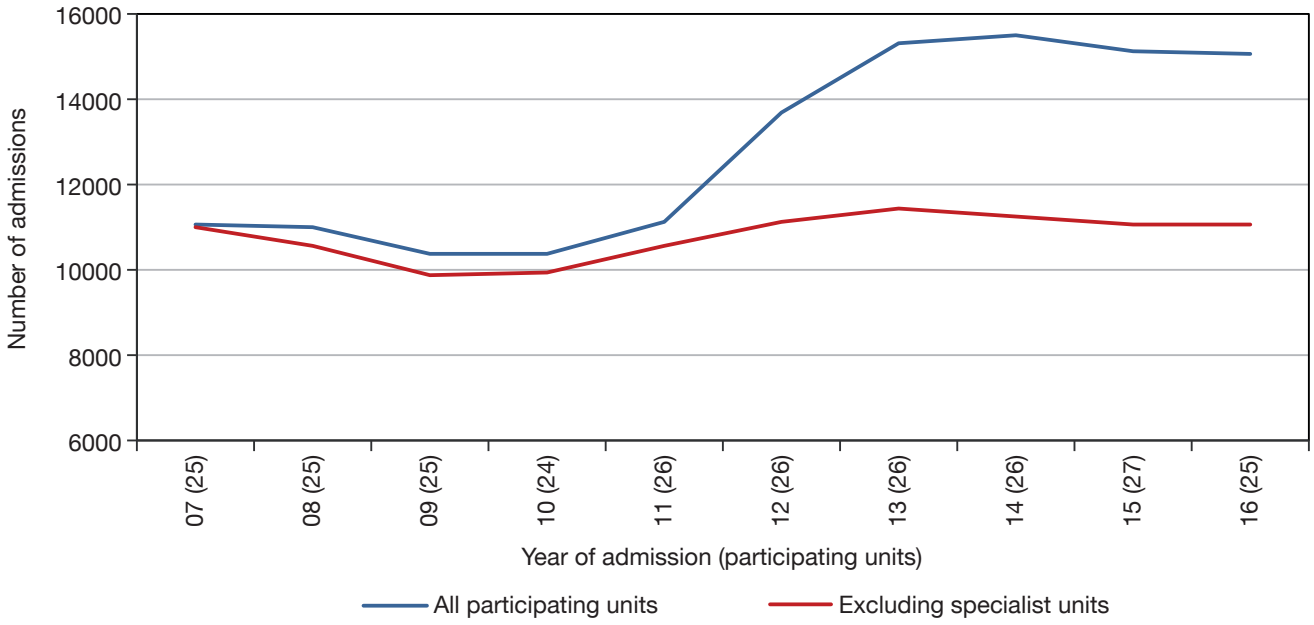
Section 3 Activity

Data regarding critical care activity is presented in this section. These data are presented in a variety of formats with information on funnel plots given in the methodology section of the SICSAG website at: http://www.sicsag.scot.nhs.uk/

When interpreting the unit-level charts it is very important to remember that each unit is unique in terms of case load, patient case-mix and geographical factors, and these may all account for any differences seen.

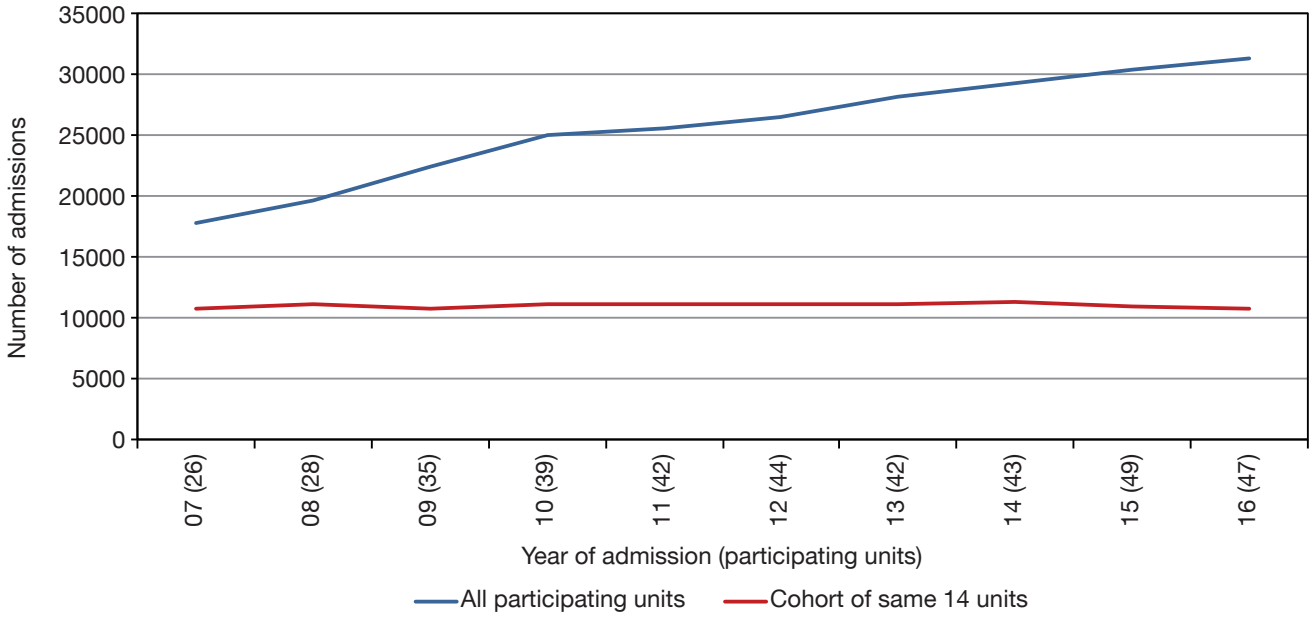
3.1 Number of admissions

Figure 17 Annual admissions to ICUs and combined units (2007-2016)



In 2016 there was a slight increase in admissions to ICUs and combined units compared to 2015, this equating to 2% more admissions. This is likely due to Monklands ICU and Monklands SHDU combining to becoming one critical care unit. The red line shows ICUs and combined units excluding specialist units, which are ARI CICU, SGH NICU, RIE CICU and GJH CICU.

Figure 18 Annual admissions to HDU (2007-2016)



The number of admissions to HDUs increased by 3% from 2015 to 2016.

The cohort line refers to units that have participated in the audit for the past ten years, the number of admissions to these units has decreased.

Figure 19 Age profile of patients admitted to ICUs and combined units (2016)

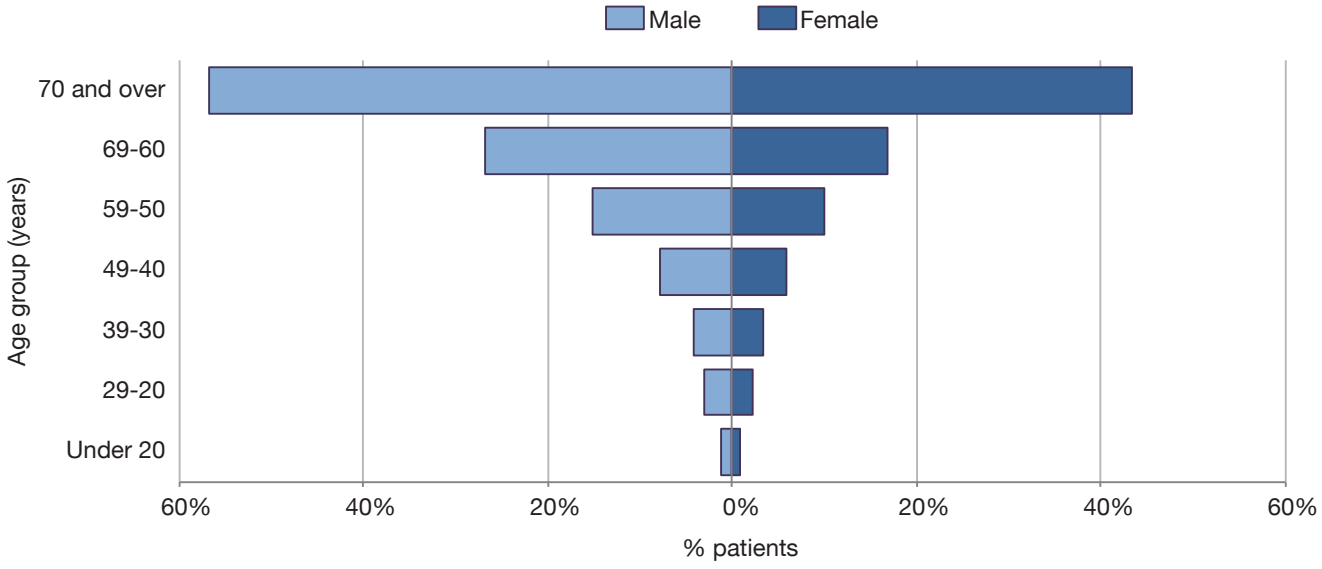


Figure 20 Age profile of patients admitted to HDUs (2016)

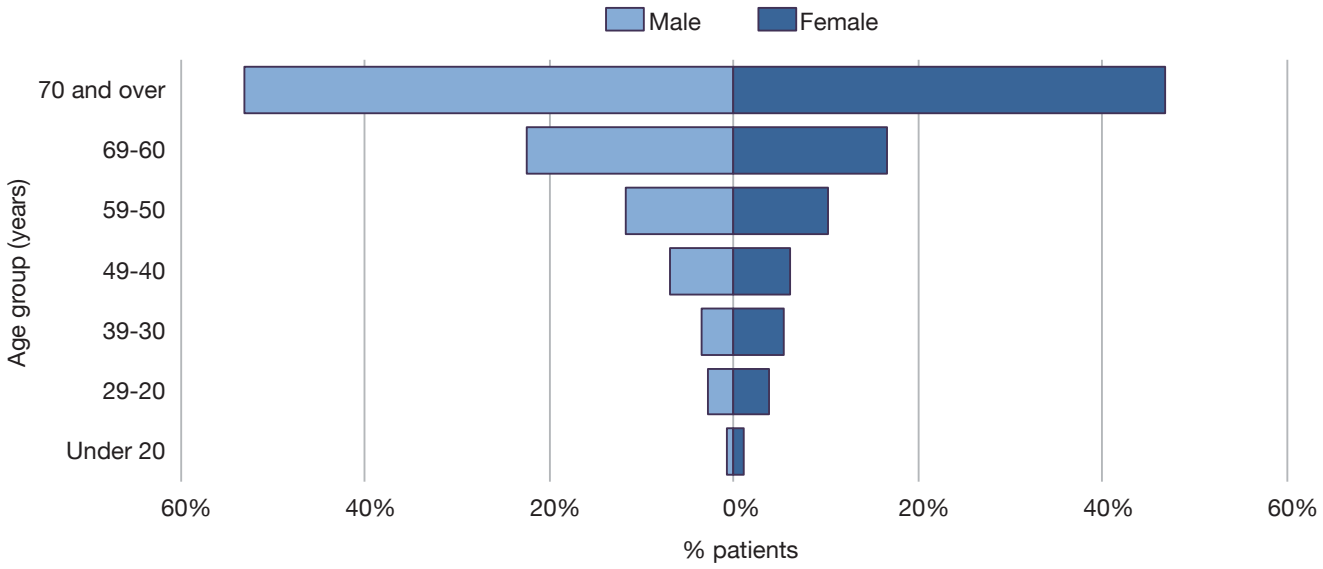


Table 11 Number of annual admissions to ICU and combined units (2007-2016)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
NHS Ayrshire & Arran										
Ayr ICU	307	330	330	292	252	268	243	255	270	223
Crosshouse ICU	302	304	294	305	319	302	276	269	287	273
NHS Borders										
BGH combined	691	406	397	429	506	600	579	586	561	543
NHS Dumfries & Galloway										
DGRI ICU	324	316	285	298	293	314	323	286	313	301
NHS Fife										
QMH ICU	373	382	437	439	449	22				
VHK ICU						394	453	429	407	391
VHK combined	179	124	38							
NHS Forth Valley										
FVRH combined					577	1189	1159	1260	1308	1264
SRI ICU	471	443	378	411	214					
NHS Grampian										
ARI ICU	778	762	717	748	665	676	821	765	669	655
ARI CICU							279	483	453	458
NHS Greater Glasgow and Clyde										
GRI combined	348	395	426	461	793	952	1060	973	1056	1199
IRH ICU	104	104	82	120	150	138	137	130	112	100
RAH ICU	367	359	360	433	402	374	359	346	369	360
SGH ICU	296	299	289	278	282	264	232	279	103	
SGH NICU	76	454	461	451	395	347	377	437	456	411
Stobhill ICU	201	233	202	155	40					
VI ICU	391	284	317	298	280	284	289	246	99	
WIG ICU	512	554	495	485	475	393	421	391	136	
QEU ICU									497	842
NHS Highland										
Raigmore ICU	436	391	429	433	383	423	433	404	374	374
NHS Lanarkshire										
Hairmyres combined	522	505	560	562	583	558	615	565	619	673
MDGH ICU1	301	278	252	225	273	267	307	298	308	93
MDGH combined[1]										471
Wishaw ICU	829	619	222	229	237	212	235	257	259	270
NHS Lothian										
RIE combined	1041	1092	968	1110	1177	1230	1236	1267	1262	1297
RIE CICU					188	926	1011	1038	1023	1039
SJH combined	367	443	465	424	444	452	458	387	371	365
WGH combined	714	772	831	735	705	647	676	721	633	667
NHS National Waiting Times Centre										
Golden Jubilee National Hospital combined[2]						1318	2223	2255	2084	2130
NHS Tayside										
Ninewells ICU	370	404	386	357	349	417	378	391	368	386
PRI ICU	151	156	136	122	119	140	124	166	132	123
Total	**10451**	**10409**	**9757**	**9800**	**10550**	**13107**	**14704**	**14884**	**14529**	**14908**
Total (excluding specialist units)	**10375**	**9955**	**9296**	**9349**	**9967**	**10516**	**10814**	**10671**	**10513**	**10870**

Notes:

1. During 2016 the ICU and SHDU at Monklands merged. Data in the rest of the report is combined for these units for all 2016 to reflect this.
2. Golden Jubilee have two ICUs and two HDUs but for the purpose of this audit are reported as one combined.

NHS Boards

Shaded areas refer to periods with incomplete data collection

Combined Unit

Key:

NICU – Neurological ICU

CICU – Cardiothoracic ICU

Table 12 Number of annual admissions to HDU (2007-2016)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
NHS Ayrshire and Arran										
Ayr HDU	413	542	527	498	487	469	474	498	500	484
Crosshouse MHDU	992	997	974	1033	1103	1193	1201	1102	1053	1084
Crosshouse SHDU	696	728	711	644	641	644	669	723	754	740
NHS Borders										
BGH Surgical (Level 1)		310	339	254						
NHS Dumfries and Galloway										
DGRI MHDU	360	393	392	431	418	437	431	456	434	395
DGRI SHDU	793	823	804	854	731	788	824	868	759	736
NHS Fife										
QMH SHDU	853	849	840	816	813	34				
QMH MHDU				525	724	37				
QMH RHDU					155					
Victoria Hospital SHDU						817	903	883	941	872
Victoria Hospital MHDU				429	444	937	1088	1084	1136	1104
Victoria Hospital RHDU						159	210	202	224	163
NHS Forth Valley										
Stirling HDU		1089	963	992	558					
NHS Grampian										
ARI SHDU (Ward 503)	587	582	623	714	630	575	609	654	619	471
ARI SHDU (Ward 506)			780	814	868	892	856	871	802	845
ARI MHDU									575	1091
ARI OHDU[4]										122
Dr Gray's HDU			797	1083	1169	1069	1068	986	950	1007
NHS Greater Glasgow and Clyde										
GRI OHDU									95	235
QEU HDU									590	946
QEU HDU									494	824
QEU HDU									406	739
QEU MHDU									607	1101
QEU OHDU[4]										76
GRI SHDU	1028	1051	1053	1026	765	629	621	650	624	647
GRI MHDU						533	671	679	720	735
IRH SHDU			266	432	469	439	485	526	479	550
RAH HDU	1201	1291	1289	1339	1459	1497	1418	1414	1453	1486
SGH SHDU	809	861	870	807	693	711	692	696	228	
SGH NHDU	703	675	660	647	621	594	637	706	681	594
Stobhill SHDU	327	327	337	287	58					
VI SHDU	702	692	636	700	812	847	873	835	317	
GGH HDU	849	885	882	904	755	755	761	806	304	
GGH HDU				75	413	438	427	443	123	
NHS Highland										
Raigmore MHDU	732	718	730	811	803	743	774	804	806	728
Raigmore SHDU	714	620	677	669	669	653	657	629	595	636
Belford HDU					74	78	114	100	63	101

Table 12 Number of annual admissions to HDU (2007-2016)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
NHS Lanarkshire										
Hairmyres MHDU					274	375	254	223	385	415
MDGH SHDU[1]	628	601	593	569	565	588	618	592	574	164
MDGH MHDU			56	278	283	377	438	406	452	425
MDGH Level 1[4]										400
Wishaw SHDU		154	602	532	546	571	526	488	498	520
Wishaw MHDU						265	1245	1188	1172	1245
NHS Lothian										
RIE HDU	1517	1541	1390	1369	1366	1377	1329	1300	1282	1305
RIE RHDU[2]	683	667	632	674	675	634	650	682	715	
RIE THDU[2]	330	338	306	345	296	325	375	392	368	
RIE Vascular (Level 1)			112	452	378	372	330	331	341	361
RIE CHDU					214	1118	1223	1249	1303	1403
RIE RTHDU[2]										822
WGH HDU	117									
WGH SHDU	1139	1192	1126	1119	1136	1112	1115	1115	1160	1184
WGH NHDU	362	230	285	404	476	431	481	481	493	480
WGH Neurological (Level 1)				52	418	364	475	475	469	432
NHS Orkney										
Balfour HDU						78	138	258	277	267
NHS Shetland										
GBH HDU	64	63	49	58	74	65	77	69	66	54
NHS Tayside										
Ninewells SHDU	723	832	742	754	794	784	816	812	842	846
Ninewells MHDU			558	641	673	743	709	782	829	839
Ninewells OHDU2								822	915	716
Perth HDU	569	623	644	618	625	659	612	576	516	525
NHS Western Isles										
WIH HDU			145	414	448	417	301	344	414	496
Total[3]	**17891**	**19674**	**22390**	**25063**	**25573**	**26623**	**28175**	**29251**	**30377**	**31297**
Total (14 units)	**10790**	**11078**	**10811**	**11060**	**11070**	**11121**	**11169**	**11273**	**11044**	**10694**

Notes:

1. Unit combined with Monklands ICU during 2016.
2. Unit RIE renal and transplant units combined in 2016.
3. Total is slightly different from last year as data is excluded from the following units; ARI NHDU, ARI CHDU, and some episode level 0s from NWD OHDU not suitable for inclusion in the report.
4. This is not a full years data as the unit opened during 2016.

NHS Boards

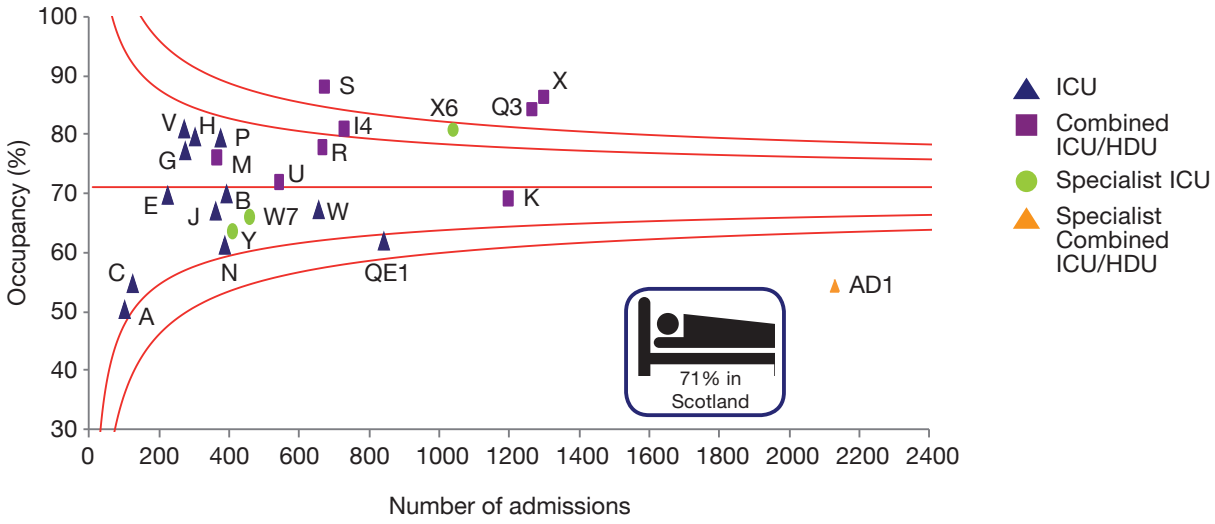
Shaded areas refer to periods with incomplete data collection

Key:

SHDU – Surgical HDU
MHDU – Medical HDU
NHDU – Neurological HDU
CHDU – Cardiothoracic HDU
RHDU – Renal HDU
OHDU – Obstetrics HDU

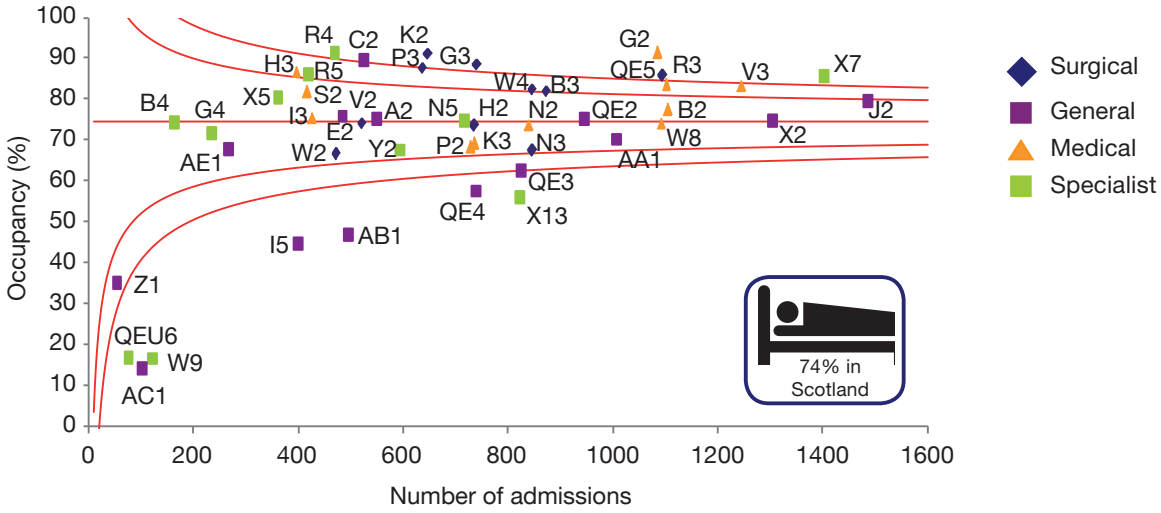
3.2 Bed occupancy

Figure 21 Bed occupancy rates for ICU and combined units (2016)



During 2016 the average occupancy in Scottish ICU and combined units was 71%. Units S (HRM combined), X (RIE combined) and Q3 (FVRH combined) have a significantly higher bed occupancy rate compared to the Scottish mean.

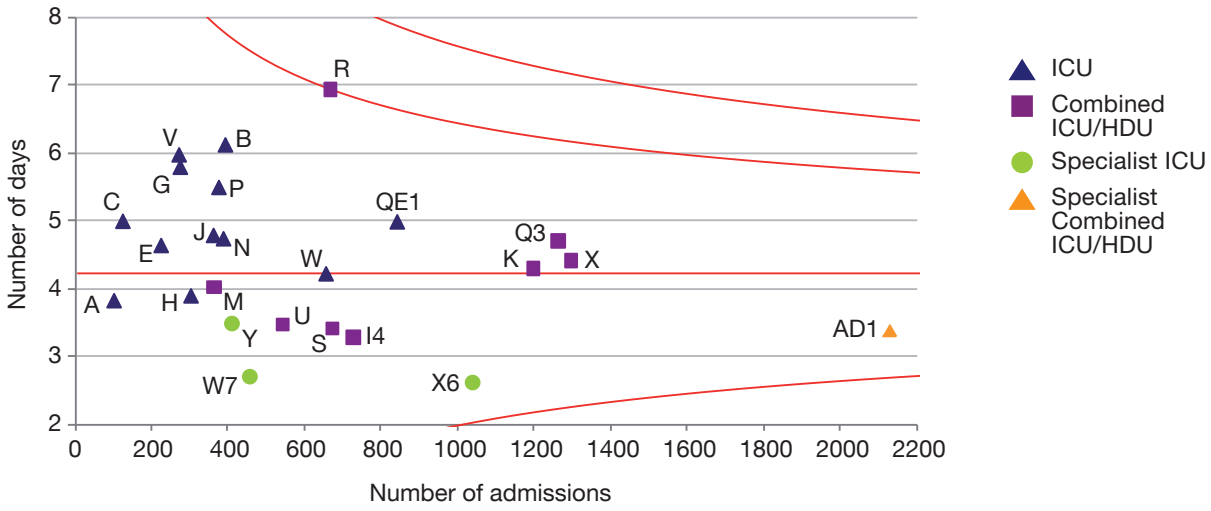
Figure 22 Bed occupancy rates for HDU (2016)



During 2016 the mean occupancy in HDUs was 74%. Some of the units with low occupancy are in smaller remote hospitals and staff work within general wards until there is a need to open HDU beds.

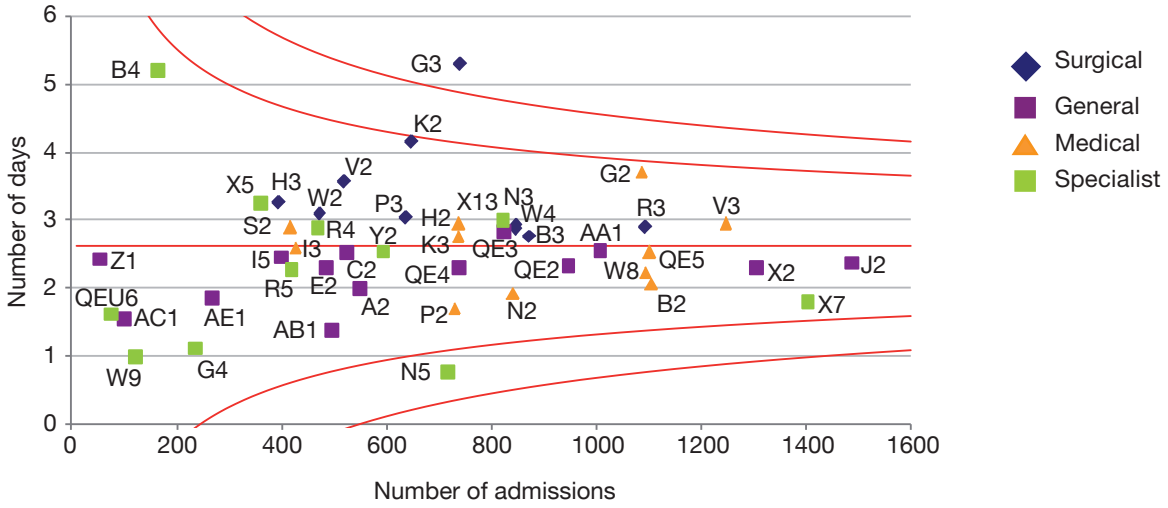
3.3 Length of stay

Figure 23 Length of stay for ICU and combined units (2016)



The mean length of stay for ICUs and combined units in 2016 was just over 4 days; which is similar to the last few years. Unit R (WGH ICU/HDU) has the longest average length of stay at 7 days. Although this unit is very close to the 2SD line, it is not an outlier.

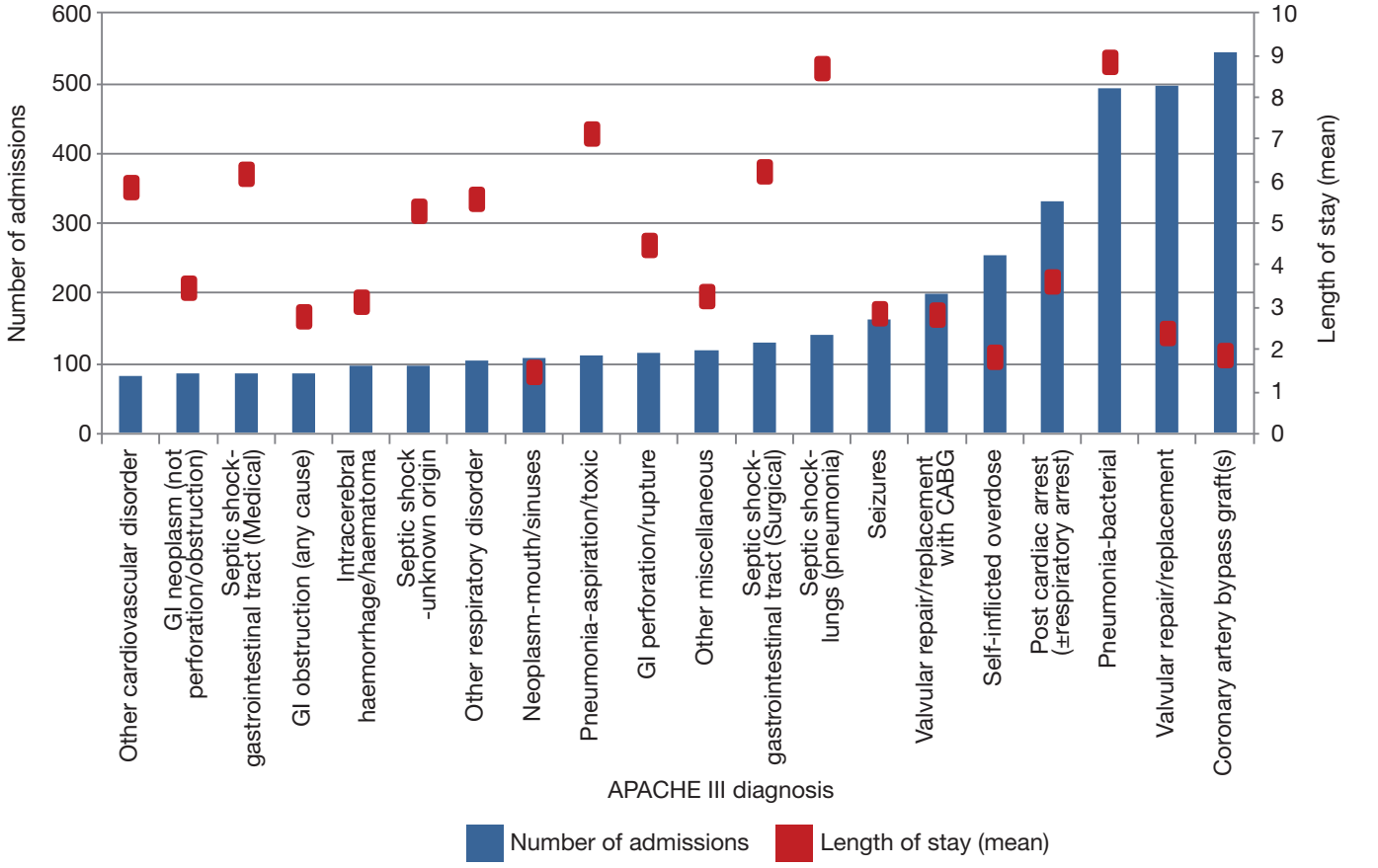
Figure 24 Length of stay for HDU (2016)



The mean length of stay in HDUs was the same as that reported in 2015 at 2 days. Unit G3 (CRH SHDU) had the longest average length of stay in a HDU at over 5 days, this is statistically significantly higher length of stay than other HDUs in Scotland.

3.4 APACHE III diagnosis

Figure 25 Top 20 Apache III diagnoses in ICU and combined units with mean length of stay for each diagnosis (2016)



The top two ICU APACHE diagnoses in 2016 were both cardiac (valvular repair and Coronary Artery Bypass Graft (CABG)).

This is a reflection of the 2 large cardiothoracic ICU's being an integral part of the unit.

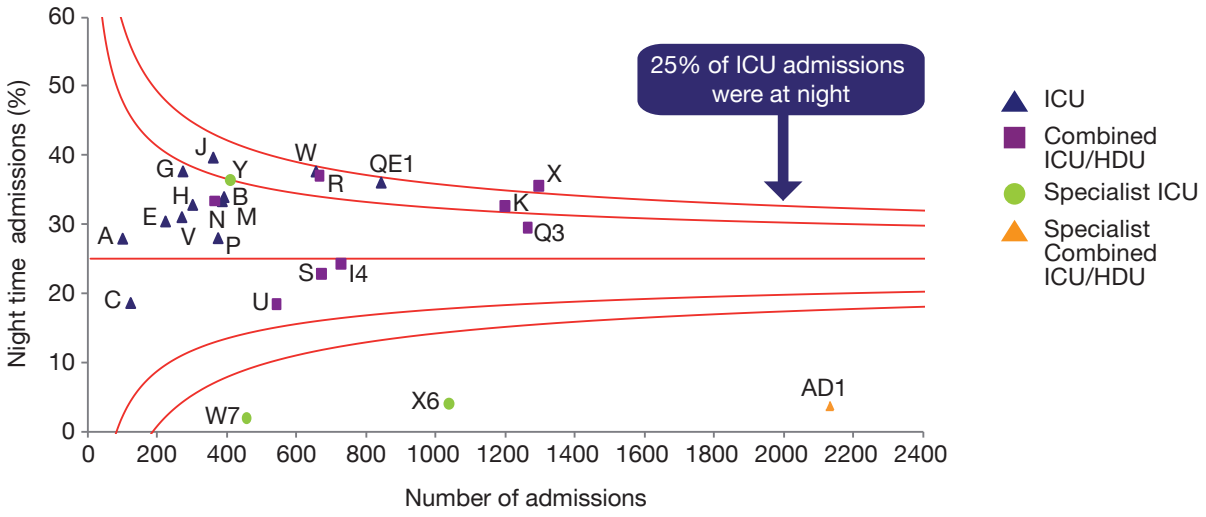
Below this the more common general ICU diagnoses of bacterial pneumonia, cardiac arrest and self-inflicted overdose show a pattern that is relatively unchanged in recent years.

3.5 Night time admissions

Night time is defined as 10pm to 8am, under the new SICSAG Minimum Standards and Quality Indicators[2].

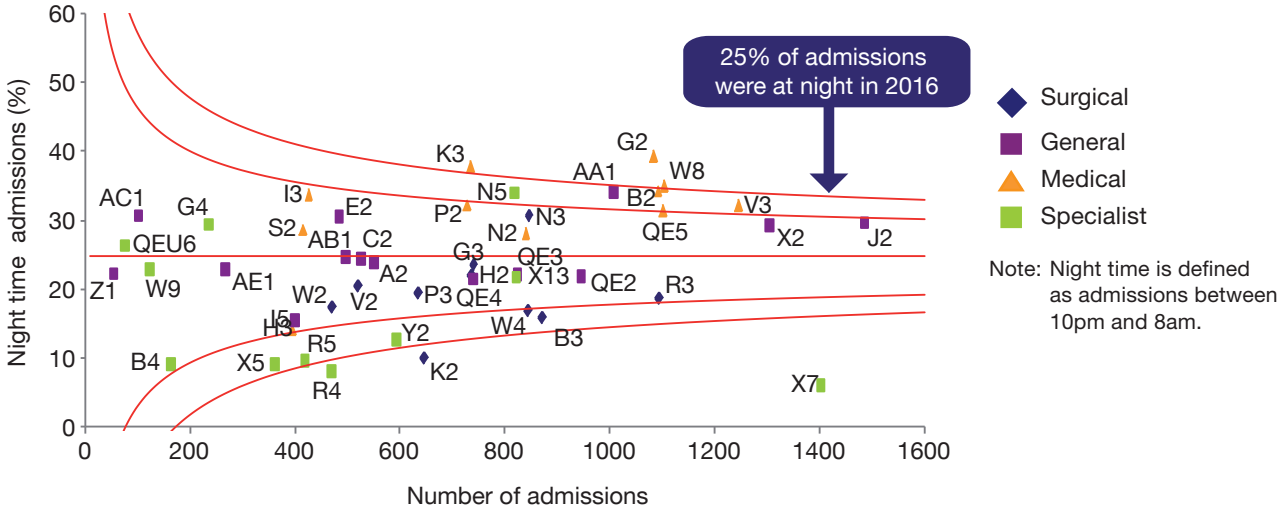
The high percentage of night time admissions highlights the pressure on units to deliver unplanned care at all hours.

Figure 26 Night time admissions to ICU and combined units (2016)



Unit X (RIE ICU/HDU) had significantly more night time admissions than the Scottish mean. All units with a significantly lower night time admission compared to the Scottish mean are classed as specialist units in this case these are all cardiothoracic units; W7 (ARI CICU), X6 (RIE CICU), AD1 (GJH CICU).

Figure 27 Night time admissions to HDU (2016)



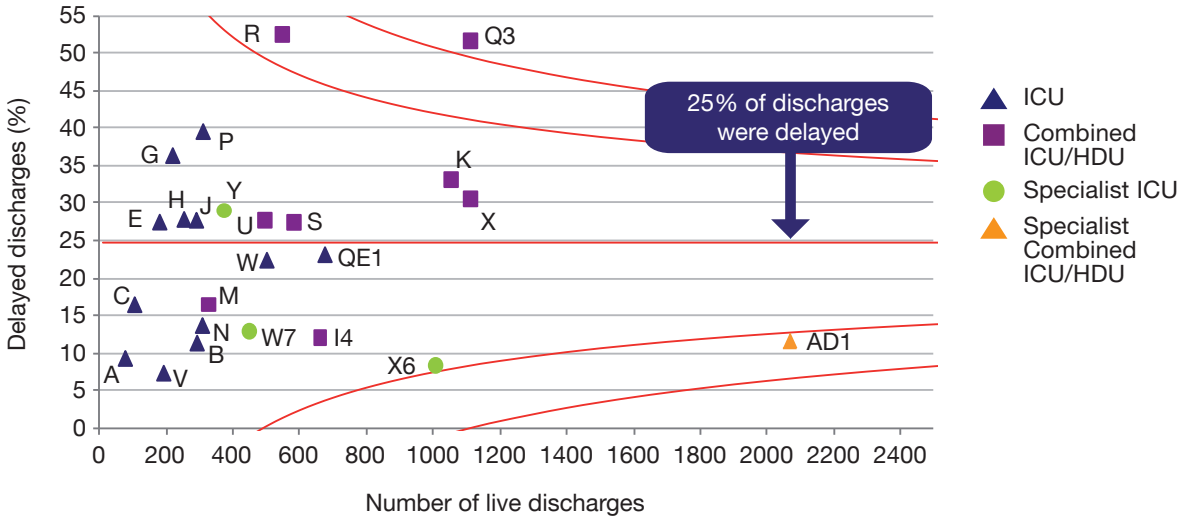
For 2016 25% of admissions were at night. Unit G2 (Crosshouse MHDU) has significantly more admissions at night compared to the Scottish mean.

Please see Figures 5 and 8 for data on night time discharges.

3.6 Delayed discharges

Delayed discharges are instances where patients are deemed clinically ready for discharge, but there is a delay or "gap" before actual discharge. Where staff feel this gap is "abnormal" they have various options to record as reasons for this. The most common reason for delayed discharge is a shortage of available downstream ward or HDU beds. This in turn can be due to delayed discharge of patients from acute hospital beds often caused by lack of social care in the community. In times of peak demand this effect can back up into critical care areas.

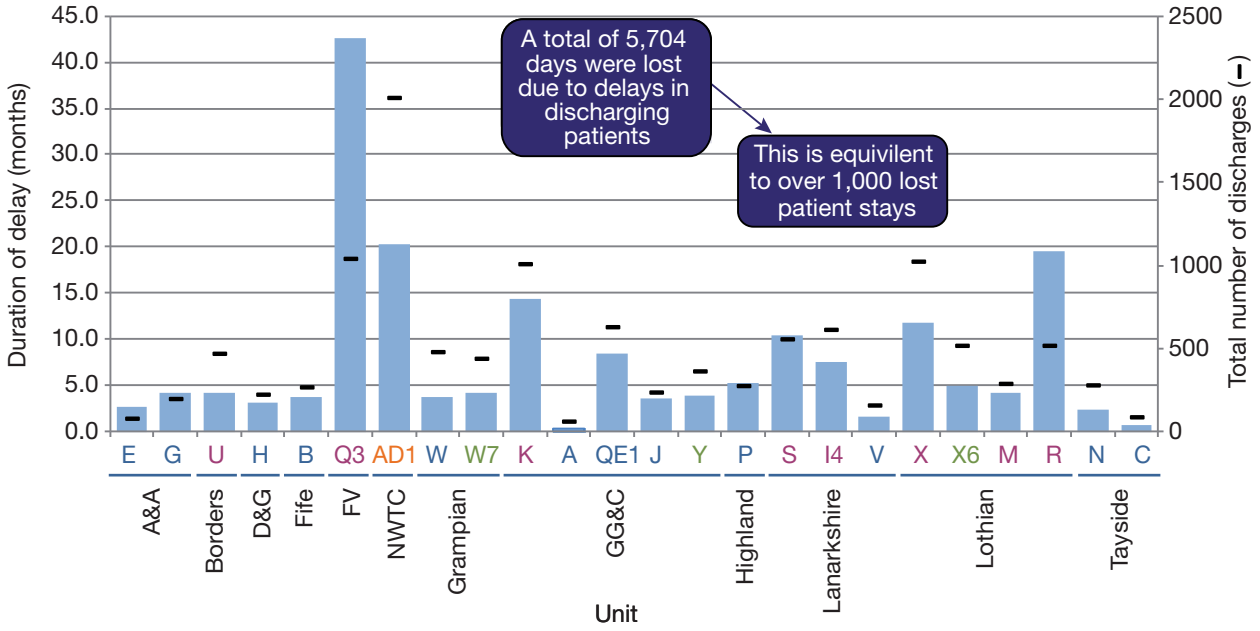
Figure 28 Delayed discharges of greater than 4 hours from ICU and combined units (2016)



In 2016 25% of episodes in Scotland had a delay in their discharge of over 4 hours. Unit Q3 (FVRH combined unit) has significantly higher delayed discharges compared to the Scottish mean, with 52% of episodes having a delay of over 4 hours. Figure 29 shows that the cumulative delay recorded for this combined unit was higher than any other ICU or combined unit in Scotland. Ward bed shortage is by far the most common reason recorded for this unit as the cause of delays.

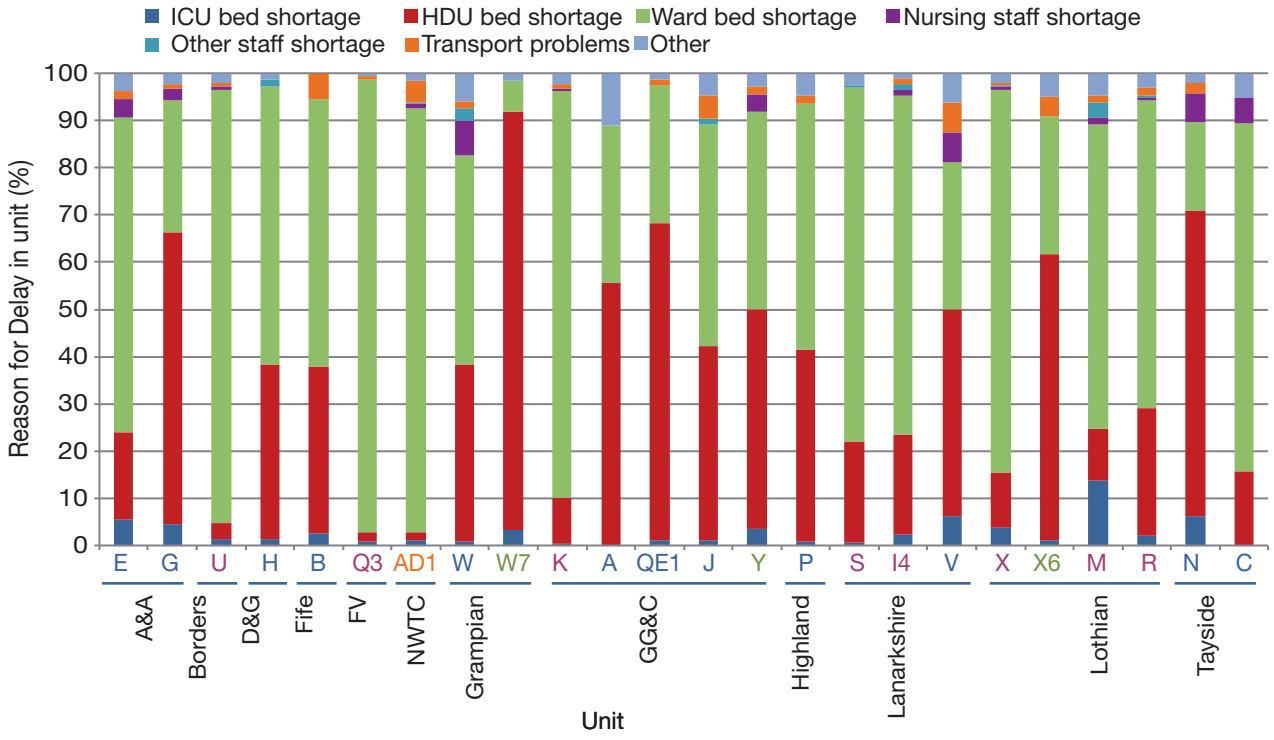
Overall in 2016 the main reason for a delay from ICU and combined units was bed shortages either in a HDU or a ward. Although patients are clinically ready to be discharged from the ICU or combined unit, there is a delay in unit discharge due to, in the majority of cases, a lack of downstream beds.

Figure 29 Total delayed discharges from ICU and combined units (2016)



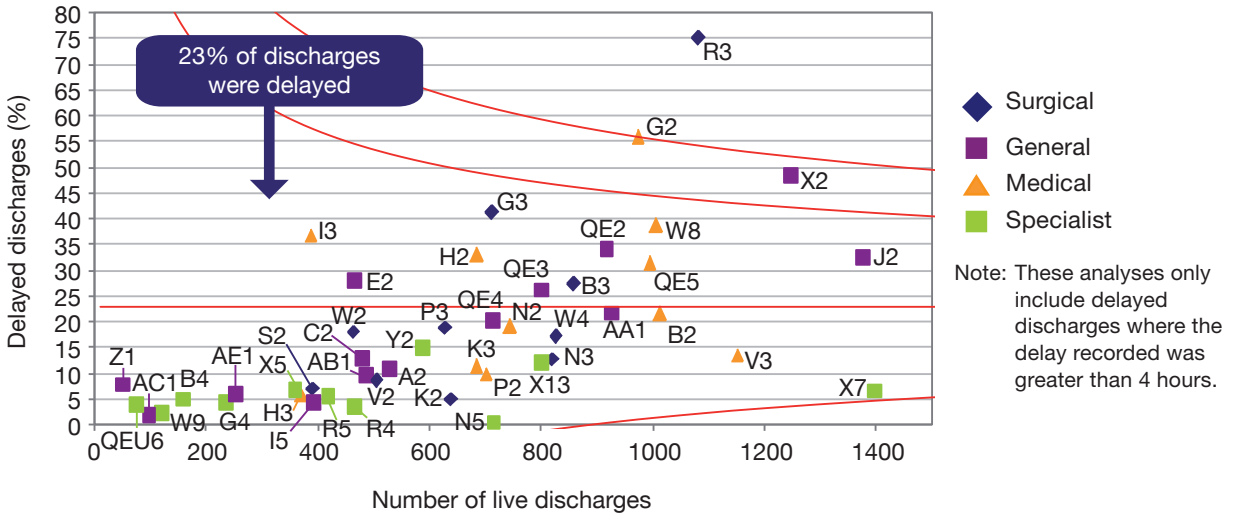
Unit Key: ICU | Combined ICU/HDU | Specialist ICU | Specialist Combined ICU/HDU

Figure 30 Reason for delayed discharge from ICU and combined units (2016)



Unit Key: ICU | Combined ICU/HDU | Specialist ICU | Specialist Combined ICU/HDU

Figure 31 Delayed discharges of greater than 4 hours to HDUs (2016)



In 2016 23% of episodes in Scotland had a delay in their discharge of over 4 hours. Unit R3 (WGH SHDU) had significantly higher delayed discharges compared to the Scottish mean, with 75% of episodes having a delay of 4 hours or more. Unit G2 (CRH MHDU) had recorded 56% of episodes having a delay and although close to the +3SD line it is not an outlier. However both these units have the highest cumulative delayed discharge in 2016 and both record 'Ward bed shortages' as the main reason for the delay.

Figure 32 Total delayed discharges from HDUs (2016)

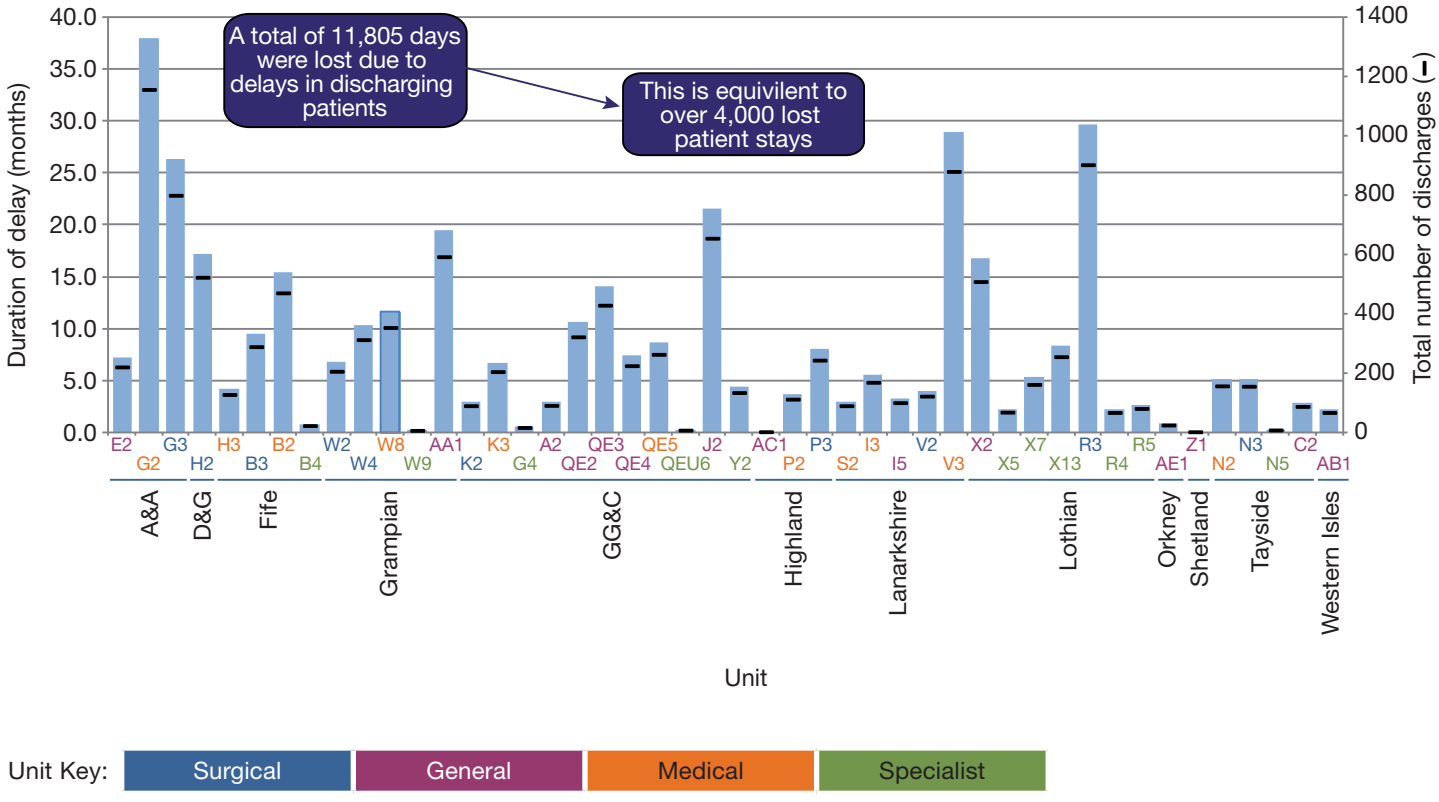
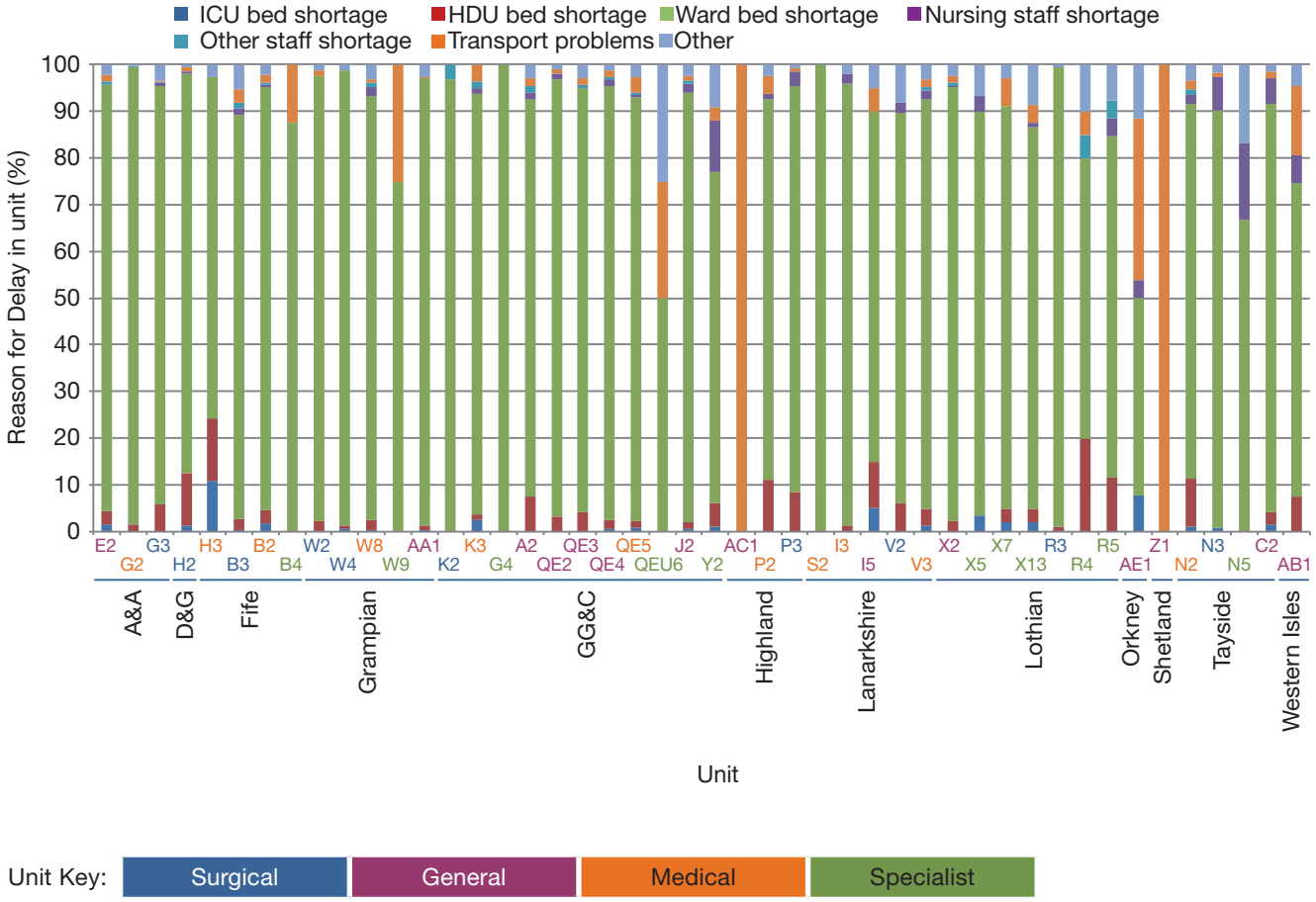


Figure 33 Reason for delayed discharge from HDUs (2016)



Unit Key: Surgical | General | Medical | Specialist

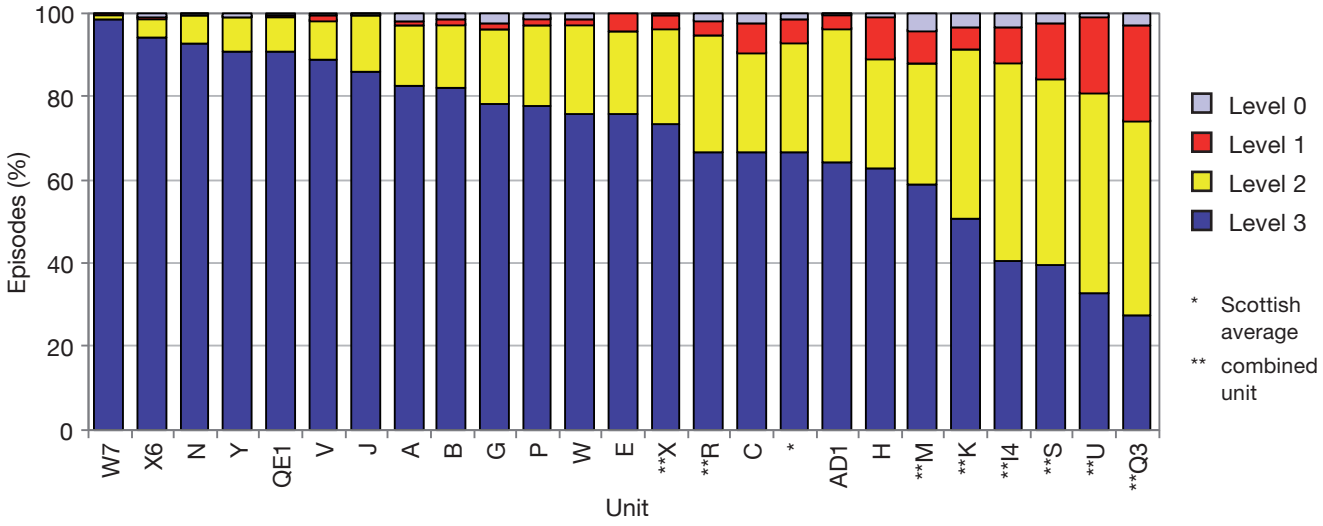
Overall in Scotland in 2016 the main reason for a delay was ward bed shortages. In the island units, AC1 (BEL HDU) and Z1(GBH HDU), transport problems were the main reason recorded for a delay.

Section 4 Interventions

4.1 Level of care

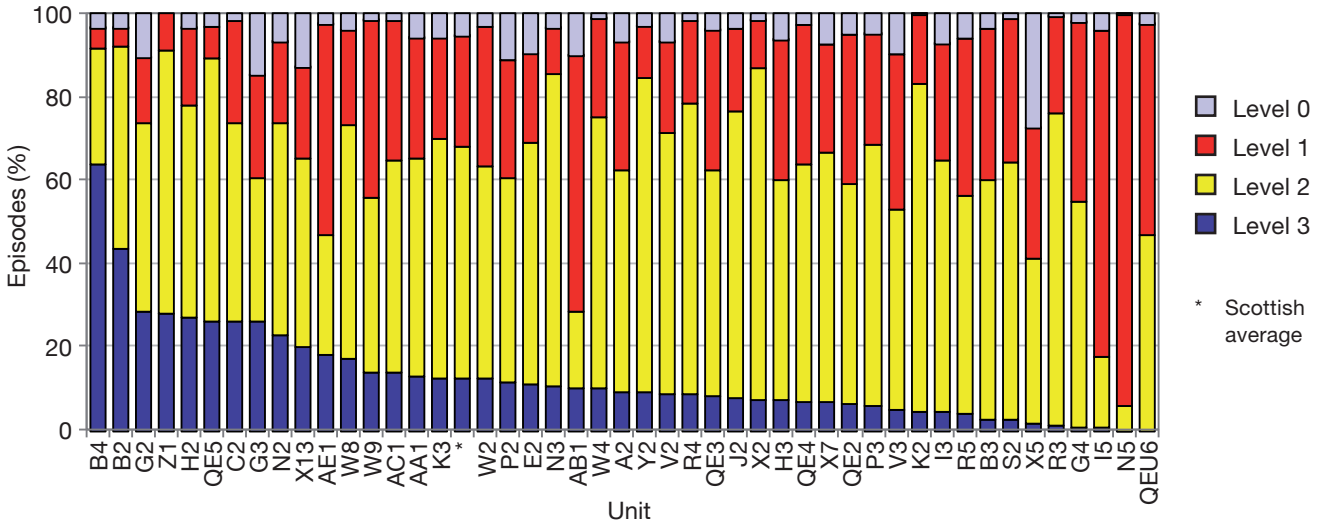
Level of care data are collected from the WardWatcher Augmented Care Period (ACP) page. It allows direct comparisons of interventions and levels of care to be made between critical care units. Level of care is defined in Appendix 4[6]. Some differences in the levels of care will be due to the differing speciality between hospitals.

Figure 34 Highest level of care in ICU and combined units (2016)



As in previous year's report the data are presented in order of descending proportion of level 3 care. In 2016 the highest level of care, level 3, was required in 66% of patient episodes in ICU and combined units and indicates the significant resource and skill-mix implications required by each unit in Scotland. Specialist ICUs – cardiothoracic or neurological W7 (ARI CICU), X6 (RIE CICU), N (NWD ICU) and Y (SGH NICU) have the highest percentage of patient episodes requiring level 3 care.

Figure 35 Highest level of care in HDU (2016)



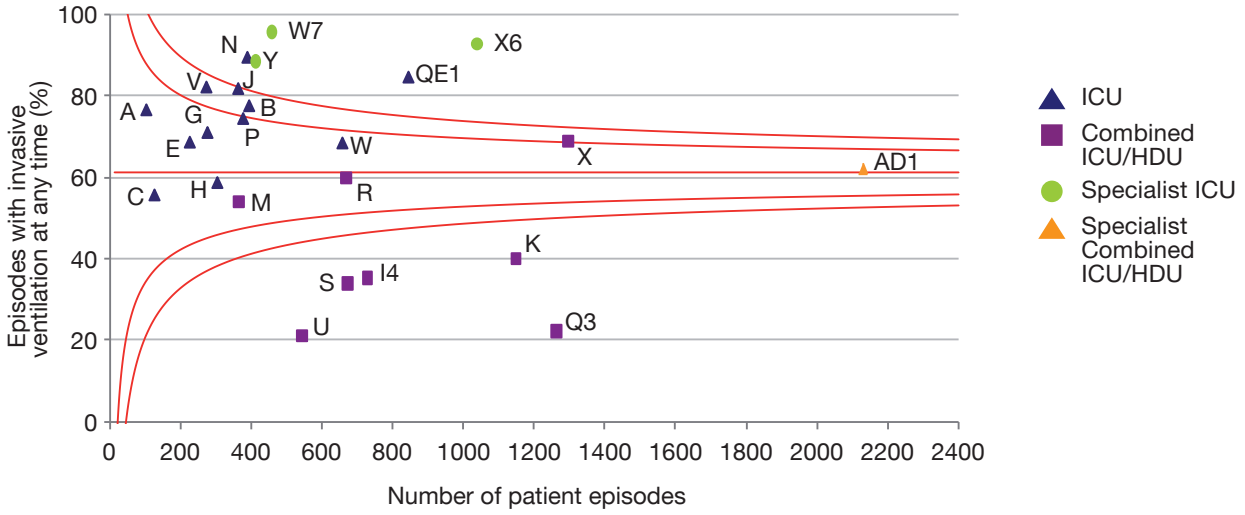
It is reassuring that this graph shows that the highest level of care required for the majority of HDU episodes is at the appropriate level, with 67% of patients at level 2 or higher. There is variation in the pattern of the highest level of care demonstrating the heterogeneous nature of HDUs.

Unit B4 (VHK RHDU) has 60% of its patients at level 3. This is a specialist renal HDU and may well have staffing implications for safe care.

The proportion of HDU episodes requiring only level 0 (ward level) care has stayed static since 2012 at 6% and likely represents downstream bed availability which remains an issue in critical care.

4.2 Respiratory support

Figure 36 Invasive ventilation in ICU and combined units (2016)

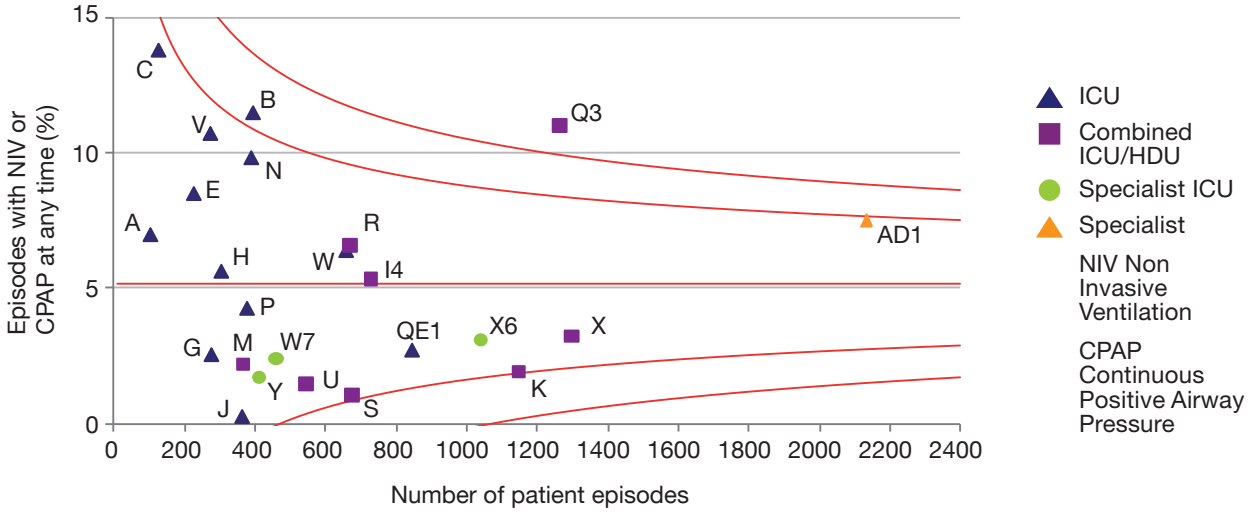


The Scottish percentage average of patients requiring invasive ventilation was 60% in 2016.

The Specialist units are again invasively ventilating a statistically significantly higher numbers of patients-but this is entirely appropriate. Units N (NWD ICU) and QE1 (QEU ICU) are also ventilating statistically significantly higher numbers compared to other units in Scotland.

The lower area of the graph is dominated by the combined units.

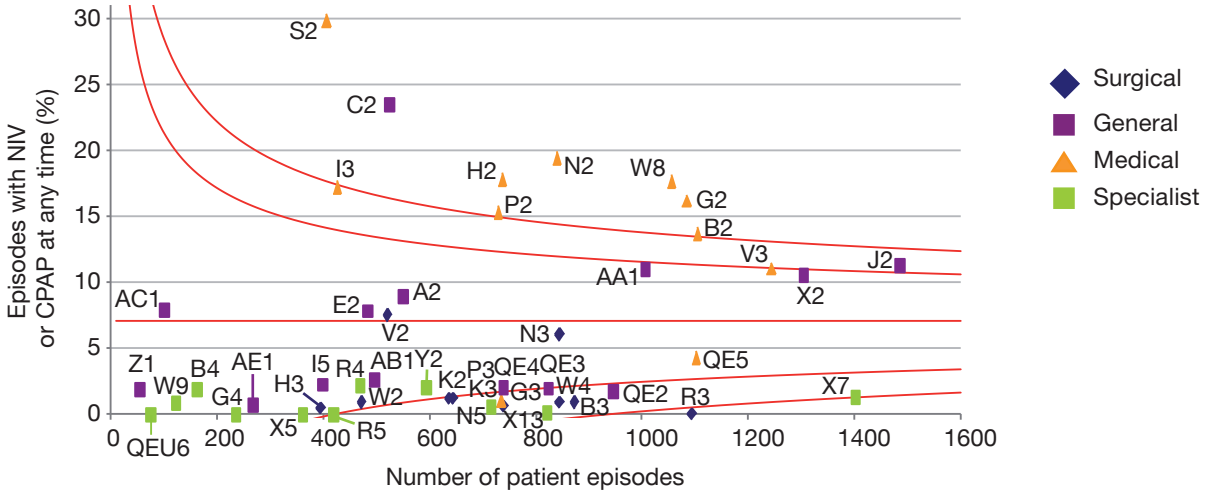
Figure 37 NIV and CPAP rates in ICU and combined units (2016)



The incidence of this method of respiratory support remains low in ICU and combined units, at around 5% in 2016, with combined units dominating the lower part of the chart.

Unit Q3 (FVRH combined) have a significantly higher percentage of patient episodes receiving this method of respiratory support.

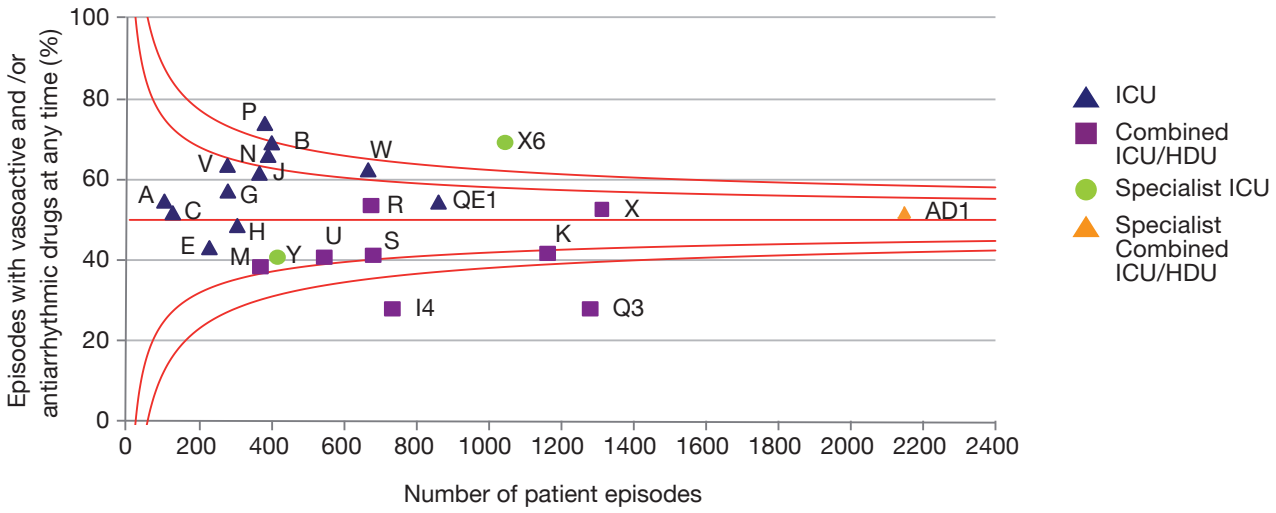
Figure 38 NIV and CPAP rates in HDU (2016)



The proportion of admissions to HDU who received NIV (Non Invasive Ventilation) and/or CPAP (Continuous Positive Airway Pressure) has remained the same since 2012 at 7%. The top of the chart is dominated by medical HDUs as would be expected.

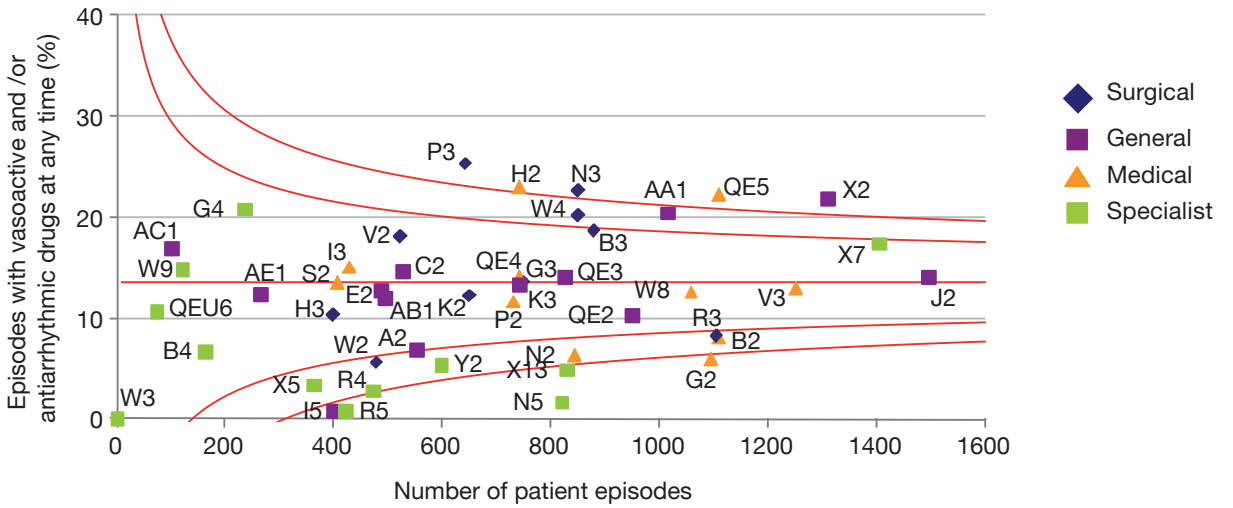
4.3 Cardiovascular support

Figure 39 Use of vasoactive and/or antiarrhythmic drugs in ICU and combined units (2016)



The proportion of patient episodes with vasoactive and/or antiarrhythmic drugs in ICU and combined units in 2016 is 50%, similar to the percentage reported in previous years. Unit P (RGM ICU) appears different from the other general units in Scotland for the first time. X6 (RIE ICU) is a specialist ICU.

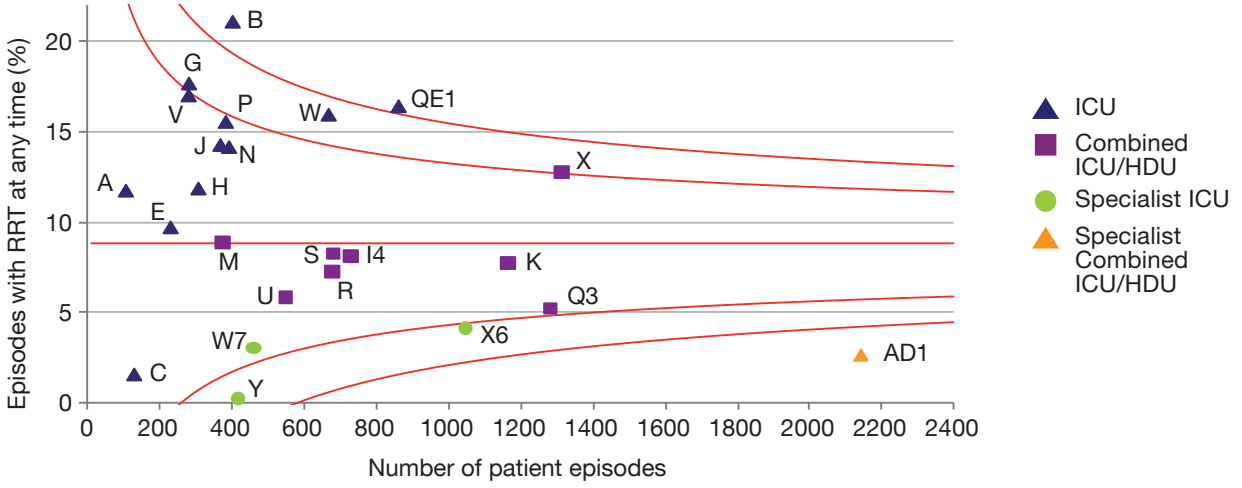
Figure 40 Use of vasoactive and/or antiarrhythmic drugs in HDU (2016)



Use of vasoactive and/or antiarrhythmic drugs in HDU has remained at a similar level to last year 14%.

4.4 Renal support

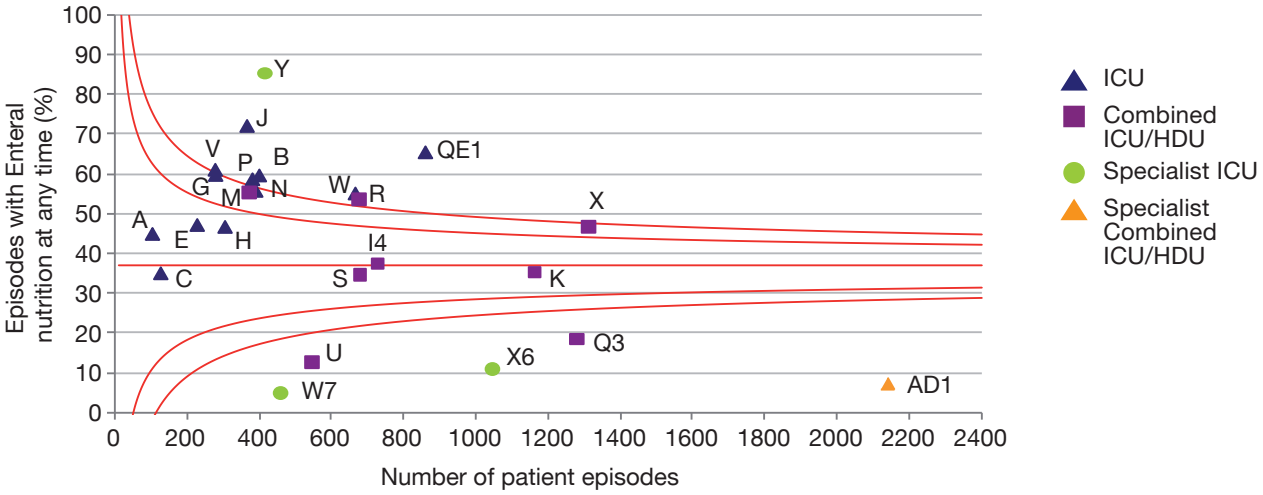
Figure 41 Renal replacement therapy in ICU and combined units (2016)



The provision of Renal Replacement Therapy (RRT) across Scotland appears static at 8-9% since 2014.

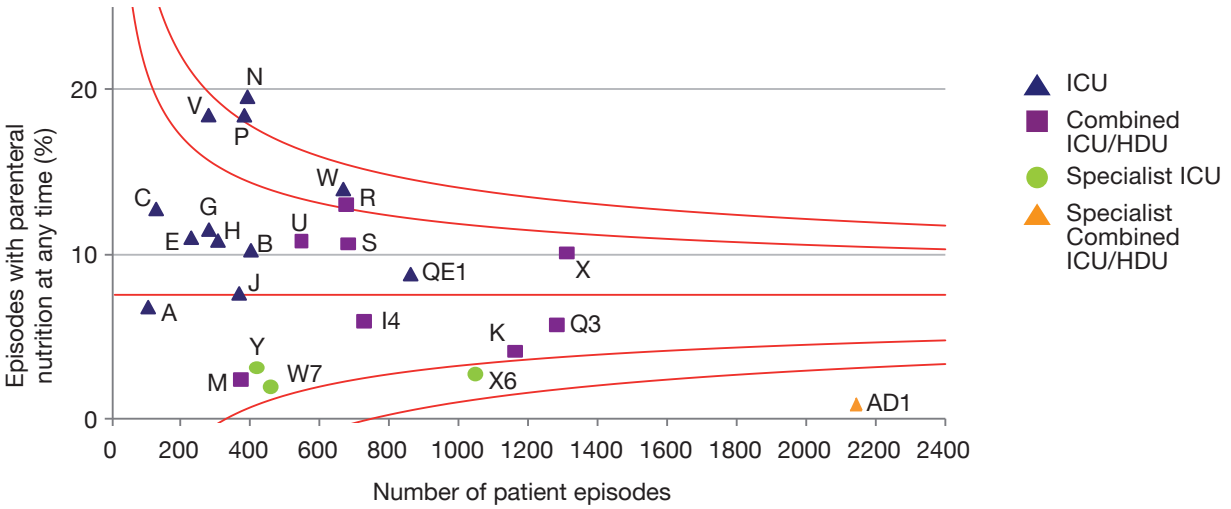
4.5 Nutrition

Figure 42 Enteral nutrition in ICU and combined units (2016)



The provision of enteral nutrition in Scottish ICUs was 37% in 2016 - slightly down from 39% in 2015.

Figure 43 Parenteral nutrition in ICU and combined units (2016)



The provision of parental nutrition in Scottish ICUs was 8% in 2016. Units P (RGM ICU) and N (NWD ICU) appear different than other units in Scotland with a higher rate of parenteral nutrition.

Section 5 Surveillance of HAI in Intensive Care Units

5.1 Data collection and patient population

Data collected for the national HAI surveillance programme are presented in this section. Surveillance data were collected from adult patients (16 years or over) admitted to all participating ICUs between 01/01/2016 and 31/12/2016, with a stay of more than two days in ICU. It is noted that this represents a different patient population than that presented in the other sections of this report. All infections reported were identified in accordance with the European Centre for Disease Prevention and Control (ECDC) surveillance methodology[7]. For the purpose of this report, all units including the combined units will be referred to as ICU.

During 2016, a total of 21 units submitted data to the national ICU surveillance programme. The cardiothoracic unit at Golden Jubilee National Hospital began contributing data to the national surveillance programme in 2016 and the ICU at Ayr Hospital did not contribute data during this period. Therefore, the case-mix has altered from 2015 and this has impacted on the ability to make year on year comparisons of data contributed during 2016. Where year on year comparisons are made, analysis makes consideration of some changes in the units participating and in the case mix, however comparisons must be made with caution.

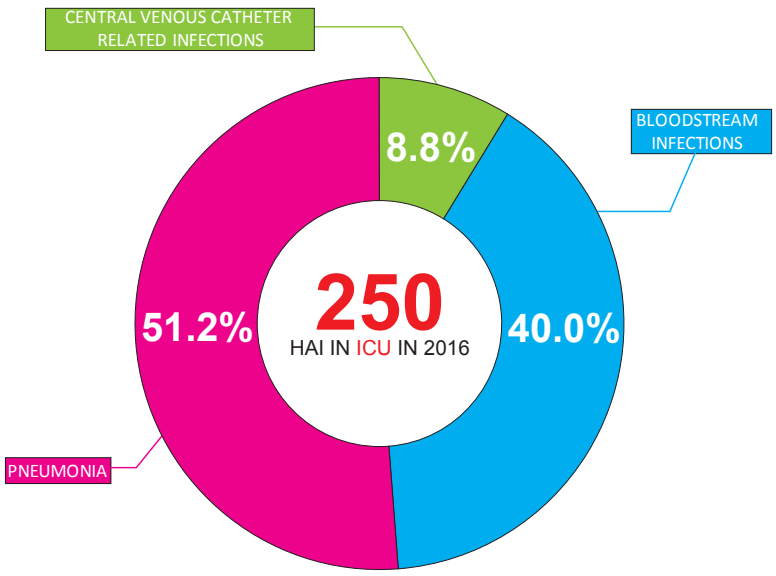
Healthcare Associated Infections

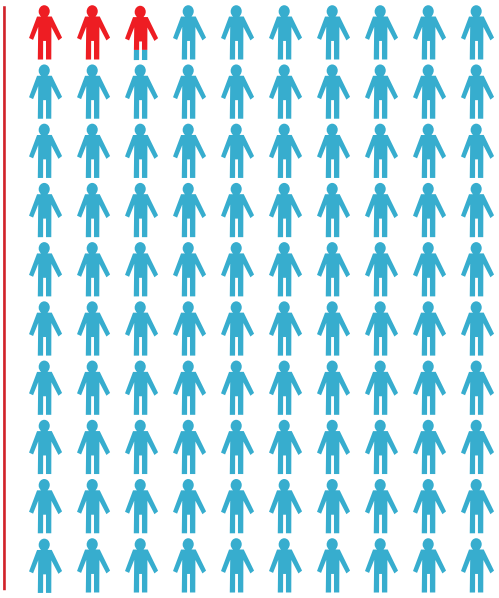
BSI	Bloodstream Infection
CLABSI	Central Line Associated Bloodstream Infection Patient had a BSI and central line *in situ* on the day of onset or in the 48 hours prior to the day of onset and where there was no infection with the same organism at another site
CRI	Catheter-Related Infection Local infection at the insertion site or clinical symptoms that improve on removal of central line
CR-BSI	Catheter-Related Bloodstream Infection Microbiologically confirmed central line related BSI
VAP	Ventilator Associated Pneumonia Pneumonia where an invasive respiratory device was present preceding infection
PN	Pneumonia

HAI in Intensive Care Units

HAI IN ICU IS A PRIORITY FOR SURVEILLANCE; PREVALENCE OF HAI IN ICU IS HIGHER THAN IN OTHER AREAS WITHIN THE ACUTE SETTING, THIS PATIENT GROUP IS AT INCREASED RISK OF INFECTION.

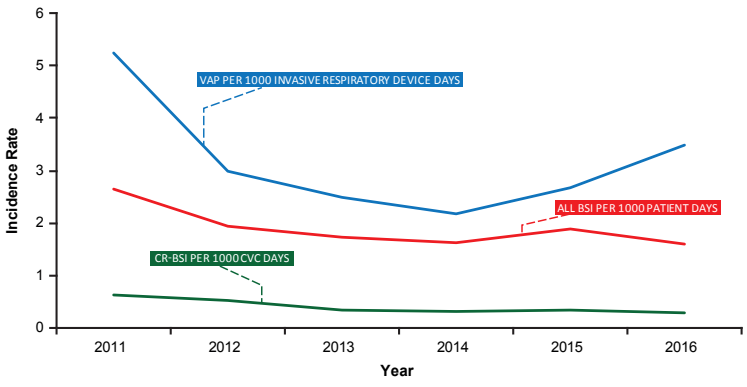
RELATIVE FREQUENCY OF HAI TYPE COLLECTED DURING 2016





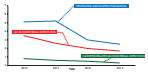
2.7% INCIDENCE OF HAI IN ICUs IN 2016.

INCIDENCE RATES OF HAI IN ICUs, 2011 TO 2016



THE INCIDENCE OF VENTILATOR ASSOCIATED PNEUMONIA HAS INCREASED SINCE 2014, THE POSSIBLE REASONS FOR THIS WILL BE INVESTIGATED AND FED BACK TO THE CRITICAL CARE COMMUNITY.

QUALITY IMPROVEMENT AND INTERVENTIONS TO REDUCE HAI IN CRITICAL CARE

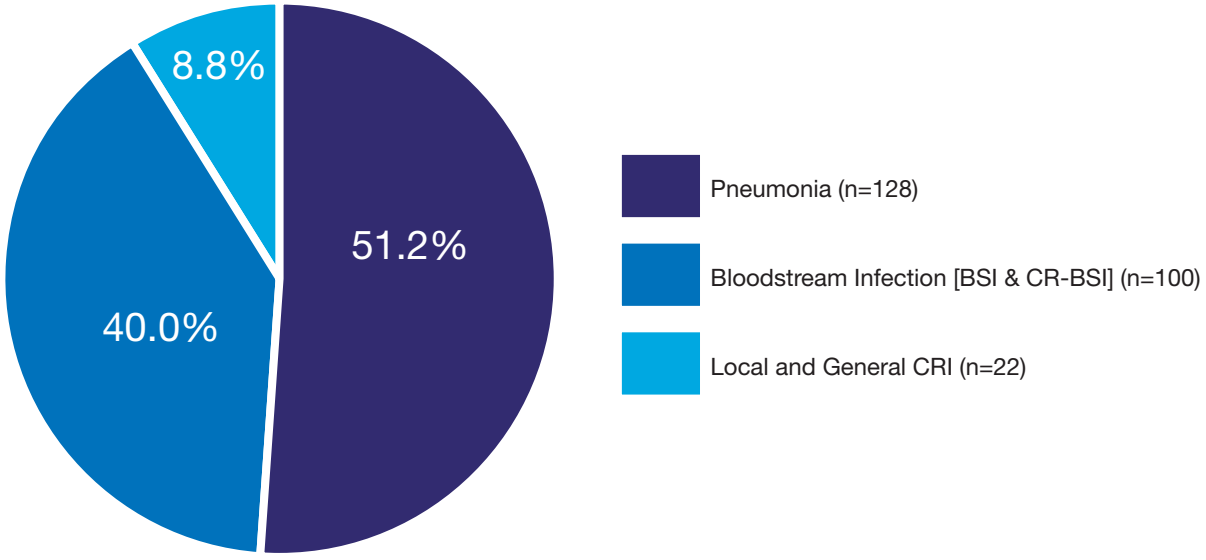


- CONTINUE TO UTILISE EXISTING APPROACHES TO INFECTION PREVENTION AND USE LOCALLY FOR IMPROVEMENT.
- VALIDATION OF SURVEILLANCE DATA WILL IDENTIFY OUTLIERS AND FACILITATE THE OPPORTUNITY FOR UNITS TO LEARN FROM ONE ANOTHER IN TERMS OF COLLECTING DATA AND REDUCING INFECTION.

5.2 The epidemiology of HAI in intensive care

Data were collected from 8455 patients and in total 250 infections were reported from 232 patients (2.7%, 95% Confidence Interval (CI): 2.4 - 3.1). As shown in Figure 44, 51.2% of infections were PN, 40.0% were BSI and 8.8% were Local and General CRI.

Figure 44 Percentage of each HAI type reported (n=250)



Pneumonia

A total of 128 pneumonia were reported from 122 (1.4%, 95% CI: 1.2 - 1.7) patients and the incidence of all pneumonia was 2.1 per 1000 patient days. A total of 119 (93.0%) were considered to be Ventilator Associated Pneumonia (VAP)§ and the remaining nine (7.0%) had no invasive respiratory device present in the 48 hours preceding the onset of infection. The incidence rates for pneumonia are summarised in Table 13.

Table 13 Incidence of pneumonia

Invasive respiratory device present¶	Number of pneumonia	Incidence (95% Confidence Intervals)
Yes (VAP)§	119	3.5 per 1000 invasive device days¶ (2.9-4.2)
No (non-VAP)	9	0.1 per 1000 patient days (0.1-0.3)
All	128	2.1 per 1000 patient days (1.2-2.4)

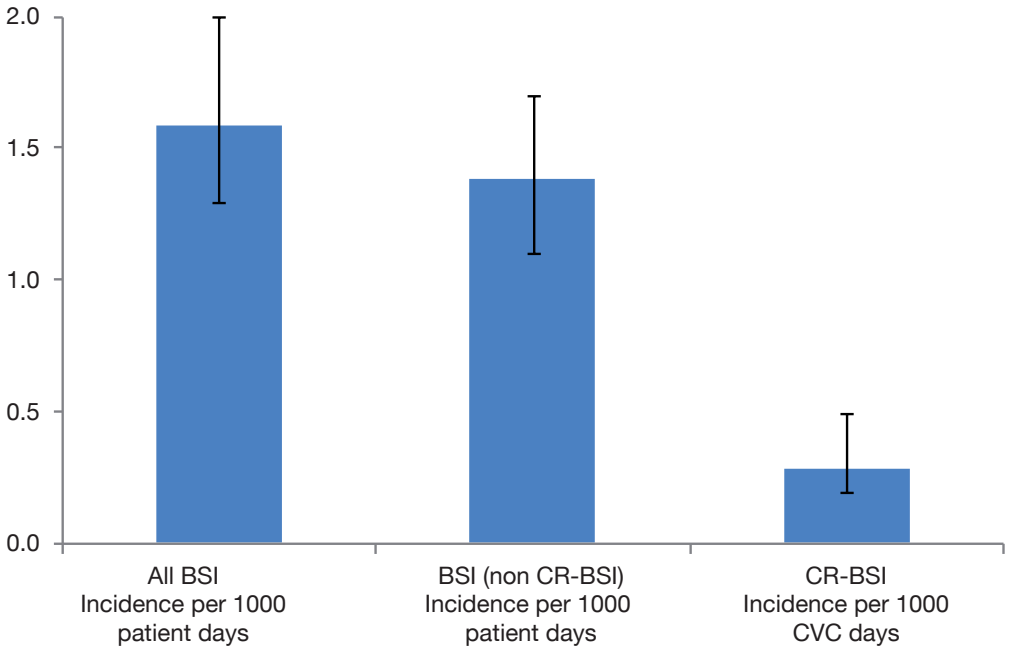
§ Infections were considered to be VAP if the patient had an invasive respiratory device present in the 48 hours preceding the onset of infection.

¶ Invasive respiratory device present in the 48 hours preceding the onset of infection.

Bloodstream Infections (BSI)

A total of 100 BSI were reported from 100 patients, (1.2%, 95% CI: 1.0 - 1.4) and the incidence of all BSI was 1.6 per 1000 patient days. Of the BSI reported, 14 (14.0%) were CR-BSI and the incidence of CR-BSI was 0.3 per 1000 central venous catheter (CVC) days. The incidence of BSI (not including CR-BSI) was 1.4 per 1000 patient days. Figure 45 shows the incidence of all BSI, CR-BSI and non CR-BSI.

Figure 45 Incidence of BSI and CR-BSI

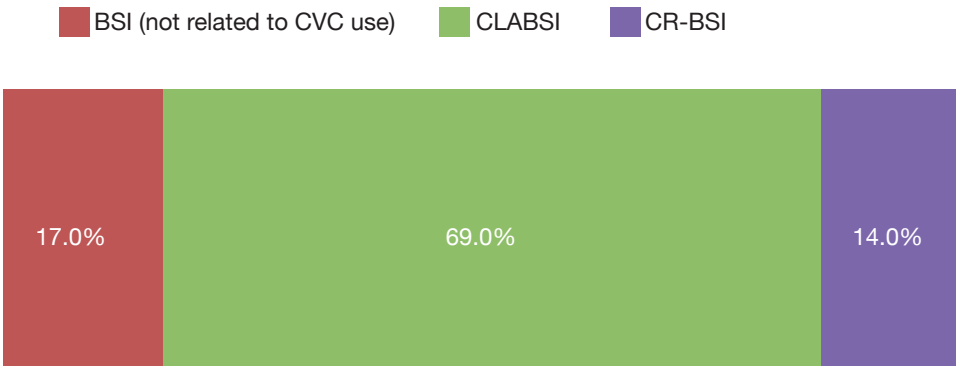


Bloodstream infections with evidence of CVC use prior to infection: Central Line Associated BSI (CLABSI)

Bloodstream infections with evidence of CVC use prior to infection have been classified as CLABSI. This is not a definition within the ECDC protocol and is presented to provide an indication of the incidence of BSI occurring where a CVC is present or where there has been recent CVC use. A CVC is considered to be present around the time of infection if it is *in situ* at the time of infection onset or had been removed within the 48 hours prior to infection onset and the causative organism was not isolated from another infection site.

Of the 86 BSI (not reported as CR-BSI), 69 (80.2%) had a CVC present around the time of infection and therefore met the criteria for CLABSI, the remaining 17 BSI had no evidence of CVC use. Figure 46 shows the relative proportions of BSI, CLABSI and CR-BSI and this suggests that 83 (83%) of all BSI reported had evidence of CVC use at the time of infection. The incidence of BSI with evidence of CVC use (CLABSI (n=69) + CR-BSI (n=14) was 1.8 per 1000 CVC days (95% CI: 1.4 - 2.2).

Figure 46 The distribution of BSI, CLABSI and CR-BSI



CVC related infection (not including CR-BSI)

In total, 22 Local and General CRI were reported, the incidence density of CRI was 0.5 per 1000 CVC days, (95% CI: 0.3 - 0.7).

Year on year comparison of micro-organisms isolated from HAI

The distribution of the top ten organisms isolated from pneumonia and BSI in 2015 and 2016 are shown in Figures 47 and 48. The number of organisms is small and therefore any variation should be interpreted with caution.

Figure 47 The distribution of the top ten micro-organisms isolated from pneumonia in 2016 and the corresponding distribution of these organisms on 2015

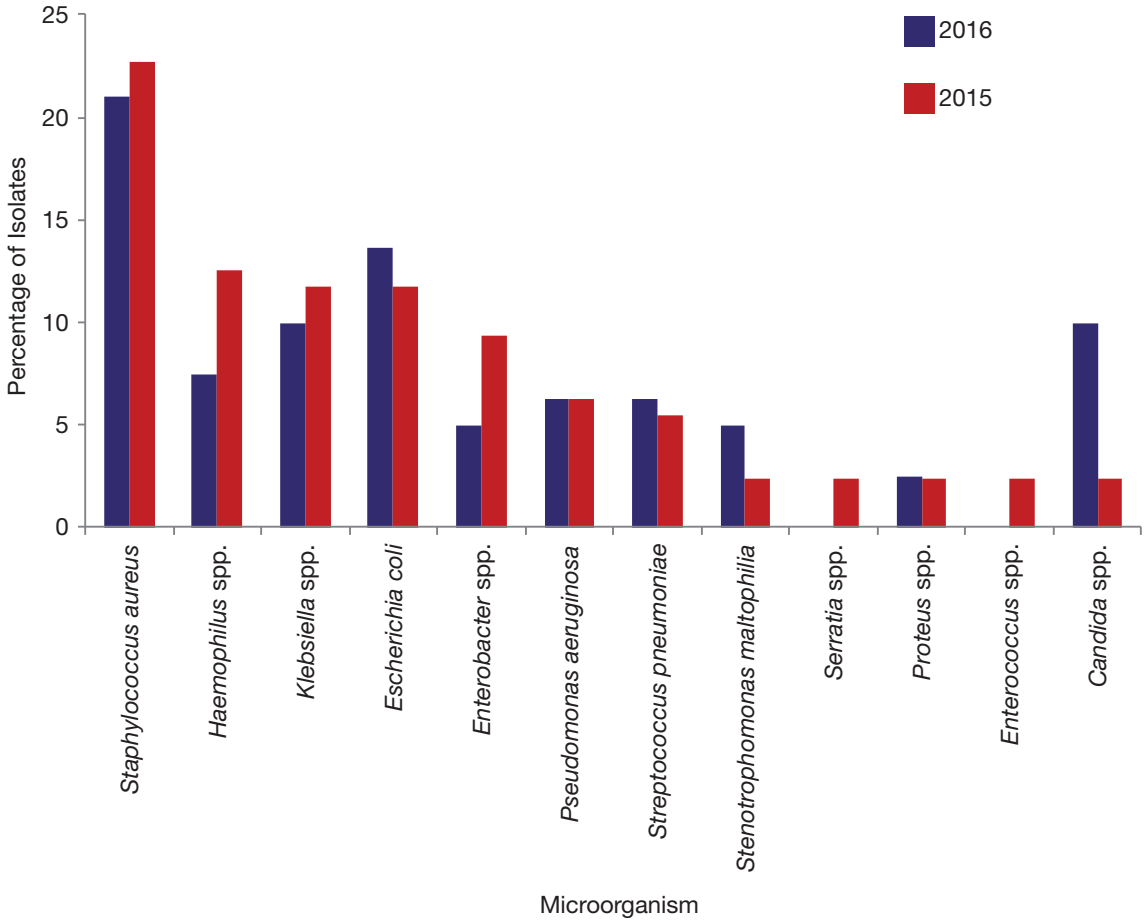
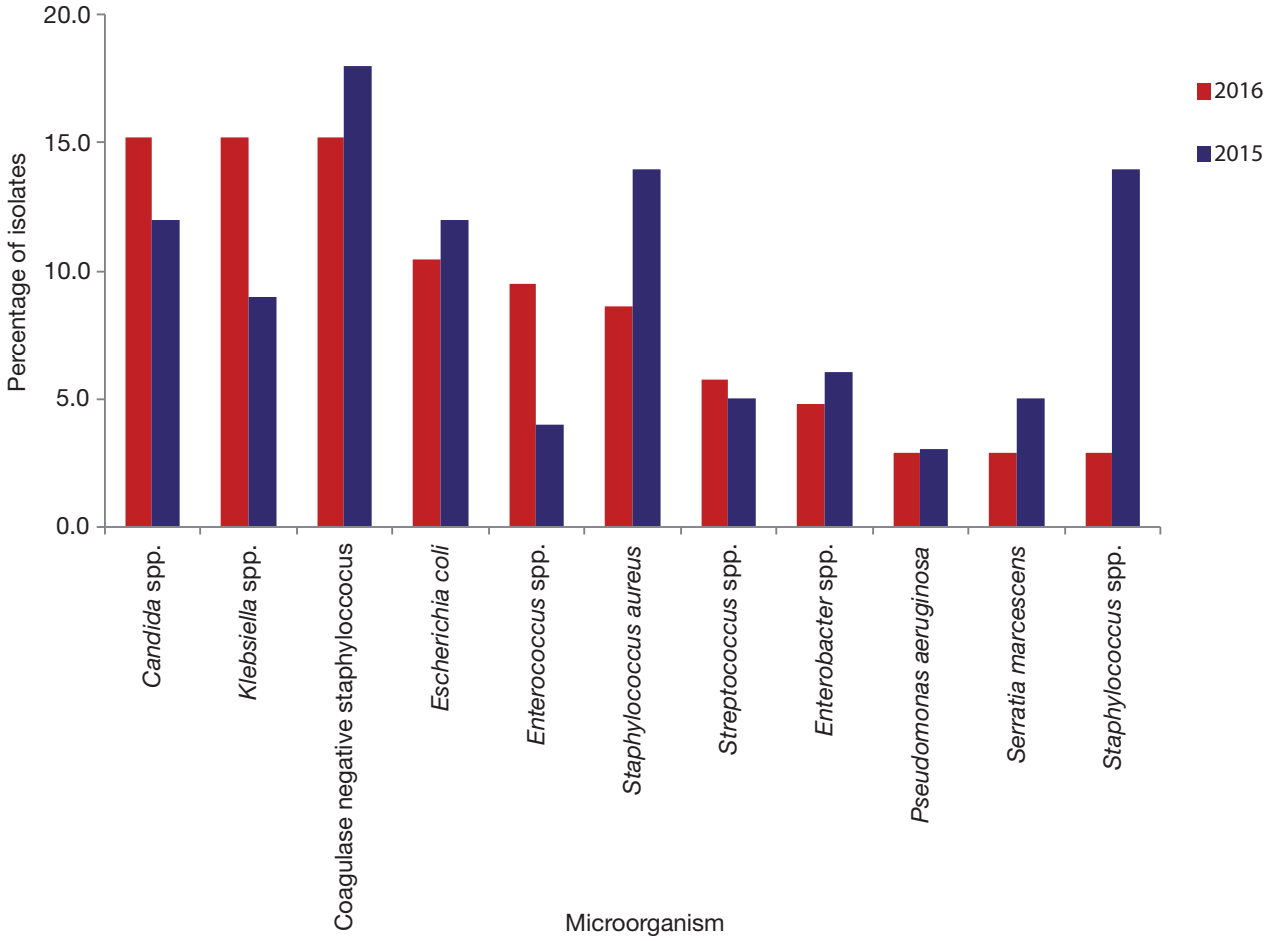


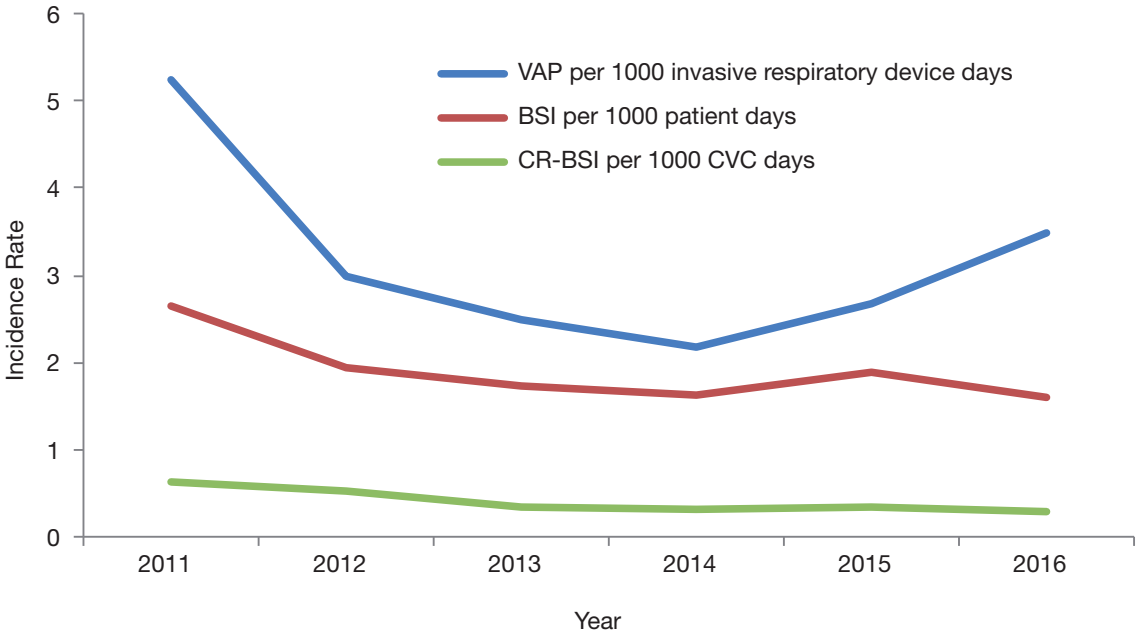
Figure 48 The distribution of the top ten micro-organisms isolated from BSI in 2016 and the corresponding distribution of these organisms on 2015



Year on year comparisons

Figure 49 shows the incidence of VAP, BSI and CR-BSI from 2011 to 2016. The data collected in 2016 indicate that there has been no change in the incidence of BSI or CR-BSI. Analysis of VAP rates show that there has been an increase between 2014 and 2016 (26.6% change year on year, p=0.002). With regards to the change in the units contributing to the dataset, this significant increase is evident when GJNH and Ayr Hospital data are excluded from the 2014-2016 datasets.

Figure 49 Incidence rates of BSI, VAP and CR-BSI, 2011-2016



At this time, it is not possible to explain the reason for this increase in VAP. Possible reasons include changes to units contributing to the dataset which may have resulted in an altered case-mix, better reporting of VAP, a true increase in infection or changes in practice. Further analysis of data and feedback from medical staff in ICU will be required to identify the potential reasons for this increase. A planned data validation exercise will also provide valuable insight into these changing rates.

The recently published Scottish Point Prevalence Survey carried out in 2016 found the prevalence of HAI in ICU to be 11.4%, this is compared to 4.6% of all acute adult patients[3]. Thus, indicating that HAI remains a priority for ICU. ICUs should continue to focus on robust data collection and using HAI data locally to minimise infection and improve patient care.

Conclusion

The information contained in this report is encouraging. Most importantly, there has been a continued small but steady improvement in the number of patients surviving ICU in Scotland. Uniquely among other national audits it covers all the ICUs and combined units in Scotland and a high and increasing percentage of HDUs and obstetric HDUs. The information contained here is highly representative of the entirety of Scottish critical care. The report therefore can give confidence to local communities, patients and professionals that there are no poorly performing ICUs or combined units in Scotland.

However, there are still challenges. The changing pattern of health service provision and increased ward bed utilization means that limited critical care beds are occupied by ward level patients, and that more patients are discharged out of hours. This has implications for both emergency patients and planned admissions (usually for elective surgery).

Finally we report this year of the first time on the new and updated Minimum Standards and Quality Indicators[2] for critical care. We recognise that these are stretching and remain aspirational for many units. There is however a widely held belief within the critical care community that this type of process audit will over time lead to reduced variation in practice and improved outcomes for patients.

Stephen Cole

Intensive Care Consultant

SICSAG Chair

Appendix 1 ICU Unit profiles

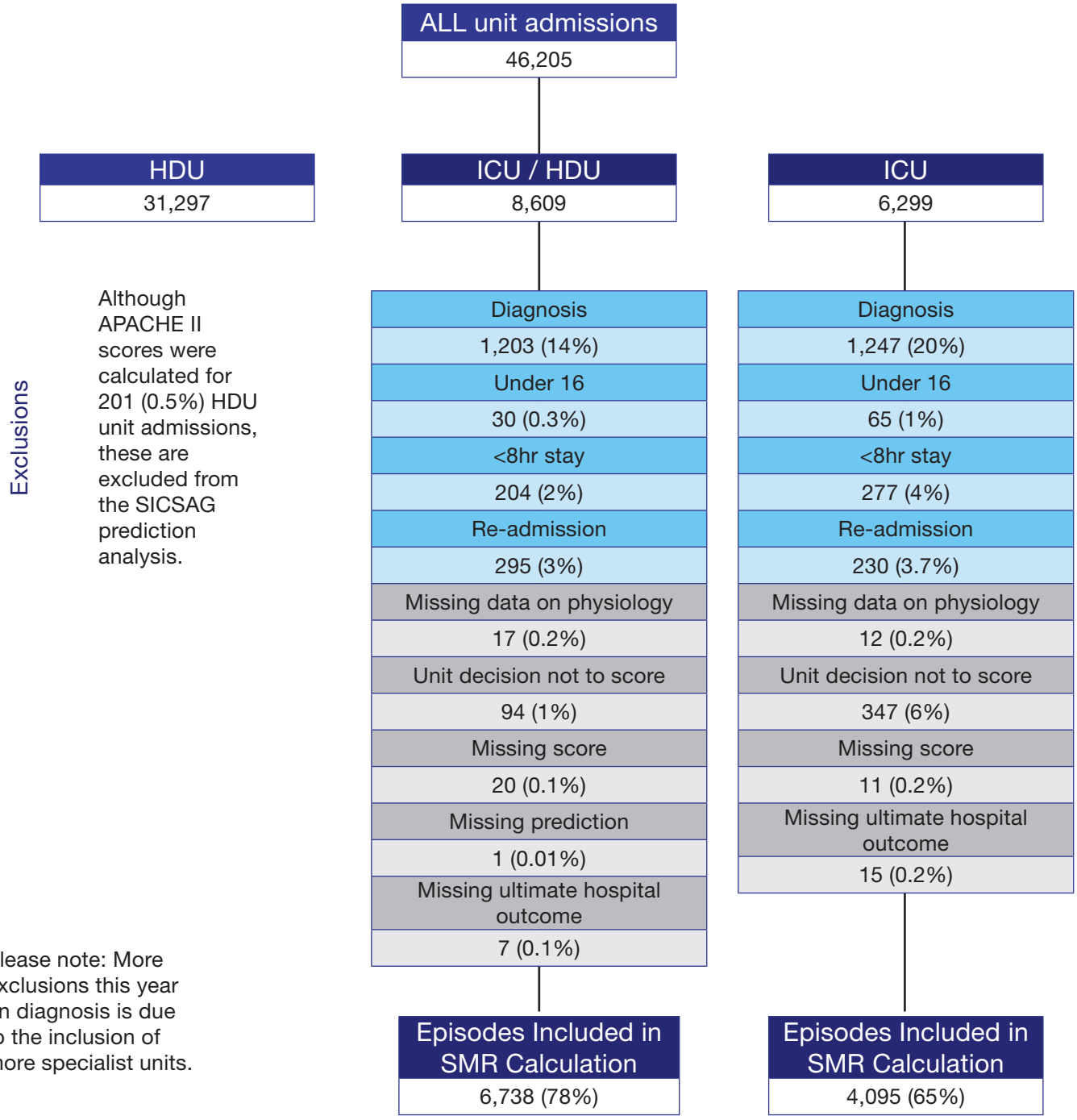
Capacity and multi-disciplinary team information		
Hospital	**Microbiologist**	**Dietetic review available**
ARI General	everyday	weekdays
ARI Cardio	On call as needed	weekdays
AYR	On call as needed	weekdays
Crosshouse	everyday	weekdays
BGH	weekdays	weekdays
DGRI	Phone service at weekends	weekdays
VHK	Phone service at weekends	weekdays
FVRH	everyday	weekdays
QEU	everyday	weekdays
GRI	everyday	weekdays
IRH	other	weekdays
RAH	weekdays	weekdays
SGH Neuro	everyday	weekdays
Raigmore	other	weekdays
Hairmyres	everyday	weekdays
MDGH	weekdays	weekdays
Wishaw	everyday	weekdays
RIE General	everyday	weekdays
RIE Cardio	weekdays	weekdays
SJH	weekdays	other
WGH	everyday	weekdays
Ninewells	everyday	weekdays
PRI	everyday	weekdays
GJNH	everyday	weekdays

Appendix 2 HDU profiles 2015

Hospital	Dedicated HDU Consultant	Microbiologist	Dietetic review available
Ayr HDU	Other	Weekdays only	Weekdays only
Crosshouse SHDU	Other	Other	Other
Crosshouse MHDU	Weekdays only	Other	Weekdays only
DGRI SHDU	Other	Other	Weekdays only
DGRI MHDU	Other	Other	Weekdays only
VHK SHDU	Weekdays only	Other	Weekdays only
VHK MHDU	Weekdays only	Other	Everyday
VHK RHDU	No	Other	Weekdays only
ARI SHDU (Ward 503)	Other	Not applicable	Weekdays only
ARI SHDU (Ward 503)	Other	Not applicable	Weekdays only
ARI SHDU	Everyday	Other	Weekdays only
ARI OHDU	Other	Other	Weekdays only
Dr Gray's HDU	No	Other	Weekdays only
GRI SHDU	Everyday	Other	Weekdays only
GRI MHDU	Everyday	Weekdays only	Weekdays only
GRI OHDU	Other	Other	Other
QEU HDU1	Everyday	Other	Weekdays only
QEU HDU2	Weekdays only	Other	Weekdays only
QEU HDU5	Weekdays only	Other	Weekdays only
QEU OHDU	Everyday	Not applicable	Weekdays only
QEU HDU6	Everyday	Weekdays only	Weekdays only
IRH HDU	No	Other	Weekdays only
RAH HDU	No	Other	Other
SGH NHDU	Other	Weekdays only	Weekdays only
Raigmore SHDU	Other	Other	Weekdays only
Raigmore MHDU	Other	Other	Weekdays only
Belford HDU	Other	Other	Other
Hairmyres MHDU	Everyday	Other	Weekdays only
MDGH MHDU	Other	Other	Weekdays only
MDGH SHDU (LEVEL 1)	Other	Other	Other
Wishaw SHDU	Other	weekdays only	weekdays only
Wishaw MHDU	Other	Other	Weekdays only
RIE HDU	Everyday	Weekdays only	Weekdays only
RIE R&T HDU	Other	Weekdays only	Weekdays only
RIE CHDU	Everyday	Weekdays only	Other
WGH SHDU	Other	Other	Weekdays only
WGH NHDU/NHDU (level 1)	Weekdays only	Available by phone	Other
Balfour Hospital HDU	Everyday	Not applicable	Weekdays only
GBH HDU	Weekdays only	Other	Weekdays only
Ninewells SHDU	Everyday	Everyday	Weekdays only
Ninewells MHDU	Other	Other	Weekdays only
Ninewells OHDU	Other	Other	Weekdays only
PRI HDU	Other	Not applicable	Weekdays only
WIH HDU	Other	other	weekdays only

Key:
SHDU – Surgical HDU
MHDU – Medical HDU
NHDU – Neurological HDU
CHDU – Cardiothoracic HDU
RHDU – Renal HDU

Appendix 3 Eligibility for APACHE II scores and selection for analysis (2016)



Please note: More exclusions this year on diagnosis is due to the inclusion of more specialist units.

Appendix 4 Level of care

Level of care is calculated on a daily basis from the Augmented Care Period (ACP) page of WardWatcher.

WardWatcher scores levels of care based on support of five organ systems: respiratory, cardiovascular, renal, neurological and dermatological.

Level 3

Advanced respiratory support (connected to a ventilator via endotracheal tube (ETT) or tracheostomy) OR

Two or more organ systems are being supported (except basic respiratory and basic cardiac)

Level 2

One organ supported

Level 1

Epidural or/and

General observations requiring more monitoring than can be provided on a general ward

Level 0

A patient is assessed as level 0 if not assessed as level 1, 2 or 3 (e.g. no organ support and adequate monitoring could be provided on a general ward)

Level of care is based on the Intensive Care Society guidelines[6].

Appendix 5 HAI Reader's Notes

Confidence Intervals

A range of values within which we are fairly confident the true population value lies. A 95% CI means that we can be 95% confident that the population value lies within the lower and higher confidence limits.

Incidence for BSI and PN

Total number of BSI/PN as a proportion of the sum of the ICU in-patient days contributed by each patient in the study population. The proportion is expressed as the number of BSI/PN per 1000 patient days.

Incidence for CRI and CR-BSI

Total number of CRI/CR-BSI as a proportion of the sum of the CVC days (days that a patient had a CVC *in situ*) contributed by each patient in the study population. The proportion is expressed as the number CRI/CR-BSI per 1000 CVC days

Incidence for VAP

Total number of VAP as a proportion of the sum of the invasive respiratory device days (days that a patient required intubation) contributed by each patient in the study population. The proportion is expressed as the number VAP per 1000 invasive respiratory device days.

Appendix 6 List of abbreviations

ACP	Augmented Care Period
APACHE	Acute Physiology and Chronic Health Evaluation
BSI	Bloodstream Infection
CABG	Coronary Artery Bypass Graft
CLABSI	Central Line Associated Bloodstream Infection
COMQI	Clinical Outcome Measures for Quality Improvement
CPAP	Continuous Positive Airway Pressure
CR-BSI	Catheter Related Bloodstream Infection
CRI	CVC Related Infection
CVC	Central Venous Catheter
ECDC	European Centre for Disease Prevention and Control
HAI	Healthcare Associated Infection
HDU	High Dependency Unit
HPS	Health Protection Scotland
IAP	Intubation Associated Pneumonia
ICS	Intensive Care Society
ICU	Intensive Care Unit
ISD	Information Services Division
M & M	Morbidity and Mortality
NIV	Non Invasive Ventilation
NRS CCSG	NHS Research Scotland Critical Care Specialty Group
PN	Pneumonia
PVC	Peripheral Venous Cannula
RRT	Renal Replacement Therapy
SD	Standard Deviation
SICS	Scottish Intensive Care Society
SICSAG	Scottish Intensive Care Society Audit Group
SHA	Scottish Healthcare Audit
SMaCC	Scottish Maternity Critical Care Group
SMR	Standardised Mortality Ratio
VAP	Ventilator Associated Pneumonia
WTE	Whole Time Equivalent

List of References

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3. Health Protection Scotland. *National Point Prevalence Survey of Healthcare Associated Infection and Antimicrobial Prescribing 2016.* May 2017. Available at: http://www.hps.scot.nhs.uk/haiic/sshaip/haiprevalencestudy.aspx. Last accessed July 2017.
4. The Scottish Government. *Healthcare Quality Strategy for NHS Scotland*; 2010. Available at: http://www.scotland.gov.uk/Resource/Doc/311667/0098354.pdf. Last accessed July 2017.
5. The Scottish Government. 2020 Vision; 2012. Available at: http://www.gov.scot/Topics/Health/Policy/2020-Vision. Last accessed July 2017.
6. The Intensive Care Society. Levels of critical care for Adult Patients: 2009. Available at: http://members.ics.ac.uk/ICS/guidelines-and-standards.aspx. Last accessed July 2017.
7. European Centre for Disease Prevention and Control. *European Surveillance of Healthcare-Associated Infections in Intensive Care Units - HAI-NET ICU Protocol, version 1.02.* Stockholm: ECDC; 2015.

Acknowledgements

This report was written by the Report Writing Subgroup of the SICSAG Steering Group, in conjunction with the HAI surveillance programme at National Services Scotland.

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Abbrievation	*ICU or HDU*	*Letter*	*Health Board*
ARI Cardiothoracic HDU	HDU	W5	Grampian
ARI Cardiothoracic ICU	ICU	W7	Grampian
ARI ICU	ICU	W	Grampian
ARI MHDU	HDU	W8	Grampian
ARI Neuro HDU	HDU	W3	Grampian
ARI OHDU	HDU	W9	Grampian
ARI SHDU (31/32)	HDU	W2	Grampian
ARI SHDU (35)	HDU	W4	Grampian
Ayr HDU	HDU	E2	Ayrshire & Arran
Ayr ICU	ICU	E	Ayrshire & Arran
Balfour HDU	HDU	AE1	Orkney
Belford HDU	HDU	AC1	Highland
BGH ICU/HDU	ICU/HDU	U	Borders
Crosshouse ICU	ICU	G	Ayrshire & Arran
Crosshouse MHDU	HDU	G2	Ayrshire & Arran
Crosshouse SHDU	HDU	G3	Ayrshire & Arran
DGRI ICU	ICU	H	Dumfries & Galloway
DGRI MHDU	HDU	H2	Dumfries & Galloway
DGRI SHDU	HDU	H3	Dumfries & Galloway
Dr Grays HDU	HDU	AA1	Grampian
FVRH ICU/HDU	ICU/HDU	Q3	Forth Valley
GBH HDU	HDU	Z1	Shetland
GGH HDU	HDU	T2	Greater Glasgow & Clyde
GJNH Cardiothoracic ICU/HDU	ICU/HDU	AD1	National Waiting Times Centre
GRI ICU / HDU	ICU/HDU	K	Greater Glasgow & Clyde
GRI MDU	HDU	K3	Greater Glasgow & Clyde
GRI SHDU	HDU	K2	Greater Glasgow & Clyde
Hairmyres ICU/HDU	ICU/HDU	S	Lanarkshire
Hairmyres MHDU	HDU	S2	Lanarkshire
IRH ICU	ICU	A	Greater Glasgow & Clyde
IRH SHDU	HDU	A2	Greater Glasgow & Clyde
MDGH ICU	ICU	I	Lanarkshire
MDGH ICU/HDU	ICU	I4	Lanarkshire
MDGH Level 1	HDU	I5	Lanarkshire
MDGH MHDU	HDU	I3	Lanarkshire
MDGH SHDU	HDU	I2	Lanarkshire
Ninewells ICU	ICU	N	Tayside
Ninewells MHDU	HDU	N2	Tayside
Ninewells Obstetric HDU	HDU	N5	Tayside
Ninewells SHDU	HDU	N3	Tayside
PRI HDU	HDU	C2	Tayside
PRI ICU	ICU	C	Tayside
PRM	HDU	G4	Greater Glasgow & Clyde
QEU HDU1	HDU	QE2	Greater Glasgow & Clyde
QEU HDU2	HDU	QE3	Greater Glasgow & Clyde
QEU HDU6	HDU	QE4	Greater Glasgow & Clyde
QEU MHDU	HDU	QE5	Greater Glasgow & Clyde
QEU OHDU	HDU	QE6	Greater Glasgow & Clyde
RAH HDU	HDU	J2	Greater Glasgow & Clyde
RAH ICU	ICU	J	Greater Glasgow & Clyde
Raigmore ICU	ICU	P	Highland
Raigmore MHDU	HDU	P2	Highland
Raigmore SHDU	HDU	P3	Highland
RIE Cardiothoracic HDU	HDU	X7	Lothian
RIE Cardiothoracic ICU	ICU	X6	Lothian
RIE RTHDU	HDU	X13	Lothian
RIE HDU	HDU	X2	Lothian
RIE ICU/HDU	ICU/HDU	X	Lothian
RIE Renal HDU	HDU	X3	Lothian
RIE Transpl	HDU	X4	Lothian
RIE Vasc (Level 1)	HDU	X5	Lothian
SGH ICU	ICU	F	Greater Glasgow & Clyde
SGH Neuro HDU	HDU	Y2	Greater Glasgow & Clyde
SGH Neuro ICU	ICU	Y	Greater Glasgow & Clyde
SGH SHDU	HDU	F2	Greater Glasgow & Clyde
SJH ICU/HDU	ICU/HDU	M	Lothian
VHK ICU	ICU	B	Fife
VHK MHDU	HDU	B2	Fife
VHK Renal HDU	HDU	B4	Fife
VHK SHDU	HDU	B3	Fife
VIG SHDU	HDU	L2	Greater Glasgow & Clyde
VI ICU	ICU	L	Greater Glasgow & Clyde
WGH ICU/HDU	ICU/HDU	R	Lothian
WGH Neuro (Level 1)	HDU	R5	Lothian
WGH Neuro HDU	HDU	R4	Lothian
WGH SHDU	HDU	R3	Lothian
WIG HDU	HDU	T3	Greater Glasgow & Clyde
WIG ICU	ICU	T	Greater Glasgow & Clyde
WIH HDU	HDU	AB1	Western Isles
Wishaw ICU	ICU	V	Lanarkshire
Wishaw MHDU	HDU	V3	Lanarkshire
Wishaw SHDU	HDU	V2	Lanarkshire

Letter	*Abbrievation*	*ICU or HDU*	*Health Board*
A	IRH ICU	ICU	Greater Glasgow & Clyde
A2	IRH SHDU	HDU	Greater Glasgow & Clyde
B	VHK ICU	ICU	Fife
B2	VHK MHDU	HDU	Fife
B3	VHK SHDU	HDU	Fife
B4	VHK Renal HDU	HDU	Fife
C	PRI ICU	ICU	Tayside
C2	PRI HDU	HDU	Tayside
E	Ayr ICU	ICU	Ayrshire & Arran
E2	Ayr HDU	HDU	Ayrshire & Arran
F	SGH ICU	ICU	Greater Glasgow & Clyde
F2	SGH SHDU	HDU	Greater Glasgow & Clyde
G	Crosshouse ICU	ICU	Ayrshire & Arran
G2	Crosshouse MHDU	HDU	Ayrshire & Arran
G3	Crosshouse SHDU	HDU	Ayrshire & Arran
G4	PRM	HDU	Greater Glasgow & Clyde
H	DGRI ICU	ICU	Dumfries & Galloway
H2	DGRI MHDU	HDU	Dumfries & Galloway
H3	DGRI SHDU	HDU	Dumfries & Galloway
I	MDGH ICU	ICU	Lanarkshire
I2	MDGH SHDU	HDU	Lanarkshire
I3	MDGH MHDU	HDU	Lanarkshire
I4	MDGH ICU/HDU	ICU	Lanarkshire
I5	MDGH Level 1	HDU	Lanarkshire
J	RAH ICU	ICU	Greater Glasgow & Clyde
J2	RAH HDU	HDU	Greater Glasgow & Clyde
K	GRI ICU / HDU	ICU/HDU	Greater Glasgow & Clyde
K2	GRI SHDU	HDU	Greater Glasgow & Clyde
K3	GRI MDU	HDU	Greater Glasgow & Clyde
L	VI ICU	ICU	Greater Glasgow & Clyde
L2	VIG SHDU	HDU	Greater Glasgow & Clyde
M	SJH ICU/HDU	ICU/HDU	Lothian
N	Ninewells ICU	ICU	Tayside
N2	Ninewells MHDU	HDU	Tayside
N3	Ninewells SHDU	HDU	Tayside
N5	Ninewells Obstetric HDU	HDU	Tayside
P	Raigmore ICU	ICU	Highland
P2	Raigmore MHDU	HDU	Highland
P3	Raigmore SHDU	HDU	Highland
Q3	FVRH ICU/HDU	ICU/HDU	Forth Valley
QE2	QEU HDU1	HDU	Greater Glasgow & Clyde
QE3	QEU HDU2	HDU	Greater Glasgow & Clyde
QE4	QEU HDU6	HDU	Greater Glasgow & Clyde
QE5	QEU MHDU	HDU	Greater Glasgow & Clyde
QE6	QEU OHDU	HDU	Greater Glasgow & Clyde
R	WGH ICU/HDU	ICU/HDU	Lothian
R3	WGH SHDU	HDU	Lothian
R4	WGH Neuro HDU	HDU	Lothian
R5	WGH Neuro (Level 1)	HDU	Lothian
S	Hairmyres ICU/HDU	ICU/HDU	Lanarkshire
S2	Hairmyres MHDU	HDU	Lanarkshire
T	WIG ICU	ICU	Greater Glasgow & Clyde
T2	GGH HDU	HDU	Greater Glasgow & Clyde
T3	WIG HDU	HDU	Greater Glasgow & Clyde
U	BGH ICU/HDU	ICU/HDU	Borders
V	Wishaw ICU	ICU	Lanarkshire
V2	Wishaw SHDU	HDU	Lanarkshire
V3	Wishaw MHDU	HDU	Lanarkshire
W	ARI ICU	ICU	Grampian
W2	ARI SHDU (31/32)	HDU	Grampian
W3	ARI Neuro HDU	HDU	Grampian
W4	ARI SHDU (35)	HDU	Grampian
W5	ARI Cardiothoracic HDU	HDU	Grampian
W7	ARI Cardiothoracic ICU	ICU	Grampian
W9	ARI OHDU	HDU	Grampian
W8	ARI MHDU	HDU	Grampian
X	RIE ICU/HDU	ICU/HDU	Lothian
X2	RIE HDU	HDU	Lothian
X3	RIE Renal HDU	HDU	Lothian
X4	RIE Transpl	HDU	Lothian
X5	RIE Vasc (Level 1)	HDU	Lothian
X6	RIE Cardiothoracic ICU	ICU	Lothian
X7	RIE Cardiothoracic HDU	HDU	Lothian
X13	RIE RTHDU	HDU	Lothian
Y	SGH Neuro ICU	ICU	Greater Glasgow & Clyde
Y2	SGH Neuro HDU	HDU	Greater Glasgow & Clyde
Z1	GBH HDU	HDU	Shetland
AA1	Dr Grays HDU	HDU	Grampian
AB1	WIH HDU	HDU	Western Isles
AC1	Belford HDU	HDU	Highland
AD1	GJNH Cardiothoracic ICU/HDU	ICU/HDU	National Waiting Times Centre
AE1	Balfour HDU	HDU	Orkney

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