



# Case Mix Programme (CMP)

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## ICNARC Coding Method (ICM) Guide

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## Introduction

The ICM is a structured, numerical method for uniformly coding critical care patients' reasons for admission; assigning unique numerical codes to all conditions/disease processes which commonly necessitate patients' admission to critical care.

The ICM is central to the interpretation, analyses and comparison of data collected across all units. It is one of the key elements in calculating an admission's predicted risk of acute hospital mortality.

### ICM History:

In setting up the CMP, we needed a way of uniformly collecting standardised, comparable data on reasons for admission. The starting point for this came from the UK APACHE II study, which included over 11,000 written, free text, reasons for admission. Reviewing these data highlighted the disadvantages of using free text, where there could be multiple permutations of spelling (e.g. aneurysm produced 11 variations) and different labels used for the same condition (e.g. pneumococcal/bacterial/lobar pneumonia). In light of these flaws it was clear that the use of free text would be unreliable.

A standardised method for recording the reason for admission was therefore required and, following analysis of the UK APACHE II study data, a hierarchical structure was developed to ensure uniform and comparable coding within and across all CMP units.

### ICM Structure:

The resulting hierarchical structure is composed of the following five tiers:

**Type:** has the admission had surgery for the condition being coded?

**System:** which body system is involved?

**Site:** which anatomical site(s) within the body system are involved?

**Process:** what physiological or pathological process is involved?

**Condition:** what is the condition being coded?

Once the theoretical method was in place, it was thoroughly reviewed to ensure that:

- the terminology was consistent; and
- all relevant conditions could be coded.

In addition, to ensure the ICM worked in practice it was tested by a selection of units. Following completion of testing it was released as the CMP system for recording conditions necessitating admission to critical care.

The ICM is designed so that the condition being coded is thought through systematically; drilling down from the system to the anatomical site, then selecting the process involved before coding the final condition.

It is designed to provide the necessary level of detail required to discriminate between conditions as risk factors for acute hospital outcome following critical care, and balances ease of use against utility. Rather than list every known condition (as a system such as ICD10 does), the conditions included in the ICM are those which lead to critical care admission.

Subsequent updates to the original release have updated/expanded the number of conditions and incorporated conditions relevant to specialist critical care units.

## How does the ICM work?

Each tier of the ICM code is represented by a number, reflecting the chosen option for that tier. By working through the tiers, the ICM constructs a unique numerical code which, when complete, relates to a specific condition.

The code is defined and built as follows:

**Type:** has the admission had surgery for the condition being coded?

The ICM code begins by distinguishing whether a patient has had surgery for the condition being coded. This is done by selecting either 1, the patient had surgery for the condition, or 2, they did not.

[Please bear in mind that your local software may capture this information by asking whether surgery was performed rather than representing it numerically. Additionally, some local software may only ask this question after you have selected the system, site, process and condition.]

**System:** which body system is involved?

The ICM codes the body system affected, and each body system has a unique code, e.g. the respiratory system is represented by the number 1.

[As they are frequently recorded, there are also shortcut systems for Poisoning and Trauma]

**Site:** which anatomical site(s) within the body system are involved?

The site tier reflects the specific site within the selected body system, e.g. lungs are always coded using 4, within the respiratory system.

**Process:** what physiological or pathological process is involved?

The process tier reflects the physiological or pathological process which is affecting the specific site. Each process code is the same across every system, e.g. infection will always be coded as 27.

**Condition:** what is the condition being coded?

The final tier of the ICM identifies the specific condition, e.g. Bacterial pneumonia is coded as:

**Type:** *Non-surgical* - 2

**System:** *Respiratory* - 1

**Site:** *Lungs* - 4

**Process:** *Infection* - 27

**Condition:** *Bacterial pneumonia* - 1

The full code for bacterial pneumonia is therefore **2.1.4.27.1**

## Conditions not present in the ICM:

If a condition you are looking for is not available within the ICM then code as far as possible through the tiers and record the name of the specific condition in the text box. This allows rare or unusual conditions to be recorded in a standardised way, reflecting their impact on specific organ systems, e.g. Dengue Fever, which does not have a full code in the ICM, should be recorded as:

**Type:** *Non-surgical – 2*  
**System:** *Haematological/Immunological – 9*  
**Site:** *Blood – 1*  
**Process:** *Infection – 27*

Code: **2.9.1.27**; Text box note – “Primary reason for admission – Dengue Fever”

Codes must be recorded to a minimum of three tiers. It should be possible to code most conditions *not* listed in the ICM as far as four tiers.

## Conditions affecting multiple body systems:

Some conditions can be seen to affect multiple body systems, and therefore can be found in the ICM via multiple paths through the tiers, e.g. myasthenia gravis can be viewed either as a respiratory condition and coded:

**Type:** *Non-surgical - 2*  
**System:** *Respiratory - 1*  
**Site:** *Neuro-muscular junction disorders causing respiratory failure - 8*  
**Process:** *Inflammation – 28*  
**Condition:** *Myasthenia gravis – 1*

Code: **2.1.8.28.1**

or as a musculoskeletal condition and coded:

**Type:** *Non-surgical - 2*  
**System:** *Musculoskeletal - 10*  
**Site:** *Muscles or connective tissue - 3*  
**Process:** *Congenital or acquired deformity or abnormality – 8*  
**Condition:** *Myasthenia gravis – 3*

Code: **2.10.3.8.3**

Where a condition can be coded via multiple paths through the tiers, the weighting in the predicted risk of acute hospital mortality will always be the same, regardless of which path is selected.

## **CMP dataset fields using the ICM:**

There are four fields within the dataset which use the ICM.

### **Primary Reason for Admission to your unit:**

The 'Primary reason for admission to your unit' records the main condition which has necessitated a patient's admission to a critical care unit. As this field is used in the predicted risk of acute hospital mortality, it should only be based on what is known or suspected to be wrong with the patient within the first 24 hours of admission.

### **Secondary Reason for Admission to your unit:**

'Secondary reason for admission to your unit' records any additional condition of lesser severity than the Primary, but still deemed significant to the patient's admission to your unit. This should also be based only on what is known or suspected to be wrong with the patient within the first 24 hours of admission.

### **Other Condition in Past Medical History:**

The 'Other Condition in Past Medical History' field is for specifically recording ongoing, chronic conditions which are not one of the 16 listed past medical history conditions in our dataset, e.g. if a patient has Diabetes mellitus, but was admitted to critical care due to a trauma, the diabetes could be recorded as the Other condition (**2.8.4.10.5**).

Any condition recorded in this field should be of significant clinical importance to the admission's prognosis and be known at or prior to admission.

Do not record conditions in this field which have already been entered as one of the 16 listed past medical history conditions.

This field should not be used to record an additional acute reason for admission.

### **Ultimate Primary Reason for Admission to your unit:**

An 'Ultimate primary reason for admission to your unit' should only be recorded if, after the first 24 hours in your unit, further information comes to light and the reason for admission to the critical care unit can be more accurately or explicitly coded than the original 'Primary reason for admission to your unit';

e.g. if an admission is thought to be suffering from a respiratory infection in the first 24 hours, but at autopsy the underlying cause of death is identified as a lung tumour, the lung tumour can be recorded as the ultimate primary reason for admission.

It must be noted that the 'Ultimate primary reason for admission to your unit' is specifically for changes to or clarification of the primary diagnosis and should not be used to record reasons for admission additional to the primary and secondary codes.

## **Practical guidance on how to use the ICM**

### **More than two conditions**

If an admission is diagnosed with more than two acute conditions you need to prioritise and record only the two which, in the clinician's opinion, led to critical care admission. If the other conditions are still considered relevant they can be named in the text box.

### **Do not duplicate codes**

Codes for conditions should only be recorded once and not duplicated across fields, e.g. do not record the same condition in the 'Primary reason for admission to your unit' and in the 'Other condition in past medical history' field, even if it is applicable to both. Similarly, where a chronic condition meets the criteria of one of the 16 listed conditions in the past medical history, this does not need to be re-recorded in any of the ICM fields; unless it is the primary reason for admission, in which case it needs to be recorded there.

### **If condition is unknown record working diagnosis**

Where a definite diagnosis has not been reached during an admission's first 24 hours in your unit we ask you to look at the motivation to admit the admission to critical care. In these situations, the working diagnosis, the suspected or potential condition affecting the admission, should be recorded as the 'Primary reason for admission to your unit'. We acknowledge that the eventual complete diagnosis may differ from the working diagnosis. In such a scenario the 'Ultimate primary reason for admission to your unit' can be used.

### **Surgical or non-surgical?**

The CMP policy is that only invasive surgical procedures, carried out under general anaesthetic and taking place in the operating theatre environment, should be coded as surgical.

To define an operating theatre we use the NHS data dictionary [definition](#). Using this definition ensures consistency across all participating units.

Where a patient has come to your unit from theatre following surgery, you need to record a surgical code for the condition which necessitated surgery as either the primary or secondary reason for admission.

Record the surgical condition as the 'Primary reason for admission to your unit' if it was the condition which necessitated admission to critical care.

### **Surgical code is not automatically the primary reason!**

If the condition which necessitated surgery alone would not have required admission to critical care, then:

- include the code as the 'Secondary reason for admission to your unit'; and
- record the main underlying reason for admission to critical care as the primary.



e.g. if a patient is undergoing routine surgery, but requires post-op monitoring in critical care due to an existing underlying medical condition, the medical condition should be recorded as primary, as this is why the patient has been admitted to critical care, rather than a standard ward.

This principle also covers potential complications, where the patient is admitted following routine surgery as a precaution against a condition which they are at risk of developing, e.g. a patient admitted as they are at risk of an extubation-related oedema or obstruction.

### **When surgery is abandoned**

If surgery is abandoned after the patient has undergone the induction of anaesthesia, e.g. if the patient goes into anaphylactic shock, then you still need to record a surgical code for the condition they were going to have surgery for. As the anaphylaxis has resulted in the patient's admission to critical care, it should be recorded as the primary reason for admission, with the condition which was planned to be operated on as secondary.

### **Do not try to code surgical procedures**

The ICM is specifically designed to record conditions not procedures. Where an admission has undergone surgery, it is the condition which necessitated surgery which should be coded.

In the case of exploratory surgery, e.g. laparotomy, where no conclusive condition is identified, the suspected condition which prompted the surgery should be coded.

The only exceptions to this rule are the CABG (coronary artery bypass graft) codes. These are included to identify CABG admissions for APACHE II exclusion criteria, and the ICM codes still tell us the relevant condition, e.g.

**Type:** *Surgical - 1*

**System:** *Cardiovascular - 2*

**Site:** *Coronary arteries -1*

**Process:** *Obstruction – 30*

**Condition:** *CABG for acute myocardial infarction – 4*

### **Patients admitted solely for organ donation**

Patients who have been admitted to your unit solely for the purposes of organ donation are excluded from ICNARC model risk-adjusted acute hospital mortality analyses, as they are not in the unit for curative treatment.

In these circumstances the key condition which resulted in the admission's death should be recorded as the 'Primary reason for admission to your unit', with the relevant donation code as the 'Secondary reason for admission to your unit'. The donation codes are:

- **2.4.2.7.6/ 2.1.10.7.6** - *Admission solely for purposes of donation after brainstem death (DBD)*
- **2.4.2.7.10** - *Admission solely for purposes of donation after cardiac death (DCD)*

## **Avoid coding Syndromes**

As syndromes are predominantly descriptive of a group of symptoms related to a specific disease, all attempts should be made to record the underlying condition.

The most common examples are Septic shock and Septicaemia.

These are syndromes which are defined through the presence of infection and organ dysfunction. It is these data which are used to identify severe sepsis in data analyses, not the recording of Septic shock/Septicaemia as the reason for admission. Recording the specific underlying infection, e.g. necrotising fasciitis, more accurately captures the prognosis of the admission.

The ICM codes for septic shock/septicaemia (**2.2.12.35.2** and **2.9.1.27.4** respectively) should only be used when no other information is available. If the underlying condition is identified after the first 24 hours, it should be recorded as the 'Ultimate primary reason for admission to your unit'.

If a patient has neutropenic sepsis due to chemotherapy drugs we advise the use of the code:

**2.9.2.25.2** *Drug induced hypoplasia.*

The Septicaemia and Septic shock codes are included in the ICM as there are rare circumstances where these are the only diagnosis which can be recorded, e.g. if a patient is admitted for spontaneous meningococcal septicaemia (without overt meningitis), then the Septicaemia code (**2.9.1.27.4**) will be valid.

## **Unhelpful terms/coding symptoms**

Avoid trying to code symptoms, e.g. "respiratory arrest" or "low GCS, cause unknown"; all attempts to ascertain and code the underlying condition should be made. ICM codes determine the motivation to admit the patient to critical care, therefore a working clinical diagnosis or the condition the admission is potentially most at risk of should be recorded.

## **Caesarean section**

If a patient has been admitted to your unit from theatre following a caesarean:

- for the 'Primary reason for admission' record the condition that necessitated the patient's admission to your unit, e.g. "Pre-eclampsia" (**2.7.4.41.3** or **2.2.12.19.5**); and
- for the 'Secondary reason for admission' record "Normal pregnancy" using a surgical code (**1.7.4.55.1**).

## Analyses, Audit and Research

The ICM is central to the interpretation, analyses and comparison of CMP data.

### Risk prediction

Primary reason for admission to your unit is a key contributor to the calculation of predicted risk of acute hospital mortality in the ICNARC model, through weightings for:

- categorical combinations of body system and pathological/physiological process; and
- individual conditions.

Other factors include first 24-hour physiology, age, past medical history, mechanical ventilation and source of admission. Additionally, interactions between fields are reviewed, including interactions between specific conditions coded through the ICM and relevant physiology data. See the [ICNARC model](#) document on our website for more information.

### Facilitating audit and research

Another common application of the ICM is in facilitating targeted audit and research, e.g. during the 2009 Swine flu (H1N1) pandemic, we conducted the Swine Flu Triage (SwiFT) study monitoring the impact the pandemic had on critical care services during this time. Here the ICM was used to identify admissions with H1N1 in CMP data. Swine flu admissions were also audited using the same method in 2010.

Should the need arise to monitor any future pandemic, specific pandemic codes have been added to the ICM so that relevant admissions can be easily identified. The codes are:

**2.1.1.27.10/ 2.1.2.27.11/ 2.1.4.27.10** - *Pandemic influenza, suspected*

**2.1.1.27.11/ 2.1.2.27.12/ 2.1.4.27.11** - *Pandemic influenza, confirmed*

These codes are specifically for use during a pandemic study, and if such a study were to be conducted we would advise you in advance of this to use these codes. Outside of any such study the codes are invalid for CMP admissions and should **not** be recorded.

Reason for admission codes also allow for the identification of specific admission groups, e.g. admissions with pneumonia or trauma.

### Updating the ICM

The ICM is periodically reviewed and updated with contemporary critical care diagnoses and medical terminology to ensure it is of maximum benefit to the CMP. This requires a review of incomplete diagnosis codes and text box comments, meetings of clinicians, and a literature review to determine any additional conditions that require complete codes. In addition to the ICM updates, ongoing development of the ICNARC risk prediction model considers new interactions involving reasons for admission and other variables collected in the dataset.

## Queries/Additional Resources

If there are admissions you are unsure how to code, or there are conditions which you cannot find in the ICM, please contact your Case Officer, who can seek coding advice from our clinical lead if required.

An ICM builder can be found on our website [here](#).

## Contact us

If you have any questions about this document and its contents, please contact us.

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