APACHE II Calculation Worksheet Instructions

The APACHE II score is derived from 3 scoring systems: **Part A** – Acute Physiology Score, **Part B** – Age Points, **Part C –** Chronic Health Points

Part A - Acute Physiology Score

For each of the 12 physiological variables, select the **most deranged value** over the **preceding 24 hour period prior to randomisation**. Enter the value in the right hand column.

For exact non-integer data that is not found in any of the given ranges, round the figure up or down to the nearest whole number. E.g., 44 years and 3 months is rounded down to ≤ 44 years and assigned 0 points; a calculated MAP of 129.7 is rounded up to 130 and assigned 3 points. For integers of xx.5 always round upwards. This is an arbitrary decision but must be followed for every patient to ensure consistency.

1. **Temperature** – this should be a core temperature measurement (rectal, tympanic, oesophageal or via PAC). Where this is not possible, add 0.5^{0}C to the oral or axillary temperature.
2. If mean arterial pressure (**MAP**) is not calculated by monitoring equipment, use the manual sphygmomanometer recording of systolic (SBP) and diastolic blood pressure (DBP) to obtain MAP using this equation $$MAP = \frac{(DBP \times 2) + SBP}{3}$$
3. If the patient has an atrial arrhythmia, measure the ventricular response rate (R waves) only to record the **heart rate**.
4. **A – aDO$_2$** is the difference between the calculated alveolar oxygen tension and the arterial oxygen tension. The alveolar oxygen tension is calculated by this equation: $AO_2 = 713 \times FiO_2 - PaCO_2 \times 1.25$. The FiO_2 here is expressed as a proportion of a unit. e.g. 100% FiO_2 = 1 and 60% equals 0.6. If the FIO_2 (inhaled oxygen concentration) is greater than or equal to 50%, record the most deranged value for the $A - aDO_2$. If the FIO_2 is less than 50% record only the $PaO2$ (arterial oxygen pressure). All measurements are in mmHg.
5. ***A – aDO$_2$* calculation is $[(FiO_2 (713)-(PaCO_2/0.8)]-PaO_2$**
6. If ABGs have not been performed, choose the most deranged value for the serum venous bicarbonate (HCO_3) in place of the **arterial pH**
7. To obtain a score for the Glasgow Coma Scale (**GCS**) use the GCS worksheet provided and subtract the GCS score from 15 to arrive at a score on the APACHE worksheet.

Whenever possible, attempt to obtain a score for each physiological variable. If one of the 12 variables is not available, assign 0 points and make a note of this absence on the APACHE II worksheet. The assumption being made is that a test or measurement was not ordered because the status of the patient did not warrant investigation, rather than the data was missing.

To complete **Part B** – assign points to the age range that the patient fits in to e.g. a 48 year old patient would be assigned 2 points.

To complete **Part C** – first decide if the patient meets any of the criteria provided on the worksheet for a history of severe organ insufficiency or immunocompromised. If there is no history, assign 0 points. If there is a history, assign points depending on whether the patient is a non-operative emergency admission or an emergency post-operative admission.

Parts B and C and overall APACHE II score calculated by the study database.

Finally, add the points recorded for each of the 3 parts. The minimum score is 0 and the maximum score is 71. Keep the completed APACHE II worksheet in the patient CRF Worksheet folder for this patient. It may be used for quality assurance measures. You will therefore need to print the Patient Study Number on the APACHE worksheet.

REMAP-CAP

INSPIRED OXYGEN CONVERSION CHART

Nasal cannulae

1 LPM = 24%

2 LPM = 28%

3 LPM = 32%

4 LPM=36%

Hudson Oxygen Mask

5 - 6 LM = 40%

6 - 7 LPM = 50%

7 - 8 LPM = 60%

High Concentration Mask

8 - 12 LPM = 60 – 80%

Partial Rebreathing Mask

8 - 12 LPM = 60-80%

Non-Rebreathing Mask

8 - 12 LPM = 90-99%

REMAP-CAP

APACHE II Severity of Disease Worksheet (mmHg)

A. ACUTE PHYSIOLOGY SCORE (APS)	PHYSIOLOGIC VARIABLE	High Abnormal Range					Low Abnormal Range				APS
		+ 4	+ 3	+ 2	+ 1	0	+1	+2	+3	+4	
	Temperature – rectal (° C)	≥ 41	39 – 40.9		38.5 – 38.9	36 – 38.4	34 - 35.9	32 – 33.9	30 – 31.9	≤ 29.9	
	Mean arterial pressure – mmHg	≥ 160	130 - 159	110 – 129		70 - 109		50 - 69		≤ 49	
	Heart rate (ventricular response)	≥ 180	140 – 179	110 – 139		70 - 109		55 - 69	40 - 54	≤ 39	
	Respiratory rate (non-ventilated or ventilated)	≥ 50	35 – 49		25 - 34	12 - 24	10 - 11	6 - 9		≤ 5	
	Oxygenation: A - aDO_2 or PaO_2 (mmHg) **a.** if $FIO_2 \geq 0.5$ record A - aDO_2	> 500	350 – 499	200 – 349		< 200					
	b. if $FIO_2 < 0.5$ record only PaO_2					PO_2 -> 71	PO_2 61 - 70		PO_2 55- 60	$PO_2 < 55$	
	Arterial 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	
	Serum sodium (mmol/L)	≥ 180	160 – 179	155 – 159	150 - 154	130 - 149		120 - 129	111 - 119	≤ 110	
	Serum potassium (mmol/L)	≥ 7	6 – 6.9		5.5 – 5.9	3.5 – 5.4	3 – 3.4	2.5 – 2.9		≤ 2.5	
	Serum creatinine (µmol/L) (double point score for acute renal failure)	≥ 300	171 – 299	121 – 170		50 – 120		< 50			
	Haematocrit (%)	≥ 60		50 – 59.9	46 – 49.9	30 – 45.9		20 – 29.9		< 20	
	White blood count (total/mm^3) (in 1,000s)	≥ 40		20 – 39.9	15 – 19.9	3 – 14.9		1 – 2.9		< 1	
	Glasgow Coma Score (GCS)* (Score = 15 minus actual GCS)										
	Serum HCO_3 (venous – mMol/L) **(Only use this if no ABGs available)**	≥52	41 – 51.9		32 – 40.9	22 – 31.9		18 – 21.9	15 – 17.9	<15	
									TOTAL APS		

Acute renal failure: *"If abnormal serum creatinine values reflect acute renal failure as opposed to chronic renal failure then the points assigned to the creatinine values should be doubled. Acute renal failure is defined as any creatinine value that is not within the normal range designated by the APACHE II system."* Thus for the purposes of this study if your patient has **any points for an increased creatinine and they are not documented to have chronic renal failure then the creatinine points should be doubled.**

* Glasgow Coma Score (GCS): pre-sedation GCS does not need to be from 24 hours prior to randomisation. You should go back as far as necessary to the time at which the patient was first sedated and identify the GCS at the time of or just prior to sedation.

REMAP-CAP

APACHE II Severity of Disease Worksheet (kPa)

A. ACUTE PHYSIOLOGY SCORE (APS)										
PHYSIOLOGIC VARIABLE	**High Abnormal Range**					**Low Abnormal Range**				**APS**
	+ 4	**+ 3**	**+ 2**	**+ 1**	**0**	**+1**	**+2**	**+3**	**+4**	
Temperature – rectal (° C)	≥ 41	39 – 40.9		38.5 – 38.9	36 – 38.4	34 - 35.9	32 – 33.9	30 – 31.9	≤ 29.9	
Mean arterial pressure – mmHg	≥ 160	130 - 159	110 – 129		70 - 109		50 - 69		≤ 49	
Heart rate (ventricular response)	≥ 180	140 – 179	110 – 139		70 - 109		55 - 69	40 - 54	≤ 39	
Respiratory rate (non-ventilated or ventilated)	≥ 50	35 – 49		25 - 34	12 - 24	10 - 11	6 - 9		≤ 5	
Oxygenation: A - aDO_2 or PaO_2 (mmHg) **a**. if $FIO_2 \geq 0.5$ record A - aDO_2	> 500	350 – 499	200 – 349		< 200					
b. if $FIO_2 < 0.5$ record only PaO_2					PO_2 -> 71	PO_2 61 - 70		PO_2 55- 60	$PO_2 < 55$	
Arterial 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	
Serum sodium (mmol/L)	≥ 180	160 – 179	155 – 159	150 - 154	130 - 149		120 - 129	111 - 119	≤ 110	
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Haematocrit (%)	≥ 60		50 – 59.9	46 – 49.9	30 – 45.9		20 – 29.9		< 20	
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								TOTAL APS		

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* Glasgow Coma Score (GCS): pre-sedation GCS does not need to be from 24 hours prior to randomisation. You should go back as far as necessary to the time at which the patient was first sedated and identify the GCS at the time of or just prior to sedation.

REMAP-CAP

B. Age point and C. Chronic Health points are calculated by the REMAP-CAP database.

B. AGE POINTS

Assign points to age as follows:

Age (yrs)	Points
☐ ≤ 44	0
☐ 45–54	2
☐ 55–64	3
☐ 65–74	5
☐ ≥ 75	6

C. CHRONIC HEALTH POINTS

If patient has history of severe organ system insufficiency or is immuno–compromised, assign points as follows:	Points	DEFINITIONS: Organ insufficiency or immuno-compromised state must have been evident **prior** to this hospital admission and conform to the following criteria:	
		LIVER	Biopsy proven cirrhosis & documented portal hypertension (PH); episodes of upper GI bleeding due to PH; or prior episodes of hepatic failure/encephalopathy/coma
☐ **a.** for non-operative or emergency post-operative patients	5	RENAL	Receiving chronic dialysis
		CARDIOVASCULAR	New York Heart Association Class IV
		RESPIRATORY	Chronic restrictive, obstructive or vascular disease resulting in severe exercise restriction (i.e. unable to climb stairs, perform household duties); or documented chronic hypoxia, hypercapnia, 2° polycythemia, severe pulmonary hypertension (>40mmHg) or respiratory dependency
☐ **b.** for elective post-operative patients	2	IMMUNOCOMPROMISED	Patient has received therapy that suppresses resistance to infection, eg. immuno-suppression, chemotherapy, radiotherapy, long term or recent high dose steroids, or has a disease sufficiently advanced to suppress resistance to infection (eg leukaemia, lymphoma, AIDS)

APACHE II SCORE - a sum of:	**A.** APS points = ____	**B.** Age points = ____	**C.** Chronic Health points = ____	Sum of A + B + C = _____ (0 to 71)

*For **intubated** patients use verbal scoring column allocated*

Best Verbal Response		"Verbal" Intubated		Best Motor Response		Best Eye Opening	
5	Orientated	5	Orientated	6	Obeys	4	Spontaneous
4	Confused	3	In Between	5	Localises	3	To Command
3	Inappropriate	1	No Response	4	Flexion – Withd.	2	To Pain
2	Incomprehensible			3	Flexion – Decort.	1	No Response
1	No Response			2	Extension		
				1	No Response		