

INSTRUCTIONS FOR COLLECTING THE INFORMATION NEEDED TO CALCULATE PIM

See Intens Care Med 1997;23:201-7. PIM is calculated from information collected at the time a child is admitted to your ICU. Because PIM describes how ill the child was at the time you started intensive care, the observations to be recorded are those made at or about the time of first face-to-face (not telephone) contact between the patient and a doctor from your intensive care unit (or a doctor from a specialist paediatric transport team). Use the **first** value of each variable measured within the period from the time of first contact to one hour after arrival in your ICU. The first contact may be in your ICU, or your emergency department, or a ward in your own hospital, or in another hospital (eg on a retrieval). The pupils' reactions to light are used as an index of brain function; **do not record an abnormal finding if this is probably caused by drugs, toxins or local injury to the eye.** If information is missing (eg base excess not measured), record zero (**except for systolic blood pressure, which should be recorded as 120**); PIM assumes that missing values are normal (eg that the base excess is 0 if it is not measured). Variables 1-7 are descriptive variables that are not needed to calculate PIM. Include **all** children admitted to your ICU.

1. Identifier (eg ICU admission number): _____
2. Age (months): _____
3. Diagnostic group (1=Resp, 2=CVS, 3=Postop, 4=Accident, 5=Neurol, 6=Other): _____
4. Date admitted to ICU (dd/mm/yyyy): _____
5. Days in ICU on this admission: _____
6. Endotracheal tube in situ at any time during this ICU admission (no = 0, yes = 1): _____
7. Booked admission to ICU after elective surgery; or elective admission for a procedure (eg
8. insertion of a central line), or monitoring, or review of home ventilation (no = 0, yes = 1): _____
9. Record the number in square brackets if the condition is present (if in doubt, record 0): _____

[0] none	[5] cardiomyopathy or myocarditis
[1] cardiac arrest out of hospital	[6] hypoplastic left heart syndrome
[2] severe combined immune deficiency	[7] HIV infection
[3] leukaemia/lymphoma after 1st induction	[8] IQ <35, worse than Down's
[4] spontaneous cerebral haemorrhage from aneurysm or AV malformation	[9] a neurodegenerative disorder (progressive ongoing loss of milestones)
10. Response of pupils to bright light (>3mm and both fixed = 1, other = 0, unknown = 0): _____
11. Base excess in arterial or capillary blood, mmol/L (unknown = 0): _____
12. PaO₂, mmHg (unknown = 0): _____
13. FiO₂ at time of PaO₂ if oxygen via ETT or headbox (unknown = 0): _____
14. Systolic blood pressure, mmHg (unknown = 120): _____
15. Mechanical ventilation at any time during the first hour in ICU (no = 0, yes = 1): _____
16. Outcome of ICU admission (discharged from ICU = 0, died in ICU = 1): _____

Example of how to calculate PIM

Child has: pupils react (fixed = no = 0), myocarditis (specified diagnosis = yes = 1), emergency admission (elective = no = 0), ventilated (= yes = 1), systolic blood pressure 40 mmHg, base excess -16.0 mmol/L, FiO₂ 1.00 and PaO₂ 60 mmHg.

PIM logit = (2.357 x 0) + (1.826 x 1) + (-1.552 x 0) + (1.342 x 1) + (0.021 x absolute(40 - 120)) + (0.071 x absolute(-16.0)) + (0.415 x 100 x 1.00/60) - 4.873 = 1.803.

Predicted probability of death = $e^{\text{logit}} / (1 + e^{\text{logit}}) = 2.7183^{1.803} / (1 + 2.7183^{1.803}) = 0.8585$, or 86%.

At <<http://pedscm.wustl.edu/clinical/pim-readme.html>> there is a free programme that calculates PIM.

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Common mistakes in collecting PIM data

1. Do not to over-diagnose the specified conditions (number 9 on the form) - if there is any doubt, do **not** record a specified condition. For example: do not code cerebral haemorrhage for intracerebral bleeding associated with trauma; impaired cardiac function associated with sepsis or surgery should not be coded as cardiomyopathy; Downs Syndrome should not be coded as IQ <35; and a static disability should not be coded as neurodegenerative (even if it is severe) unless there is progressive ongoing loss of milestones.
2. You should record the **first** value of each variable from the time of first contact up to one hour after arrival in your ICU (not the worst value).
3. If a variable is not measured within one hour of admission to ICU it should be **coded as missing** (for example, if the first blood gas is not done until two hours after admission, the base excess and PaO₂ should both be coded as missing). Missing data is treated as being normal when PIM is calculated.
4. The PIM equation is used to calculate the PIM logit. If any information is missing, that variable should add nothing to the PIM logit. For example, if the PaO₂ or the F_iO₂ is missing, the value of "0.415 x 100 x PaO₂/F_iO₂" should be set to zero.
5. Record the F_iO₂ being given **at the same time** that the first PaO₂ is measured (that is, both the F_iO₂ and PaO₂ that you record must relate to the same time).
6. Make sure that you are consistent about the PaO₂ units (all mmHg, or all kPa), and the F_iO₂ (all between 0.0 and 1.0, **not** percentages between 0 and 100).
7. Read very carefully the definition, "booked [**pre-arranged**] admission to ICU after **elective** surgery; or **elective** admission for a **procedure** (eg insertion of a central line), or **monitoring**, or **review** of home ventilation".
8. The pupils are only recorded as fixed if both are >3 mm, **and** both are fixed, **and** the finding is not caused by drugs or toxins or direct injury to the eye.
9. If systolic blood pressure is not measured in the first hour, record 120 - **do not record zero**.
10. Randomly sample about every 20th admission to your ICU and get another person to collect the PIM data independently a second time, so that you can check the accuracy of your data.
11. You should include **all** admissions to your ICU, not just selected cases.

Interpretation of PIM

PIM should only be applied to groups of patients. It should **not** be used to make decisions about the management of individual patients, or even to describe individual patients.

PIM predicts about 40% fewer deaths than the old PRISM II (so your ICU will not look as good with PIM). PIM was developed using data from seven large tertiary PICUs in Australia (almost all ventilated children in Australia are looked after in one of these units) and a large PICU in the UK, where the standard of care is high. PRISM II is based on data collected in 1984-85 (and outcomes have improved since then), and PRISM uses the worst results in the first 24 hours in ICU – because about 45% of deaths occur in this period, PRISM will tend to make children who die look sicker.

If PIM does not predict the correct number of deaths in your unit, this may be because the score does not work well in your environment, or because the standard of care in your unit is better or worse than in Australia. Some PICUs have changed the PIM formula so that it predicts outcomes better for their patients. This defeats one of the main purposes of the score, which is to allow you to compare your performance with that of the Australian and UK units that developed it (but you can still use it to look at trends in your own unit over time).

PIM is being collected in large prospective studies in the UK, and in every PICU in Australia and the Netherlands. We intend to use this data to revise PIM. If you decide to use PIM, it would be very helpful if you were to send me your data so that I can check the operation of PIM in a variety of PICUs in a variety of countries. Of course, your data would be kept confidential. Many people have already taken the trouble to send me their data - thank you.