Intensive care DSS

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Intensive care DSS

Identifying and definitional attributes

Metadata item type:	Data Set Specification
METEOR identifier:	316130
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DSS type:	Data Set Specification (DSS)

Scope:

The Intensive care data set specification (IC DSS) is a core data set collected from episodes of patient care within intensive care units (ICUs). It contains the minimum data elements required by the Australian and New Zealand Intensive Care Society (ANZICS) Adult Patient Database. This database is maintained by ANZICS and sponsored through AHMAC. Data are collected for all patients admitted to dedicated intensive care units in participating public acute and private hospitals.

This data set is primarily concerned with the collection of intensive care data from individual patients. It was developed to provide basic demographic, length of stay and outcome information. The physiological variables were selected to support risk adjusted outcomes based on the Acute Physiology Assessment and Chronic Health Evaluation (APACHE) and Simplified Acute Physiology Score (SAPS) systems.

A calculation of score is made based on the physiological and other data recorded to describe the severity of illness of a person and to estimate the probability of death. Three scores are used in the Intensive care DSS.

APACHE II

The point score ranging from 0-71 is generated by adding together the weight points scored from 12 acute physiological values, a chronic health evaluation at hospital admission, source of ICU arrival, and age group.

APACHE III

The point score ranging from 0 to 299 is generated using the APACHE III severity of disease classification system. The score is validated by a relationship between the score and the probability of death for a diagnosis.

The point score is generated by adding together the weight points scored from 17 acute physiological values, a chronic health evaluation at hospital admission and age group.

SAPS

The point score is generated using the SAPS severity of disease classification system.

The SAPS II score is generated from 12 physiological variables, age, source of ICU arrival and three variables relating to AIDS, haematological malignancy and metastatic cancer.

The physiological data is collected as the 'worst values in first 24 hours of ICU stay'. The collection of detail on chronic health conditions and reason for entry to an intensive care unit (ANZICS diagnosis codes) allows case mix adjustment and the use of prognostic models to predict risk of death for groups of patients. Clinicians are able to use pooled data from the central database for comparative audit and assessment of outcomes from intensive care.

Reports generated from the database help provide individual ICUs and healthcare providers with a greater understanding of intensive care workload and practice.

Quality of care (length of stay, risk adjusted outcome) delivered is benchmarked against comparable units and international standards. In this way the dataset allows the monitoring of individual unit, state and national trends, epidemiological research and supports ongoing improvement in safety and quality in intensive care.

The data is also used by a wider range of healthcare providers, particularly those responsible for the delivery of health care within the tertiary hospital system.

Health departments are supportive of contributions to the database but submission is voluntary. Contribution to the ANZICS Adult Patient Database by ICUs is an ACHS clinical indicator and is advocated in the private sector by several insurers.

In addition to the data elements in this DSS, ANZICS collects further data items, namely Intensive care diagnosis codes. These codes can be referred from ANZICS APD Data Dictionary that can be viewed or downloaded by clicking the link http://www.anzics.com.au/core/data-collection-tools.

Collection and usage attributes

Statistical unit: Episodes of care for admitted patients that include care provided in an intensive care unit.

Collection methods: Data are collected at each intensive care unit from administrative and clinical record systems. This data is then submitted to the central database.

Source and reference attributes

Submitting organisation: ANZICS Database Management Committee

Metadata items in this Data Set Specification

Seq No.	Metadata item	Obligation	Max occurs
-	Episode of admitted patient care—admission date, DDMMYYYY	Mandatory	1
	DSS specific information:		
	Admission date ≤ separation date.		
	Admission date ≥ date of birth.		
	Date on which the patient was admitted to the hospital that includes the current episode of intensive care, i.e		
	Admission date ≤ Intensive care episode start date.		
-	Episode of admitted patient care—admission mode, code N	Mandatory	1
-	Episode of admitted patient care—admission time, hhmm	Mandatory	1
-	Episode of admitted patient care—separation date, DDMMYYYY	Mandatory	1
-	Episode of admitted patient care—separation mode, code N	Mandatory	1
	DSS specific information:		
	Outcome measure required for the calculation of the APACHE II, APACHE III and SAPS II standardised mortality ratios. Is used to calculate hospital mortality.		

Seq No.	Metadata item	Obligation	Max occurs
-	Episode of intensive care—elective indicator, yes/no code N	Mandatory	1

DSS specific information:

Used in the calculation of APACHE II, APACHE III and SAPS II scores.

For the APACHE scoring systems, this data element is used with the mode of entry to ICU to determine the number of chronic health points assigned where chronic co morbidities exist at hospital admission.

For the APACHE II score, the point score weighting allocated for a elective episode of intensive care with chronic health co morbidities is reduced from 5 to 2 if the mode of entry to Intensive care is OT/recovery.

For the APACHE III score, the point score weighting allocated for a elective episode of intensive care with chronic health co morbidities is nulled if the mode of entry to intensive care is OT/recovery. Under the APACHE II and APACHE III scoring systems, all other patients with co morbidities at hospital admission are allocated 5 points.

For the SAPS II score, a point score weighting of 6 is given for all modes of entry to intensive care except for OT/recovery. For non elective episode of Intensive care from OT/recovery, a point score of 8 is allocated. For elective episode of Intensive care from OT/recovery, 0 points are allocated.

This data element differentiates between

- a patient who was a elective admission to an Intensive care unit following surgery and
- a patient for whom entry to ICU was not elective following a surgery.

-	Episode of intensive care—episode end date, DDMMYYYY	Mandatory	1

DSS specific information:

Intensive care episode end date > Intensive care episode start date

Provides information relating to intensive care length of stay.

-	Episode of intensive care—episode end mode, code N[N]	Mandatory	1

DSS specific information:

Used to calculate ICU mortality.

-	Episode of intensive care—episode end time, hhmm	Mandatory	1
-	Episode of intensive care—episode start date, DDMMYYYY	Mandatory	1

DSS specific information:

Intensive care episode start date > Admission date

Intensive care episode start date < Separation date

Intensive care episode start date < Intensive care episode end date

Used to provide information relating to intensive care length of stay.

Stays in ICU of less than 8 hours are excluded from the APACHE II predictive risk of death and standardised morbidity rate (SMR) analyses. Stays in ICU of less than 4 hours are excluded from the APACHE III SMR analyses.

Seq No.	Metadata item	Obligation	Max occurs
-	Episode of intensive care—episode start mode, code N[N]	Mandatory	1

DSS specific information:

Used in the calculation of APACHE II, APACHE III and SAPS II scores.

APACHE II

For the APACHE II score, the point score weighting allocated for a planned episode of intensive care with chronic health co morbidities is reduced from 5 to 2 if the source of entry to intensive care is operating room/recovery.

APACHE III

For the APACHE III score, the point score weighting allocated for a planned episode of intensive care with chronic health co morbidities is nulled if the the source of entry to intensive care is operating room/recovery.

SAPS II

For the SAPS II score, a point score weighting of 6 is given for all sources of entry to Intensive care except for 1: operating room/recovery. For an unplanned episode of intensive care from operating room/recovery, a point score of 8 is allocated. For a planned episode of intensive care from operating room/recovery, 0 points are allocated.

-	Episode of intensive care—episode start time, hhmm	Mandatory	1

DSS specific information:

Used to exclude stays in ICU of less than 8 hours from the APACHE II predictive risk of death and standardised morbidity rate (SMR) analyses. Stays in ICU of less than 4 hours are excluded from the APACHE III SMR analyses.

-	Episode of intensive care—length of stay, total days N[NNN]	Mandatory	1
-	Intensive care unit—level of intensive care, code N	Mandatory	1
-	Intensive care unit—unit identifier, NN	Mandatory	1

DSS specific information:

Required to stratify data by level of intensive care at an individual site.

-	Person—acute renal failure diagnosis indicator, yes/no code N	Mandatory	1

DSS specific information:

Required for the calculation of intensive care specific prognostic model severity of illness scores.

Use in the calculation of APACHE II, APACHE III and SAPS II scores.

APACHE II

For the APACHE II score calculation, the score for the highest scoring creatinine value is doubled if acute renal failure is present.

APACHE III

For the APACHE III score calculation, the score assigned for the creatinine value is 10 if acute renal failure is present and creatinine value is greater than or equal to 133 µmol/L.

Seq No.	Metadata item	Obligation	Max occurs
-	Person—age, total years N[NN]	Mandatory	1

DSS specific information:

Required for the calculation of intensive care specific prognostic model severity of illness scores. Required in probability of death estimates SAPS II, APACHE II and APACHE III scoring systems.

Estimate age if not known.

In the intensive care DSS, the age recorded is the age on Intensive care episode start date.

-	Person—airway intubation indicator, yes/no code N	Mandatory	1

DSS specific information:

Used in the calculation of the APACHE III score.

The airway intubation status of a patient at the time the worst (highest) scoring arterial blood gas using the APACHE III oxygenation scoring algorithm is taken.

-	Person—albumin serum level, grams per litre NN	Mandatory	1

DSS specific information:

The specimen must be serum.

Used in the calculation of APACHE III scores.

Albumin levels from a series of blood tests in the first 24 hours of intensive care should be collected. The specimen must be serum.

APACHE III

For calculation of the APACHE III score, the highest and lowest albumin values in the first 24 hours are collected and then scored using the following APACHE III weight scoring system. For the calculation of the APACHE III score, the highest score is used.

APACHE III	High abnormal range	Normal range	Low abnormal range	
Score	+4	0	+6	+11
Albumin level	>45	25-44	20-24	<19

-	Person—artificial respiratory ventilation indicator, yes/no code N	Mandatory	1

DSS specific information:

The invasive ventilation status of a patient at the time the highest scoring arterial blood gas using the APACHE III oxygenation scoring algorithm is taken.

Seq No.	Metadata item	Obligation	Max occurs
-	Person—bicarbonate blood level, millimoles per litre N[N].N	Mandatory	1

DSS specific information:

The specimen can be serum or plasma.

The Bicarbonate (HCO_3) value is used in the calculation of APACHE II score when no arterial blood gases are available. This HCO_3 value is also used in the calculation of the SAPS II score.

Bicarbonate HCO_3 levels measured in the first 24 hours of intensive care should be collected.

For the calculation of the APACHE II score, the highest and lowest HCO_3 values in the first 24 hours are collected and scored using the following APACHE II weight scoring system. The highest score is used in the calculation of the APACHE II score.

APACHE II	High abnormal range					Low abnormal range			
HCO_3	≥52	41-51.9		32-40.9	22-31.9		18-21.9	15-17.9	<15
Score	+4	+3	+2	+1	0	+1	+2	+3	+4

-	Person—bilirubin blood level, micromoles per litre NNNN	Mandatory	1

DSS specific information:

The specimen may be serum or plasma.

Used in the calculation of APACHE III and SAPS II scores.

For adults, the bilirubin value ranges from 5 to 1200 micromoles per litre. Higher the value more critical it is. Therefore worst Bilirubin value to be recorded is the highest one measured during the first 24 hours of admission into the intensive care.

-	Person—blood pressure (diastolic invasive), millimetres of mercury NN[N]	Mandatory	1

DSS specific information:

The diastolic BP measured in mmHg that accompanied the worst systolic BP recorded during the first 24 hours of intensive care is used.

Used in the calculation of the mean arterial pressure (MAP) for the APACHE II and III scores if no direct measure is available.

Seq No.	Metadata item	Obligation	Max occurs
-	Person—blood pressure (systolic invasive), millimetres of mercury NN[N]	Mandatory	1

DSS specific information:

The highest and lowest systolic BP in the first 24 hours of intensive care should be recorded. The worst scoring systolic BP (highest scoring according to SAPS II weight scoring system provided in table below) in the first 24 hours should be selected.

Used in the calculation of the SAPS II score and mean arterial pressure (MAP) for the APACHE II and III scores if no direct measure is available.

SAPS II

High abnormal range		Low abnormal range	
+2	0	+5	+13
≥200	100-199	70-99	<70

-	Person—chronic health evaluation indicator, comorbidity code A(7)	Mandatory	1
-	Person—chronic health evaluation indicator, comorbidity code AAAAAA	Mandatory	1
-	Person—coma status, Glasgow coma scale code N[N]	Mandatory	1

DSS specific information:

A paralysed or sedated patient is unscorable and GCS should therefore be determined from pre-anaesthetic GCS for elective and emergency surgery. In cases of transfers and retrievals, this information should be sourced from a clear medical/para-medical assessment prior to intubation for stabilisation/transfer. This may be found in the admission note, transfer notes, A&E notes, ambulance record or referral letter.

Patients with Intensive care diagnosis of drug overdose should have a Glasgow coma score determined.

Seq No.	Metadata item	Obligation	Max occurs
-	Person—core body temperature, degrees Celsius NN.N	Mandatory	1

DSS specific information:

Core temperature may be collected from the following sites-oral, tympanic, nasopharyngeal, rectal, oesophageal, pulmonary artery and bladder.
The temperature should ideally be the core temperature measured for example by oral, tympanic, nasopharyngeal, rectal, oesophageal, Swan-Ganz thermistor, bladder catheter sensor. Measurements from a skin sensor or axillary thermometer should only be used if there are no measurements from one of the preferred routes.

Core temperature needs to be assessed when the patient is free from the effects of active cooling. If the patient has been actively cooled, record the pre-cooling value when this is within the sampling period of the first 24 hours of Intensive care or the one hour before intensive care.

The core body temperature recorded periodically in the first 24 hours of Intensive care should be collected.

APACHE II

For calculation of the APACHE II score, the highest and lowest core body temperature values in the first 24 hours are collected and then scored using the following APACHE II weight scoring system. The highest score is then used in the calculation of the APACHE II score.

If only one core temperature is measured and recorded, this is considered the highest scoring value.

High abnormal range					Low abnormal range			
+4	+3	+2	+1	0	+1	+2	+3	+4
≥41°	39°-40.9°		38.5°-38.9°	36°-38.4°	34°-35.9°	32°-33.9°	30°-31.9°	≤29.9°

APACHE III

For calculation of the APACHE III score, the highest and lowest core body temperature values in the first 24 hours are collected and then scored using the following APACHE III weight scoring system. The highest score is then used in the calculation of the APACHE III score. If only one core temperature is measured and recorded, this is considered the highest scoring value.

High abnormal range		Low abnormal range				
+4	0	+2	+8	+13	+16	+20
≥40°	36°-39.9°	35°-35.9°	34°-34.9°	33.5°-33.9°	33°-33.4°	≤32.9°

SAPS II

For calculation of the SAPS II score, the highest temperature measured in degrees Celsius in the first 24 hours of intensive care is recorded. Temperatures greater than or equal to 39 degrees Celsius are given a score weighting of 3 for the SAPS II calculation.

Seq No.	Metadata item	Obligation	Max occurs
-	Person—creatinine serum level, total micromoles per litre NN[NN]	Mandatory	1

DSS specific information:

Used in the calculation of APACHE II and APACHE III scoring systems.

The highest and lowest creatinine values in the first 24 hours are collected. The highest scoring creatinine value is selected using the scoring system.

High abnormal range					Low abnormal range			
+4	+3	+2	+1	0	+1	+2	+3	+4
≥310	177-309	133-176		53-132		<53		

-	Person—eye opening response to stimuli, Glasgow coma scale code N	Mandatory	1

DSS specific information:

Used to calculate the total Glasgow coma score which is required for the calculation for the APACHE II, APACHE III and SAPS II scores. Used in the calculation for the APACHE III as a unique value.

The Glasgow coma score is recorded periodically in the first 24 hours of intensive care. The lowest score in that period is the significant value.

Glasgow coma scales need to be assessed when the person is free from the effects of sedative and/or paralysing or neuromuscular blocking agents. A paralysed or sedated patient is unscorable and GCS should therefore be determined from pre-anaesthetic GCS for elective and emergency surgery. In cases of transfers and retrievals, this information should be sourced from a clear medical/para-medical assessment prior to intubation for stabilisation/transfer. This may be found in the admission note, transfer notes, emergency department notes, ambulance record or referral letter.

Patients with Intensive care diagnosis of drug overdose should have a Glasgow coma score determined.

-	Person—fibrinolytic therapy indicator, yes/no/not stated/inadequately described code N	Mandatory	1

DSS specific information:

This data element describes whether a patient has received fibrinolytic/thrombolytic therapy. For patients who have received fibrinolytic/thrombolytic therapy, the value is yes, provided the fibrinolytic/thrombolytic therapy was given within the 24 hours preceding ICU or immediately following and intensive care episode.

For the APACHE III-J scoring system, this data element is used in the hospital risk of death calculation for patients whose main reason for Intensive care is acute myocardial infarct.

Examples of therapy include:

rTPA

metalyse

Streptokinase

Urokinase

Seq No.	Metadata item	Obligation	Max occurs
-	Person—first coronary artery bypass graft indicator, yes/no/not stated/inadequately described code N	Mandatory	1

DSS specific information:

Required for the calculation of intensive care specific prognostic model risk of death. This information is required where the main reason for intensive care is coronary artery bypass graft (CABG) only.

-	Person—fraction of inspired oxygen, N.NN	Mandatory	1

DSS specific information:

Used in the calculation of APACHE II, APACHE III, and SAPS II scores.

The APACHE II and APACHE III algorithm for oxygenation uses the alveolar-arterial (A-a) gradient value for scoring when the FiO_2 is 0.50 or greater. Use the lowest PaO_2 score only if the FiO_2 is less than 0.5.

SAPS II uses the PaO_2 / FiO_2 ratio for scoring if the patient is ventilated or on continuous positive airway pressure (CPAP).

The calculation of A-a gradient uses the formula:

A-a gradient = 713 x FiO_2 – PaO_2 – $PaCO_2$

All variables used in the calculation of the A-a gradient must come from the one blood gas sample.

APACHE III, APACHE II and SAPS II requirements:

For patients with assisted breathing, the fraction of inspired oxygen is read from the controlled oxygen source. E.g., Venturi masks, ventilator and CPAP systems with calibrated oxygen blenders. For patients breathing unassisted, i.e., room air, the FiO_2 is recorded as 0.21.

If a patient is on an uncontrolled oxygen source, the table below allows for the conversion of oxygen flow in L/min to FiO_2.

O_2 (L/min)	1	2	3	4	5	6	8	15	15*Reservoir mask
FiO_2	0.23	0.25	0.27	0.30	0.35	0.40	0.45	0.50	0.70

Seq No.	Metadata item	Obligation	Max occurs
-	Person—glucose blood level, millimoles per litre NNN.N	Mandatory	1

DSS specific information:

Glucose levels from a series of blood tests in the first 24 hours of intensive care should be collected.

The specimen may be serum or plasma.

For the calculation of the APACHE III score, the highest and lowest glucose values in the first 24 hours are collected and then scored using the following APACHE III weight scoring system. For the calculation of the APACHE III score, the highest score is used.

High abnormal range			Low abnormal range	
+5	+3	0	+9	+8
≥19.4	11.2-19.3	3.4-11.1	2.2-3.3	≤2.1

Seq No.	Metadata item	Obligation	Max occurs
-	Person—haematocrit blood level, fraction N.NN	Mandatory	1

DSS specific information:

Haematocrit levels from a series of blood tests in the first 24 hours of intensive care should be collected.

APACHE II

For the calculation of the APACHE II score, the highest and lowest haematocrit values in the first 24 hours need to be collected and scored using the following weight scoring system. The highest score is then used in the calculation of the APACHE II score.

High abnormal range					Low abnormal range			
+4	+3	+2	+1	0	+1	+2	+3	+4
≥0.60		0.50-0.59	0.46-0.49	0.30-0.45		0.29-0.20		<0.20

APACHE III

For the calculation of the APACHE III score, the highest and lowest haematocrit values in the first 24 hours need to be collected and scored using the following weight scoring system. The highest score is then used in the calculation of the APACHE III score.

High abnormal range		Low abnormal range
+3	0	+3
≥0.50	0.41-0.49	<0.41

Seq No.	Metadata item	Obligation	Max occurs
-	Person—heart rate, total beats per minute N[NN]	Mandatory	1

DSS specific information:

The heart rate to be collected is the ventricular rate as shown on an ECG trace – not the pulse rate.

Used in the calculation of APACHE II, APACHE III and SAPS II scores.
The highest heart rate measured in beats per minutes in the first 24 hours of the Intensive care episode start should be recorded.

If the patient suffers a cardiorespiratory arrest or death in the first 24 hours, the values recorded should be the lowest measured values prior to arrest or death.

APACHE II

For calculation of the APACHE II score, the highest and lowest heart rate values in the first 24 hours need to be collected and scored using the following weight scoring system. The highest score is then used in the calculation of the APACHE II score. If only one heart rate is measured and recorded, this is considered the highest scoring heart rate.

High abnormal range					Low abnormal range			
+4	+3	+2	+1	0	+1	+2	+3	+4
≥180	140-179	110-139		70-109		55-69		≤49

APACHE III

For calculation of the APACHE III score, the highest and lowest heart rate values in the first 24 hours need to be collected and scored using the following weight scoring system. The highest score is then used in the calculation of the APACHE III score. If only one heart rate is measured and recorded, this is considered the highest scoring heart rate.

High abnormal range						Low abnormal range	
+17	+13	+7	+5	+1	0	+5	+8
≥155	140-154	120-139	110-119	100-109	50-99	40-49	≤39

SAPS II

For calculation of the SAPS II score, the highest and lowest heart rate values in the first 24 hours need to be collected and scored using the following weight scoring system. The highest score is then used in the calculation of the SAPS II score. If only one heart rate is measured and recorded, this is considered the highest scoring heart rate.

High abnormal range			Low abnormal range	
+7	+4	0	+2	+11
≥160	120-159	70-119	40-69	<40

Seq No.	Metadata item	Obligation	Max occurs
-	Person—mean arterial blood pressure, millimetres of mercury NNN	Conditional	1

DSS specific information:

The highest and lowest mean arterial pressure (MAP) measured in mmHg in the first 24 hours of intensive care should be recorded. The worst scoring MAP (highest scoring according to the APACHE II weight scoring system) selected using the following APACHE II weight scoring system should be reported. If only one MAP is measured and recorded, this is considered the worst value reported.

High abnormal range						Low abnormal range		
+4	+3	+2	+1	0	+1	+2	+3	+4
≥160	130-159	110-129		70-109		50-69		≤49

-	Person—motor response to stimuli, Glasgow coma scale code N	Mandatory	1

DSS specific information:

Used to calculate the total Glasgow Coma score which is required for the calculation of the APACHE II, APACHE III and SAPS II scores.

Used in the calculation of the APACHE III score as a unique value.

Collected in the first 24 hours of intensive care.

Record the motor component value for the lowest Total Glasgow coma score in that period.

Glasgow coma scales need to be assessed when the admission is free from the effects of sedative and/or paralysing or neuromuscular blocking agents. A paralysed or sedated patient is unscorable and GCS should therefore be determined from pre-anaesthetic GCS for elective and emergency surgery. In cases of transfers and retrievals, this information should be sourced from a clear medical/para-medical assessment prior to intubation for stabilisation / transfer. This may be found in the admission note, transfer notes, emergency department notes, ambulance record or referral letter.

Patients with Intensive care diagnosis of drug overdose should have a Glasgow coma score determined.

-	Person—number of coronary artery bypass grafts, total number N	Mandatory	1

DSS specific information:

Used in the APACHE III-J prognostic model specific for coronary artery bypass graft patient admissions.

This data element describes the number of coronary arteries with a bypass graft in an operation on a patient leading to an episode of intensive care. This information is required where the main reason for intensive care is coronary artery bypass graft (CABG) only. Where the reason for ICU admission is CABG, a value of 0 is invalid and will be treated as not stated/inadequately described, and the risk of death cannot be calculated.

-	Person—partial pressure of carbon dioxide, millimetres of mercury NNN	Mandatory	1

DSS specific information:

~~Required for use in the assessment of severity of illness in intensive care~~

patients. Used to adjust for case-mix in statistical reports.

If Partial pressure of carbon dioxide ($PaCO_2$) in arterial blood gas is not collected or recorded, use code 999.

Used in the calculation of APACHE II and APACHE III scores.

Oxygenation method for APACHE II and APACHE III:

When the FiO_2 is less than 0.5 mmHg, record the value associated with the quantitatively lowest Partial pressure of oxygen (PaO_2) only.

When the Fractional value of inspired oxygen (FiO_2) is 0.50 mmHg or greater, APACHE II & III scores require the use of an algorithm for oxygenation called the alveolar-arterial (A-a) gradient for determining the $PaCO_2$ to record. All variables used in the oxygenation method calculation must come from the one blood gas sample.

Acid-Base method for APACHE III:

All variables used in the acid-base method calculation must come from the one blood gas sample.

In conjunction with the pH of the same blood sample, the $PaCO_2$ associated with the highest points according to the APACHE III acid-base scoring algorithm is recorded.

The $PaCO_2$ is determined from a patient's blood collected over the first 24 hours of intensive care.

APACHE III and APACHE II scores calculation – oxygenation method:

For non-intubated patients or intubated patients whose FiO_2 is <0.5 mmHg, record the PaCO2 associated with the arterial blood gas sample with the lowest PaO_2.

For intubated patients whose oxygen is >0.5 mmHg, record the PaCO2 from the arterial blood gas with the highest alveolar arterial (A-A) gradient. Use the following formula to calculate the A-a gradient:

A-a gradient = 713 x FiO_2 – PaO_2 – $PaCO_2$

APACHE III score calculation -acid-base scoring algorithm:

In conjunction with the pH of the same blood sample, record the partial pressure of carbon dioxide associated with the highest points APACHE III acid-base scoring algorithm. The point weight score is calculated using the table below.

-

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Seq No.	Metadata item			Obligation	Max occurs
	7.45-<7.50	2	12		
	7.50-<7.55	3	12		
	7.55-<7.60				
	7.60-<7.65	0			
	>7.65				

-

- Person—partial pressure of oxygen, millimetres of mercury NNN — Mandatory — 1

DSS specific information:

All variables used in the calculation of the A-a gradient must come from the one blood gas sample.

If the Fractional value of inspired oxygen (FiO_2) value is < 0.5 mmHg, the lowest arterial blood gas Partial pressure of oxygen (PaO_2) is recorded.

If the Fractional value of inspired oxygen (FiO_2) value is ≥ 0.5 mmHg, the Partial pressure of oxygen associated with the highest A-a gradient is recorded.

The formula used to calculate A-a gradient is as follows:

A-a gradient = 713 x FiO_2 – PaO_2 – $PaCO_2$

Used in the calculation of SAPS II, APACHE II and APACHE III scores.

APACHE II

When the Fractional value of inspired oxygen (FiO_2) is 0.50 mmHg or greater, APACHE II scores require the PaO_2 associated with the arterial blood gas with the highest alveolar-arterial (A-a).

When the FiO_2 is less than 0.5 mmHg, they require the quantitatively lowest PaO_2 value.

APACHE III

When the Fractional value of inspired oxygen (FiO_2) is 0.50 mmHg or greater, APACHE III scores require the PaO_2 associated with the arterial blood gas with the highest alveolar-arterial (A-a).

When the FiO_2 is less than 0.5 mmHg, they require the quantitatively lowest PaO_2 value.

SAPS II

SAPS II scores use the PaO_2 / FiO_2 ratio for scoring if the patient is ventilated or on continuous positive airway pressure.

- Person—person identifier, XXXXXX[X(14)] — Mandatory — 1

DSS specific information:

The same identifier should be used for all episodes of care.

Seq No.	Metadata item	Obligation	Max occurs
-	Person—pH of arterial blood gas, level N[.NN]	Mandatory	1

DSS specific information:

Blood samples are taken at intervals during the first 24 hours of a patient's entry to an intensive care unit. Several measurements of the pH of a patient's arterial blood gas are taken in this time period.

Used in the calculation of APACHE II and APACHE III scores.

Code 9.99 if arterial pH is not recorded.

APACHE II:

For adults, the value to be recorded for use in the calculation of the APACHE II score is the one that achieves the highest score determined using the APACHE II score weights shown in the table below.

APACHE II	High abnormal range					Low abnormal range			
pH	≥7.7	7.6-7.69		7.5-7.59	7.33-7.49		7.25-7.32	7.15-7.24	<7.15
Score	+4	+3	+2	+1	0	+1	+2	+3	+4

APACHE III

For APACHE III scores, the highest scoring pH is selected in conjunction with the level of carbon dioxide in the same blood sample.

<table>
<tr><td>APACHE III</td><td colspan="9">$PaCO_2$</td></tr>
<tr><td>2pH</td><td><25</td><td>25-<30</td><td>30-<35</td><td>35-<40</td><td>40-<45</td><td>45-<50</td><td>50-<55</td><td>55-<60</td><td>≥60</td></tr>
<tr><td><7.15</td><td colspan="5" rowspan="2">12</td><td colspan="4" rowspan="2">4</td></tr>
<tr><td>7.15-<7.2</td></tr>
<tr><td>7.20-<7.25</td><td colspan="2" rowspan="3">9</td><td colspan="2" rowspan="2">6</td><td colspan="2" rowspan="2">3</td><td colspan="3" rowspan="2">2</td></tr>
<tr><td>7.25-<7.30</td></tr>
<tr><td>7.30-<7.35</td><td colspan="3" rowspan="3">0</td><td colspan="4" rowspan="3">1</td></tr>
<tr><td>7.35-<7.40</td><td colspan="2" rowspan="3">5</td></tr>
<tr><td>7.40-<7.45</td></tr>
<tr><td>7.45-<7.50</td><td colspan="3">2</td><td colspan="4">12</td></tr>
<tr><td>7.50-<7.55</td><td colspan="4" rowspan="2">3</td><td colspan="5" rowspan="4">12</td></tr>
<tr><td>7.55-<7.60</td></tr>
<tr><td>7.60-<7.65</td><td rowspan="2">0</td><td colspan="3" rowspan="2"></td></tr>
<tr><td>>7.65</td></tr>
</table>

DSS specific information:

Potassium levels from a series of blood tests in the first 24 hours of Intensive care should be collected. The specimen may be serum or plasma. The potassium value is used in the calculation of APACHE II, and SAPS II scoring systems.

APACHE II

For calculation of the APACHE II score, the highest and lowest potassium values in the first 24 hours need to be collected and scored using the following weight scoring system. The highest score is then used in the calculation of the APACHE II score.

High abnormal range					Low abnormal range			
+4	+3	+2	+1	0	+1	+2	+3	+4
≥7	6-6.9		5.5-5.9	3.5-5.4	3-3.4	2.5-2.9		<2.5

SAPS II

For calculation of the SAPS II score, the highest and lowest potassium values in the first 24 hours need to be collected and scored using the following weight scoring system. The highest score is then used in the calculation of the APACHE II score.

High abnormal range					Low abnormal range			
+4	+3	+2	+1	0	+1	+2	+3	+4
≥7	6-6.9		5.5-5.9	3.5-5.4	3-3.4	2.5-2.9		<2.5

Not recorded values are assumed to be normal and are scored accordingly.

Seq No.	Metadata item	Obligation	Max occurs
-	Person—respiratory rate, total breaths per minute N[N]	Mandatory	1

DSS specific information:

If the patient suffers a cardiorespiratory arrest or death in the first 24 hours, the values recorded should be the lowest measured values prior to arrest or death. It is inappropriate to record a variable as zero merely because cardiorespiratory arrest or death has occurred. Where an automated monitoring system is being employed then values on the preceding hour pre-arrest should be considered in the selection of the lowest (worst available) value. e.g. if arrest occurs at 11:35am, then consider substituting values corresponding to 11:00am.

Used in the calculation of APACHE II and APACHE III scores.

APACHE II

For the calculation of the APACHE II score, the highest and lowest respiratory rates in the first 24 hours are collected and then scored using the following APACHE II weight scoring system. For the calculation of the APACHE II score, the highest score is used.

High abnormal range					Low abnormal range			
+4	+3	+2	+1	0	+1	+2	+3	+4
≥50	35-49		25-34	12-24	10-11	6-9		≤5

APACHE III

For the calculation of the APACHE III score, the highest and lowest respiratory rates in the first 24 hours are collected and then scored using the following APACHE III weight scoring system. For the calculation of the APACHE III score, the highest score is used. For mechanically ventilated patients, no points are given for respiratory rate 6 – 12.

High abnormal range					Low abnormal range		
+18	+11	+9	+6	0	+7	+8	+17
≥50	40-49	35-39	25-34	14-24	12-13	6-11	≤5

-	Person—sex, code N	Mandatory	1

Seq No.	Metadata item	Obligation	Max occurs
-	Person—sodium blood level, millimoles per litre NNN	Mandatory	1

DSS specific information:

Sodium levels from a series of blood tests measured in the first 24 hours of the Intensive care admission should be collected.

The sodium (Na) value is used in the calculation of APACHE II, APACHE III and SAPS II scoring systems. Not recorded values are assumed to be normal and are scored accordingly.

APACHE II

For the calculation of the APACHE II score, the highest and lowest sodium values in the first 24 hours are collected and then scored using the following APACHE II weight scoring system. For the calculation of the APACHE II score, the highest score is used.

High abnormal range					Low abnormal range			
+4	+3	+2	+1	0	+1	+2	+3	+4
≥180	160-179	155-159	150-154	130-149		120-129	111-119	≤110

APACHE III

For the calculation of the APACHE III score, the highest and lowest sodium values in the first 24 hours are collected and then scored using the following APACHE III weight scoring system. For the calculation of the APACHE III score, the highest score is used.

High abnormal range		Low abnormal range	
+4	0	+2	+3
≥155	135-154	120-134	≤119

SAPS II

For the calculation of the SAPS II score, the highest and lowest sodium values in the first 24 hours are collected and then scored using the following SAPS II weight scoring system. For the calculation of the SAPS II score, the highest score is used.

High abnormal range		Low abnormal range
1	0	+5
≥145	125-144	<125

-	Person—urea blood level, millimoles per litre NNN.N	Mandatory	1

DSS specific information:

The specimen may be serum or plasma.

If Urea is not collected or recorded, code 999.9.

The urea value is used in the calculation of APACHE III and SAPS II scores.

For submission to the Adult Patient database, the highest urea value in the first 24 hours of intensive care should be recorded.

Seq No.	Metadata item	Obligation	Max occurs
-	Person—urine output 24 hours, millilitres NNNNN	Mandatory	1

DSS specific information:

The total urine output is recorded for the first 24 hours in intensive care. If there is an incomplete 24 hour urine collection, extrapolate to report a 24 hour urine output. If however, the urine collected is for a period of ≤6 hours or the patient is terminal, leave the information out and it will be treated as unknown, i.e. normal.

Urine output forms part of the definition for acute renal failure. Acute renal failure doubles the weighting of points allocated to the creatinine value in the APACHE II and APACHE III scoring systems. Urine output is also required for the SAPS II scoring system algorithm.

-	Person—verbal response to stimuli, Glasgow coma scale code N	Mandatory	1

DSS specific information:

Used to calculate the Total Glasgow Coma score which is required for the calculation of the APACHE II, APACHE III and SAPS II scores.

Used in the calculation of the APACHE III score as a unique value.

The Glasgow coma score is recorded periodically in the first 24 hours of intensive care. The lowest score in that period is the significant value.

Glasgow Coma Scale needs to be assessed when the person is free from the effects of sedative and/or paralysing or neuromuscular blocking agents. A paralysed or sedated patient is unscorable and GCS should therefore be determined from pre-anaesthetic GCS for elective and emergency surgery. In cases of transfers and retrievals, this information should be sourced from a clear medical/para-medical assessment prior to intubation for stabilisation/transfer. This may be found in the admission note, transfer notes, emergency department notes, ambulance record or referral letter.

Patients with Intensive care diagnosis of drug overdose should have a Glasgow coma score determined.

-	Person—verbal response to stimuli, Glasgow coma scale intubated airway code N	Mandatory	1

DSS specific information:

Used to calculate the Total Glasgow Coma score which is required for the calculation of the APACHE II, APACHE III and SAPS II scores.

Used in the calculation of the APACHE III score as a unique value.

The Glasgow coma score is recorded periodically in the first 24 hours of intensive care. The lowest score in that period is the significant value.

Glasgow Coma Scale needs to be assessed when the person is free from the effects of sedative and / or paralyzing or neuromuscular blocking agents. A paralysed or sedated patient is unscorable and GCS should therefore be determined from pre-anaesthetic GCS for elective and emergency surgery. In cases of transfers and retrievals, this information should be sourced from a clear medical/para-medical assessment prior to intubation for stabilisation / transfer. This may be found in the admission note, transfer notes, emergency department notes, ambulance record or referral letter.

Patients with Intensive care diagnosis of drug overdose should have a Glasgow coma score determined.

Seq No.	Metadata item	Obligation	Max occurs
-	Person—white blood cell count, NNN.N	Mandatory	1

DSS specific information:

White blood cell count levels from a series of blood tests in the first 24 hours of intensive care should be collected. Used in the calculation of APACHE II, APACHE III and SAPS II scores.

APACHE II

For calculation of the APACHE II score, the highest and lowest white blood cell count values in the first 24 hours are collected and then scored using the following APACHE II weight scoring system. The highest score is then used in the calculation of the APACHE II score. If only one white cell count is measured and recorded, this is considered the highest scoring value.

High abnormal range					Low abnormal range			
+4	+3	+2	+1	0	+1	+2	+3	+4
≥40		20-39.9	15-19.9	3-14.9		1-2.9		<1

APACHE III

For calculation of the APACHE III score, the highest and lowest white blood cell count values in the first 24 hours are collected and then scored using the following APACHE III weight scoring system. The highest score is then used in the calculation of the APACHE III score. If only one white cell count is measured and recorded, this is considered the highest scoring value.

High abnormal range			Low abnormal range	
+5	+1	0	+5	+19
≥25	24-24.9	3-19.9	1-2.9	<1

SAPS II

For calculation of the SAPS II score, the highest and lowest white blood cell count values in the first 24 hours are collected and then scored using the following SAPS II weight scoring system. The highest score is then used in the calculation of the SAPS II score. If only one white cell count is measured and recorded, this is considered the highest scoring value.

High abnormal range		Low abnormal range
+3	0	+12
≥20	1.0-19.9	<1