

Number of sepsis admissions to critical care and associated mortality, 1 April 2010 – 31 March 2013

Question

How many sepsis admissions to an adult, general critical care unit in England, Wales and Northern Ireland participating in the Case Mix Programme (CMP) were there, categorised into three criteria of sepsis, and what was the associated mortality, between 1 April 2010 and 31 March 2013?

Background to the ICNARC Case Mix Programme

The Intensive Care National Audit & Research Centre (ICNARC) was established in 1994 on a two-year (1994-1995), pump-priming grant from the Department of Health (England) and Welsh Health Common Services Authority (Wales), ICNARC became an independent Registered Charity in July, 1994 (Registered Charity Number: 1039417).

ICNARC's aim is to foster improvements in the organisation and practice of adult critical care (intensive and high dependency care) to improve patient care and outcomes. Towards achieving part of this aim, ICNARC coordinates a national, comparative audit of patient outcomes from adult, critical care units in England, Wales and Northern Ireland known as the Case Mix Programme (CMP). Currently, 95% of adult, general critical care units in England, Wales and Northern Ireland are participating in the CMP.

The CMP is a voluntary, performance assessment programme using high quality clinical data to facilitate local quality improvement through routine feedback of comparative outcomes and key quality indicators to clinicians/managers in adult critical care units.

The CMP recruits predominantly adult, general critical care units. Adult, general critical care units are defined as either standalone intensive care units (ICUs) or combined intensive care/high dependency units (ICU/HDUs). Participation in the CMP is entirely voluntary.

CMP specified data are recorded prospectively and abstracted retrospectively by trained data collectors according to precise rules and definitions - set out in the ICNARC Case Mix Programme Dataset Specification. Data collectors from each unit are trained prior to commencing data collection with retraining of existing staff, or training of new staff, also available. CMP training courses are held at least four times per year.

CMP specified data are collected on consecutive admissions to each participating critical care unit and are submitted to ICNARC quarterly. Data are validated locally, on data entry, and then undergo extensive central validation, for completeness, illogicalities and inconsistencies, with data validation reports returned to units for correction and/or

confirmation. The validation process is repeated until all queries have been resolved and then the data are incorporated into the CMP Database (CMPD).

Participating units receive comparative data analysis reports on outcomes and key quality indicators, in which they can identify their own unit data and compare with all units participating in the CMP. In addition, staff at units can interrogate the CMPD by submitting analysis requests which are provided free-of-charge.

Data collected for the CMP include alphanumeric unit/admission identifiers, demographics (e.g. age, sex, ethnicity), case mix (e.g. acute severity, comorbidity, surgical status, reason for admission), outcome (e.g. unit/acute hospital survival) and activity (e.g. unit/acute hospital length of stay) for each admission to each critical care unit.

Available data for report

383,314 admissions to 211 adult, general critical care units between 1 April 2010 and 31 March 2013.

Selection of cases

All adult, general critical care unit admissions in England, Wales and Northern Ireland participating in the Case Mix Programme (CMP) between 1 April 2010 and 31 March 2013.

Definitions for variables included

UK financial year was defined as twelve months beginning 1 April and ending 31 March.

Hypotension was defined as systolic blood pressure (SBP) <90 mmHg or mean arterial pressure (MAP) <70 mmHg.

An admission was identified as receiving advanced cardiovascular support if the number of calendar days of advanced cardiovascular support (recorded for the Critical Care Minimum Dataset) was at least one. One calendar day of advanced cardiovascular support was considered to be advanced cardiovascular support at any point in a calendar day (00:00 to 23:59) with any part-days considered as total calendar days.

Critical care unit mortality was defined as the status at discharge from the critical care unit.

Acute hospital mortality was defined as the status at ultimate discharge from acute hospital, wherever.

The Case Mix Programme Database (CMPD) contains data that were collected, primarily, for case mix adjustment. Virtually all of the admission data relates to the first 24 hours following admission to the critical care unit, with some data on medical history and reasons for admission. Thus, the CMPD can be used to identify admissions that had sepsis or severe sepsis at admission to the unit or that developed sepsis or severe sepsis during the first 24

hours in the unit, but cannot be used to identify admissions that developed sepsis or severe sepsis after the first 24 hours following admission to the unit.

Sepsis was defined as meeting at least three of the four systemic inflammatory response syndrome (SIRS) criteria during the first 24 hours following admission to the critical care unit, plus evidence of infection from the primary or secondary reason for admission to the critical care unit.

Physiological definitions of the SIRS criteria and organ dysfunctions were matched as closely as possible to those used in the PROWESS trial.¹ These are summarised in Table 1.

The definitions have been modified slightly from those used in previous publications from the CMPD,^{2,3} to ensure compatibility across versions of the Case Mix Programme Dataset.

Table 1: Definitions of the criteria for systemic inflammatory response syndrome (SIRS), infection, and organ dysfunction used in the PROWESS trial and in the Case Mix Programme Database (CMPD)

	PROWESS trial¹	CMPD
SIRS	Satisfaction of SIRS criteria required three of the following to be present within a 24-hour period:	Satisfaction of SIRS criteria required three of the following to be present within the first 24 hours in the critical care unit:
Temperature	Core temperature >38.0°C or <36.0°C. If only oral or axillary temperature available, 0.5°C added to measured value. Hypothermia must be confirmed by a rectal or central temperature.	Central temperature >38.0°C or <36.0°C. If only non-central temperature available, 0.5°C added to measured value. Hypothermia must be confirmed by a central temperature.
Heart rate	>90 beats min ⁻¹ . If patients have a medical condition or are receiving treatment that would prevent tachycardia, patient only needed to meet two of the remaining SIRS criteria.	>90 beats min ⁻¹ . If heart block or myxoedema is recorded reason for admission, only two of the remaining SIRS criteria need be met.
Respiratory rate	>20 breaths min ⁻¹ or PaCO ₂ <32 mmHg or mechanical ventilation for an acute process.	>20 breaths min ⁻¹ or PaCO ₂ <32 mmHg (<4.3 kPa) in a non-ventilated admission or mechanical ventilation in the first 24 hours in an admission not previously receiving home ventilation.
White cell count	>12,000 mm ⁻³ or <4,000 mm ⁻³ or >10% immature neutrophils on a differential count.	>12,000 mm ⁻³ or <4,000 mm ⁻³ .
Infection	Known or suspected infection.	Diagnosis of infection as primary or secondary reason for ICU admission.

¹ Bernard GR, Vincent JL, Laterre PF, LaRosa SP, Dhainaut JF, Lopez-Rodriguez A et al. Efficacy and safety of recombinant human activated protein C for severe sepsis. *N Engl J Med* 2001; 344:699–709.

² Padkin A, Goldfrad C, Brady AR, Young D, Black N, Rowan K. Epidemiology of severe sepsis occurring in the first 24 hrs in intensive care units in England, Wales, and Northern Ireland. *Crit Care Med* 2003; 31:2332–8.

³ Harrison DA, Welch CA, Eddleston J. The epidemiology of severe sepsis in England, Wales and Northern Ireland, 1996 to 2004: secondary analysis of a high quality clinical database, the ICNARC Case Mix Programme Database. *Crit Care* 2006; 10:R42.

Results

Table 2 details the total number of admissions to adult, general critical care units in England, Wales and Northern Ireland participating in the CMP by financial year, between 1 April 2010 and 31 March 2013.

Table 3 details the total number of sepsis admissions to critical care and associated mortalities for three categories of sepsis admissions: those with hypotension; those with advanced cardiovascular support; and those with both hypotension and advanced cardiovascular support.

Table 2: Total number of admissions to critical care by financial year, 1 April 2010 to 31 March 2013

	2010/11	2011/12	2012/13
Total number of patients*	112,336	127,166	126,689
Total number of admissions	117,366	133,206	132,742

* excluding readmissions within the same hospital stay

Table 3: Total number of sepsis admissions to critical care and associated mortalities by financial year, 1 April 2010 to 31 March 2013

	2010/11	2011/12	2012/13
Hypotension			
Total number of admissions, (%)	11,584 (9.9)	12,810 (9.6)	13,246 (10.0)
Critical care unit mortality, (%)	2,084 (18.0)	2,267 (17.7)	2,414 (18.2)
Acute hospital mortality*, (%) [N]	3,049 (28.5) [10,709]	3,247 (27.6) [11,747]	3,463 (28.3) [12,222]
Advanced cardiovascular support			
Total number of admissions, (%)	1,285 (1.1)	1,117 (0.8)	1,100 (0.8)
Critical care unit mortality, (%)	435 (33.9)	389 (34.8)	354 (32.2)
Acute hospital mortality*, (%) [N]	509 (43.4) [1,172]	451 (45.0) [1,003]	421 (41.8) [1,006]
Hypotension and advanced cardiovascular support			
Total number of admissions, (%)	8,486 (7.2)	8,579 (6.4)	8,437 (6.4)
Critical care unit mortality, (%)	3,753 (44.2)	3,682 (42.9)	3,637 (43.1)
Acute hospital mortality*, (%) [N]	4,330 (54.1) [8,002]	4,238 (53.0) [7,997]	4,120 (52.2) [7,890]

* excluding readmissions within the same hospital stay

#: percentage; N: total number of admissions

Acknowledgement

Please acknowledge the source of these data in all future presentations (oral and/or written), as follows:

“These data derive from the Case Mix Programme Database. The Case Mix Programme is the national, comparative audit of patient outcomes from adult critical care coordinated by the Intensive Care National Audit & Research Centre (ICNARC). These analyses are based on data for 383,314 admissions to 211 adult, general critical care units based in NHS hospitals geographically spread across England and Wales. For more information on the representativeness and quality of these data, please contact ICNARC.”