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# Deliverable N. 6

# Detailed sheets of the collected outcome indicators (long list)

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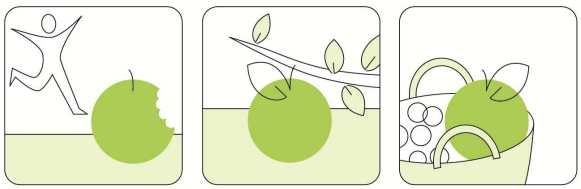

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# Introduction

The following are some of the potential uses of outcome information:

- for clinical decision-making and audit of clinical work, including audit and management of health professionals' practice and research;
- For informing decisions about the strategic and operational development of services;
- for comparisons of organizations in the delivery of services which may be provider based or population based;
- for assessing progress towards nationally or locally agreed standards or targets for health outcomes, which may be identified from the research literature or set by clinical and managerial decisions.

The availability of instruments and methods that measure the Outcome of Health interventions, aimed at prevention, diagnosis, therapy and rehabilitation, can help public health managers by allowing:

- the comparative evaluation of the structures responsible for the intervention (hospitals, Local Health Units, etc.);
- the study of the empirical relations between the structural characteristics of the Unit that is responsible for the intervention and the modalities of the intervention on one hand and the efficacy of provided healthcare on the other;
- the evaluation of the effectiveness of treatments and technologies of proven theoretical efficacy in clinical practice compared with other treatments of less proven efficacy.

Health indicators are more likely to be successful if they fit naturally into the everyday duties of health care professionals than when they are collected as a separate activity. The aim is to have indicators that are:

- relevant because professionals use them daily in treating their patients and will record them accurately;
- reliable because they can be validated or cross checked from other sources;
- responsive because they readily identify changes in the patient's state of health;
- research-based because there is a plausible link between processes of care and outcome.

A key criterion for the selection of indicators is the choice between:

a) A requirement for the work to be based on routinely available data. This practical constraint means that the recommended indicators are selected as an opportunistic rather than an ideal set and yields a bias towards outcomes which may be measurable now but which may not necessarily be those which are most appropriate and most needed.
b) A requirement for developing 'ideal' outcome indicators without confining recommendations to data which have been routinely available in the past.

Following the indications arisen from "Progetto Mattoni – Misura dell'Outcome"[1] (Mattoni Project – Outcome Evaluation), previously conducted in Italy from 2002 to 2005, for each outcome indicator studied, a sheet containing a number of facts characterizing the indicator was prepared during 2006. A general format has been adopted for the sheet that reports a number of items for each indicator, so as to simplify the comparison and standardization of different indicators:

- Definition of the indicator;
- Rationale of the indicator: a brief statement of the reasons and objectives behind the indicator, both in terms of the issues it addresses and its selection from a range of potential alternatives;
- Numerator;
- Denominator;
- Statistical methods to be performed to calculate the indicator;
- How to use: it contains some indications about possible uses and comparisons made possible by the indicator.

[1] For further information about Mattoni Project please visit the website: http://www.nsis.ministerosalute.it/mattoni/paginaInternaMenuMattoni.jsp?id=11&menu=mattoni

# List of Indicators

| Category | | N. | Indicator | P (*) | T (*) | Numerator | Denominator |
|---|---|---|---|---|---|---|---|
| A. CARDIOVASCULAR DISEASE AND SURGERY | A | 1 | Emergency readmission to hospital following treatment for a stroke | * | * | The number of emergency admissions within 0-27 days (inclusive), previous discharge from hospital following treatment for a stroke (excluding psychiatric and obstetric readmission episodes). | The number of discharges following treatment for a stroke, excluding those where discharge is coded as death. |
| | A | 2 | Death within 30 days of admission to hospital with a stroke | * | * | The number of emergency admissions for patients with a primary diagnosis of stroke (ICD 10 codes I61-I64) on admission, where the patient dies in hospital and after discharge between 0-29 days (inclusive) of admission. | The number of emergency admissions for patients of all ages with a primary diagnosis on admission of stroke (ICD 10 codes I61-I64). |
| | A | 3 | In-hospital deaths following Coronary Artery Bypass Graft (CABG) operation | * | * | The number of ordinary admissions with CABG where the patient dies in hospital (before the discharge). | The number of ordinary hospital admissions with CABG. |
| | A | 4 | Death within 30 days of Coronary Artery Bypass Graft (CABG) operation | * | * | The number of ordinary admissions with CABG where the patient dies in hospital or after discharge, between 0-29 days (inclusive) after the first eligible procedure. | The number of ordinary hospital admissions where CABG was performed. |
| | A | 5 | In-hospital deaths following Percutaneous Transluminal Coronary Angioplastic (PTCA) operation | * | * | The number of ordinary admissions with PTCA where the patient dies in hospital (before the discharge). | The number of ordinary hospital admissions with PTCA. |
| | A | 6 | Death within 30 days of Percutaneous Transluminal Coronary Angioplastic (PTCA) operation | * | * | The number of ordinary admissions with PTCA where the patient dies between 0-29 days (inclusive) of the procedure, included deaths in hospital and after discharge. | The number of ordinary hospital admissions with PTCA. |
| | A | 7 | Death within 6 months of Percutaneous Transluminal Coronary Angioplastic (PTCA) operation | * | * | The number of ordinary admissions with PTCA where the patient dies between 0-6 months (inclusive) of the procedure, included deaths in hospital and after discharge. | The number of ordinary hospital admissions with PTCA. |
| | A | 8 | Death within 12 months of Percutaneous Transluminal Coronary Angioplastic (PTCA) operation | * | * | The number of ordinary admissions with PTCA where the patient dies between 0-12 months (inclusive) of the procedure, included deaths in hospital and after discharge. | The number of ordinary hospital admissions with PTCA. |
| | A | 9 | In-hospital deaths following admission to hospital with Acute Myocardial Infarction (AMI) | | | The number of emergency admissions for patients aged over 18 with a primary diagnosis of AMI on admission, where the patient dies in hospital (before the discharge). | The number of emergency admissions for patients aged over 18, with a primary diagnosis of AMI. |
| | A | 10 | Death within 30 days of admission to hospital with an Acute Myocardial Infarction (AMI) | * | * | The number of emergency admissions for patients aged over 18 with a primary diagnosis of AMI on admission, where the patient dies in hospital and after discharge between 0-29 days (inclusive) of admission. | The number of emergency admissions for patients aged over 18 with a primary diagnosis of AMI. |
| | A | 11 | Death within 30 days of admission to hospital with Congestive Heart Failure (CHF) | * | * | The number of emergency admissions for patients aged over 18 with a primary diagnosis of CHF on admission, where the patient dies in hospital and after discharge between 0-29 days (inclusive) of admission. | The number of emergency admissions for patients aged over 18 with a primary diagnosis of CHF. |
| | A | 12 | Hospital admission for Congestive Heart Failure (CHF) | * | | The number of ordinary admission episodes for patients aged over 18 with a primary diagnosis of CHF. | Resident population aged over 18. |
| | A | 13 | In-hospital deaths and neurological complications following carotid stenting procedures | | | The number of ordinary admissions with carotid stenting where the patient dies or has neurological complication in hospital (before the discharge). | The number of ordinary hospital admissions with carotid stenting. |
| | A | 14 | Deaths and neurological complications within 30 days from carotid stenting procedures | | | The number of ordinary admissions with carotid stenting where the patient dies or has neurological complications in hospital and after discharge between 0-29 days (inclusive) of admission. | The number of ordinary hospital admissions with carotid stenting. |

(*) P = Population; T = Trust

| Category | | N. | Indicator | P (*) | T (*) | Numerator | Denominator |
|---|---|---|---|---|---|---|---|
| B. CANCER | B | 1 | Breast cancer relative survival | * | | The observed five year survival rate of patients diagnosed with breast cancer. | The expected survival rate among a population with the same age structure. |
| | B | 2 | Lung cancer relative survival | * | | The observed five year survival rate of patients diagnosed with lung cancer. | The expected survival rate among a population with the same age structure. |
| | B | 3 | Colon cancer relative survival | * | | The observed five year survival rate of patients diagnosed with colon cancer. | The expected survival rate among a population with the same age structure. |
| C. INFECTIOUS DISEASES | C | 1 | Emergency admissions to hospital of children with lower respiratory infections | * | | The number of emergency admissions of children aged under 16 with lower respiratory tract infections. (Primary diagnosis – ICD 10 codes: J10.0, J11.0, J11.1,J12.-,J13,J14,J15.-,J16.-,J18.0,J18.1,J18.9,J21.-). | Resident population aged under 16. |
| | C | 2 | AIDS survival | * | | The observed 1/2/5 year survival rate of patients diagnosed with AIDS. | The expected survival rate among a population with the same age structure. |
| | C | 3 | Death within 30 days of admission to hospital with pneumonia | * | * | The number of admissions for patients with a primary diagnosis of pneumonia where the patient dies in hospital and after discharge between 0-29 days (inclusive) of admission. | The number of admissions for patients of all ages with a primary diagnosis of pneumonia. |
| | C | 4 | Hospital admissions for paediatric gastroenteritis | * | | The number of ordinary admission episodes for children aged under 18 diagnosed with paediatric gastroenteritis. | Resident population aged under 18. |
| | C | 5 | Hospital admissions for influenza | * | | The number of ordinary admission episodes for patients diagnosed with influenza. | Resident population. |
| | C | 6 | Hospital admissions for tuberculosis | * | | The number of ordinary admission episodes for patients diagnosed with tuberculosis. | Resident population. |
| D. OTHER CHRONIC DISEASES | D | 1 | Hospital admissions for uncontrolled diabetes | * | | The number of ordinary admission episodes for patients aged over 18 diagnosed with uncontrolled diabetes. | Resident population aged over 18. |
| | D | 2 | Hospital admissions for short term complications of diabetes | * | | The number of ordinary admission episodes for patients aged over 18 diagnosed with short term complications of diabetes. | Resident population aged over 18. |
| | D | 3 | Hospital admissions for long term complications of diabetes | * | | The number of ordinary admission episodes for patients aged over 18 diagnosed with long term complications of diabetes. | Resident population aged over 18. |
| | D | 4 | Hospital admissions for lower extremity amputations in patients with diabetes | * | | The number of ordinary admission episodes for lower extremity amputations in patients aged over 18 with diabetes. | Resident population aged over 18. |
| | D | 5 | Hospital admissions for adult asthma | * | | Discharged patients aged over 18 and under 65 with ICD-9-CM principal diagnosis codes for asthma. Patients with any diagnosis code of cystic fibrosis and anomalies of the respiratory system, transferring from another institution, or Major Diagnostic Category (MDC) 14 (pregnancy, childbirth, and puerperium) are excluded. | Population aged over 18 and under 65 in a selected area or country. |
| | D | 6 | Hospital admissions for paediatric asthma | * | | Discharged patients aged under 18 years with ICD-9-CM principal diagnosis codes for asthma. Patients with any diagnosis code of cystic fibrosis and anomalies of the respiratory system, transferring from another institution, or Major Diagnostic Category (MDC) 14 (pregnancy, childbirth, and puerperium) are excluded. | Population aged under 18 in a selected area or country. |
| | D | 7 | Hospital admissions for senile asthma | * | | Discharged patients aged 65 years and older with principal diagnosis codes for asthma. Patients with any diagnosis code of cystic fibrosis and anomalies of the respiratory system, transferring from another institution, or Major Diagnostic Category (MDC) 14 (pregnancy, childbirth, and puerperium) are excluded. | Population aged 65 years and older in selected area or country. |

(*) P = Population; T = Trust

| Category | | N. | Indicator | P (*) | T (*) | Numerator | Denominator |
|---|---|---|---|---|---|---|---|
| E. ORTHOPAEDICS | E | 1 | Emergency readmission to hospital following treatment for a fractured hip | * | * | The number of emergency admissions within 0-27 days (inclusive), previous discharge from hospital (excluding psychiatric and obstetric readmission episodes). | The number of discharges excluding those coded under mental health and obstetric specialities and those where discharge is coded as death. |
| | E | 2 | Death within 30 days of admission to hospital with a fractured hip | * | * | The number of emergency admissions for patients aged 65 years and over with a primary diagnosis on admission of fractured proximal femur (ICD 10 codes S72.0,S72.1 and S72.2) where the patient dies in hospital and after discharge between 0-29 days (inclusive) of admission. | The number of emergency admissions for patients aged 65 years and over with a primary diagnosis on admission of fractured proximal femur (ICD 10 codes S72.0,S72.1 and S72.2). |
| | E | 3 | In-hospital death following admission with a fractured hip | | | The number of emergency admissions for patients aged 65 years and over with a primary diagnosis on admission of fractured proximal femur (ICD 10 codes S72.0, S72.1 and S72.2) where the patient dies in hospital (before the discharge). | The number of emergency admissions for patients aged 65 years and over with a primary diagnosis on admission of fractured proximal femur (ICD 10 codes S72.0,S72.1 and S72.2). |
| | E | 4 | Returning home following hospital treatment for fractured hip | | * | The number of emergency admissions for patients aged 65 years and over with a primary diagnosis on admission of fractured proximal femur (ICD 10 codes S72.0, S72.1 and S72.2 – see denominator data) where the patient is discharged to the pre-admission category of accommodation between 0 and 27 days (inclusive) of admission. | The number of emergency admissions for patients aged 65 years and over with a primary diagnosis on admission of fractured proximal femur (ICD 10 codes S72.0, S72.1 and S72.2). The denominator excludes admissions where the first episode has an admission source coded other than 19, 29, 30, 37, 38, 48, 50, 54, 65, 66, 69, 84, 85, 86, 88, 89. |
| | E | 5 | In-hospital waiting time for femur fracture surgery | | * | The number of patients aged 65 and over admitted to the hospital with a diagnosis of upper femur fracture with surgery initiated within 48 hours. | The number of patients aged 65 and over admitted to the hospital with a diagnosis of upper femur fracture. |
| | E | 6 | Total hip replacement in-hospital mortality rate | | * | The number of in-hospital deaths with a code of total hip replacement in any procedure field (ICD-9-CM procedure code: 81.51 total hip replacement). | All discharges with a procedure code of total hip replacement in any field (ICD-9-CM procedure code: 81.51 total hip replacement). |
| | E | 7 | Partial hip replacement in-hospital mortality rate | | * | The number of in-hospital deaths with a code of partial hip replacement in any procedure field (ICD-9-CM procedure code: 81.52 partial hip replacement). | All discharges with a procedure code of partial hip replacement in any field (ICD-9-CM procedure code: 81.52 partial hip replacement). |
| | E | 8 | Revision rate | | | Number of revisions (= exchange or removal of at least a part of the implant) at follow-up period X. | Total number of primary implantations included in the evaluation sample. |
| | E | 9 | Revision burden rate | | | Number of revisions (= exchange or removal of at least a part of the implant) in a period. | Number of all operations (primary and revision). |
| F. TRANSPLANTATIONS | F | 1 | Medulla ossium graft relative survival | * | * | The five year survival rate of patients after the medulla ossium graft transplantation procedure. | The expected survival rate among a population with the same age structure. |
| | F | 2 | Liver transplantation relative survival | * | * | The five year survival rate of patients after the liver transplantation procedure. | The expected survival rate among a population with the same age structure. |
| | F | 3 | Heart transplantation relative survival | * | * | The five year survival rate of patients after the heart transplantation procedure. | The expected survival rate among a population with the same age structure. |
| | F | 4 | Lung transplantation relative survival | * | * | The five year survival rate of patients after the lung transplantation procedure. | The expected survival rate among a population with the same age structure. |
| | F | 5 | Kidney transplantation relative survival | * | * | The five year survival rate of patients after the kidney transplantation procedure. | The expected survival rate among a population with the same age structure. |

(*) P = Population; T = Trust

| Category | | N. | Indicator | P (*) | T (*) | Numerator | Denominator |
|---|---|---|---|---|---|---|---|
| G. EMERGENCY | G | 1 | Emergency admission to hospital | * | | The number of emergency admissions to hospital. | Population resident in a selected area or country. |
| | G | 2 | Emergency readmissions to hospital within 28 days | * | * | The number of emergency admissions within 0-27 days (inclusive), previous discharge from hospital. The readmission where the patient dies is included, but patients with any mention of a cancer diagnosis or chemotherapy for cancer, or Major Diagnostic Category (MDC) 14 (pregnancy, childbirth, and puerperium), or mental health specialties are excluded. Day cases are also excluded. | The number of discharges from every hospital. The following cases are excluded from the calculation of the denominator: - patients discharged as deceased;- day cases;- patients discharged with mention of mental health;- patients discharged with any mention of cancer or cancer related pathologies or treatment;- patients discharged with Major Diagnostic Category (MDC) 14 (pregnancy, childbirth, and puerperium). |
| | G | 3 | Emergency hospital admissions for alcohol related pathologies | | * | The number of emergency admission episodes for patients with principal and secondary diagnosis for alcohol related pathologies (ICD9-CM 291;303;305.0;357.5;425.5;535.3). | Resident population. |
| H. NEONATAL/MATERNAL | H | 1 | Maternal mortality rate | * | | The number of deaths of women while pregnant or within 42 days of termination of pregnancy. | Number of live births in year of analysis. |
| | H | 2 | Neonatal / Infant mortality rate | * | | The number of children dying under 28 days / one year of age. | The number of live births. |
| | H | 3 | Perinatal mortality rate | * | | The number of perinatal deaths. The perinatal period starts as the beginning of foetal viability (28 weeks gestation or 1,000g) and ends at the end of the 7$^{th}$ day after delivery. Perinatal deaths are the sum of stillbirths plus early neonatal deaths. | The number of live or death births. |
| | H | 4 | Perinatal intensive care mortality rate | | * | The number of perinatal deaths admitted in intensive care unit. The perinatal period starts as the beginning of foetal viability (28 weeks gestation or 1,000g) and ends at the end of the 7$^{th}$ day after delivery. Perinatal deaths are the sum of stillbirths plus early neonatal deaths. | The number of live or death births. |
| | H | 5 | Percentage of births carried out by caesarean section | * | * | The number of births carried out by caesarean section. | The number of births. |
| I. MISCELLANEA | I | 1 | Death within 30 days of surgery (elective and non-elective admissions) | * | * | The number of discharges with elective/non-elective admission records where the patient dies between 0 - 29 days (inclusive) of the first procedure while hospitalized. | The number of discharges records with elective/non-elective admissions, where an eligible operative procedure was performed. Day cases are excluded. |
| | I | 2 | Hospital admissions for alcohol related pathologies | | * | The number of ordinary admission episodes for patients with principal and secondary diagnosis for alcohol related pathologies (ICD9-CM 291; 303;305.0;357.5;425.5;535.3). | Resident population. |

(*) P= Population; T=Trust

# A: CARDIOVASCULAR DISEASE AND SURGERY

## A1: Emergency readmission to hospital following treatment for a stroke

Percentage of patients of all ages with emergency readmission to any hospital within 27 days (inclusive) of the last, previous discharge from hospital after admission with a stroke.

**RATIONALE:** Not all emergency readmissions after a previous discharge from hospital, and after admission with a stroke, were part of originally planned treatments, and some could have been potentially avoided. This indicator may be useful to identify those situations and/or trusts where there is a number of higher than expected emergency readmissions.

**NUMERATOR:** The number of emergency admissions within 0-27 days (inclusive), previous discharge from hospital following treatment for a stroke (excluding psychiatric and obstetric readmission episodes).

**DENOMINATOR:** The number of discharges following treatment for a stroke, excluding those where discharge is coded as death.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Emergency readmissions following treatment for a stroke may vary between organizations because of many factors. Age and gender standardization is highly recommended to account for at least those aspects of case mix which can be certainly identified.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

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## A2: Death within 30 days of admission to hospital with a stroke

The number of patients who die within 30 days after previous emergency admission to hospital with a stroke (includes deaths in hospital and after discharge).

**RATIONALE:** Some people with stroke die before they can be admitted to hospital. However, there are wide variations between hospitals and populations in death rates among those who survive long enough to be admitted, and some of these deaths may potentially be preventable. This indicator may help to identify the most critical situations.

**NUMERATOR:** The number of emergency admissions for patients with a primary diagnosis of stroke (ICD 10 codes I61-I64) on admission, where the patient dies in hospital and after discharge between 0-29 days (inclusive) of admission.

**DENOMINATOR:** The number of emergency admissions for patients of all ages with a primary diagnosis on admission of stroke (ICD 10 codes I61-I64).

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Death rate following treatment for a stroke may vary between organizations because of many factors. Age and gender standardization is highly recommended to account for at least those aspects of case mix which can be certainly identified.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


- NHS - National Centre for Health Outcomes Development. *Clinical and Health Outcomes Knowledge Base* Available from: http://www.nchod.nhs.uk
- Roberts SE, Goldacre MJ. Case fatality rates after admission to hospital with stroke: linked database study. *BMJ* 2003;326:193-4

## A3: In-hospital deaths following Coronary Artery Bypass Graft (CABG) operation

Rate of deaths occurring in hospital after Coronary Artery Bypass Graft (CABG).

**RATIONALE:** It has been fully demonstrated that mortality rate after CABG represents a good indicator of performances in cardio-surgery departments as a whole.

It has been shown that some deaths are also related to shortcomings in health care.

This indicator could be useful in preventing such potentially avoidable deaths by comparing mortality rates of different hospitals/populations and identifying situations where the number of observed deaths results higher/lower than expected.

**NUMERATOR:** The number of ordinary admissions with CABG where the patient dies in hospital (before the discharge).

**DENOMINATOR:** The number of ordinary hospital admissions with CABG.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

In-hospital death rate following CABG procedure may vary between organizations because of many factors. Age, gender and type of procedure (isolated or associated to other procedures CABG) standardization or stratification is highly recommended to account for at least those aspects of case mix which can be certainly identified.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


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- New York State Department of Health. *Adult Cardiac Surgery in New York State 2000-2002.* Albany, NY: New York State Department of Health; October 2004.

## A4: Death within 30 days of Coronary Artery Bypass Graft (CABG) operation

Rate of deaths occurring (both in hospital and following discharge) within 30 days of a Coronary Artery Bypass Graft (CABG).

**RATIONALE:** It has been fully demonstrated that mortality rate after CABG represents a good indicator of performances in cardio surgery departments as a whole. It has been shown that some deaths are also related to shortcomings in health care. This indicator could be useful in preventing such potentially avoidable deaths by comparing mortality rates of different hospitals/populations and identifying situations where the number of observed deaths results higher/lower than expected.

Mortality rates may vary among different organizations because of different discharge policies. Hospitals/populations where discharges occur earlier could present lower rates but this may not mean better performances. For these reasons, it is more appropriate to consider 30 day mortality rates rather than in-hospital rates when comparing hospitals and/or organizations.

**NUMERATOR:** The number of ordinary admissions with CABG where the patient dies in hospital or after discharge, between 0-29 days (inclusive) after the first eligible procedure.

**DENOMINATOR:** The number of ordinary hospital admissions where CABG was performed.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Death rate following CABG procedure may vary between organizations because of many factors. Age, gender and type of procedure (isolated or associated to other procedures CABG) standardization or stratification is highly recommended to account for at least those aspects of case mix which can be certainly identified.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


- DeBuono BA *et al.* Cardiac Surgery Reporting System Analysis Workgroup. *Coronary Artery By-Pass Surgery in New York State 1994-1996.* New York State Department of Health; 1998.
- Iezzoni LI, Ash AS, Shwartz M, Daley J, Hughes JS, Mackierman YD. Judging hospitals by severity-adjusted mortality rates: the influence of the severity-adjustment method. *Am J Public Health* 1996;86:1379-87.
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- New York State Department of Health. *Adult Cardiac Surgery in New York State 2000-2002.* Albany, NY: New York State Department of Health; October 2004.

## A5: In-hospital deaths following Percutaneous Transluminal Coronary Angioplastic (PTCA) operation

Rate of deaths occurring in hospital following a PTCA operation.

**RATIONALE:** Percutaneous transluminal coronary angioplasty (PTCA) is an increasingly common procedure that should be performed by operators with advanced technical skills. A successful PTCA should achieve angiographic success (substantial enlargement of the lumen at the target site) without in-hospital major clinical complications (e.g., death, acute myocardial infarction, emergency coronary artery bypass surgery) during hospitalization. It has been demonstrated that better processes of care may reduce short-term mortality. Higher procedural volumes have been associated with better outcomes, especially when PTCA must be performed in a timely fashion in patients with ST-Elevation Myocardial Infarction (STEMI). ACC/AHA guidelines suggest that the procedure should be supported by experienced personnel in an appropriate laboratory environment (a laboratory that performs more than 200 PTCA procedures per year, of which at least 36 are primary PTCA for STEMI).

This indicator compares mortality rates of different hospitals/populations and identifies situations where the number of observed deaths is higher/lower than expected. It serves as a useful starting point to raise questions about mortality following PTCA, and which might merit further investigation.

Mortality rates may vary among different organizations because of different discharge policies: lower rates may be observed for hospitals where discharges occur earlier. Therefore, the 30 day mortality rate should be preferred over in-hospital mortality rate when comparing hospitals and/or organizations.

**NUMERATOR:** The number of ordinary admissions with PTCA where the patient dies in hospital (before the discharge).

**DENOMINATOR:** The number of ordinary hospital admissions with PTCA.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

In-hospital death rate following PTCA procedure may vary between organizations because of many factors, such as age, gender, multilevel angioplasty, unstable angina, congestive heart failure and comorbidities. Standardization or stratification is highly recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

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## A6: Death within 30 days of Percutaneous Transluminal Coronary Angioplastic (PTCA) operation

Rate of deaths occurring within 30 days of a PTCA operation.

**RATIONALE:** Percutaneous transluminal coronary angioplasty (PTCA) is an increasingly common procedure that should be performed by operators with advanced technical skills. A successful PTCA should achieve angiographic success (substantial enlargement of the lumen at the target site) without in-hospital major clinical complications (e.g., death, acute myocardial infarction, emergency coronary artery bypass surgery) during hospitalization. Higher volumes have been associated with better outcomes, especially when PTCA must be performed in a timely fashion in patients with ST-Elevation Myocardial Infarction (STEMI). ACC/AHA guidelines suggest that the procedure should be supported by experienced personnel in an appropriate laboratory environment (a laboratory that performs more than 200 PTCA procedures per year, of which at least 36 are primary PTCA for STEMI).

It has been demonstrated that better processes of care may reduce short-term mortality and a 30 day mortality rate after PTCA represents a good indicator of hospital performances.

This indicator compares mortality rates of different hospitals/populations and identifies situations where the number of observed deaths results higher/lower than expected. It serves as a useful starting point to raise questions about mortality following PTCA, and which might merit further investigation.

The 30 day mortality rate is a more accurate indicator than in-hospital mortality because it is less susceptible to different discharge policies (lower rates could be observed for hospitals where discharges occur earlier).

**NUMERATOR:** The number of ordinary admissions with PTCA where the patient dies between 0-29 days (inclusive) of the procedure, included deaths in hospital and after discharge.

**DENOMINATOR:** The number of ordinary hospital admissions with PTCA.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Death rate within 30 days of PTCA procedure may vary between organizations because of many factors, such as age, gender, multilevel angioplasty, unstable angina, congestive heart failure and comorbidities. Standardization or stratification is highly recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

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## A7: Death within 6 months of Percutaneous Transluminal Coronary Angioplastic (PTCA) operation

Rate of deaths occurring within 6 months of a PTCA operation.

**RATIONALE:** Percutaneous transluminal coronary angioplasty (PTCA) is an increasingly common procedure that should be performed by operators with advanced technical skills. A successful PTCA should achieve angiographic success (substantial enlargement of the lumen at the target site) without in-hospital major clinical complications (e.g., death, acute myocardial infarction, emergency coronary artery bypass surgery) during hospitalization. Despite significant improvements in PTCA technology, restenosis remains the major limitation of percutaneous revascularization techniques, with peak occurrence 1 to 3 months following successful dilatation. Prevention of restenosis and major adverse cardiac events (cardiac death, nonfatal myocardial infarction, re-intervention procedures) after PTCA is of great public health importance.

Clinical status at 6 months has been shown to correlate well with long-term angiographic success after PTCA. Appropriate secondary coronary heart disease (CHD) prevention programmes, i.e. early initiation of lipid lowering therapy with statins, behaviour modifications contribute to reduce subsequent morbidity and mortality.

This indicator compares mortality rates of different hospitals/populations and identifies situations where the number of observed deaths results higher/lower than expected. It serves as a useful starting point to raise questions about mortality after PTCA, and which might merit further investigation.

**NUMERATOR:** The number of ordinary admissions with PTCA where the patient dies between 0-6 months (inclusive) of the procedure, included deaths in hospital and after discharge.

**DENOMINATOR:** The number of ordinary hospital admissions with PTCA.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Death rate within 6 months of PTCA procedure may vary between organizations because of many factors, such as age, gender, left ventricle ejection fraction, multivessel disease, unstable angina, congestive heart failure and comorbidities. Standardization or stratification is highly recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for comparative evaluation of coronary heart disease management after PTCA between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


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## A8: Death within 12 months of Percutaneous Transluminal Coronary Angioplastic (PTCA) operation

Rate of deaths occurring within 12 months of a PTCA operation.

**RATIONALE:** Percutaneous transluminal coronary angioplasty (PTCA) is an increasingly common procedure that should be performed by operators with advanced technical skills. A successful PTCA should achieve angiographic success (substantial enlargement of the lumen at the target site) without in-hospital major clinical complications (e.g., death, acute myocardial infarction, emergency coronary artery bypass surgery) during hospitalization. Despite significant improvements in PTCA technology, restenosis remains the major limitation of percutaneous revascularization techniques, with peak occurrence 1 to 3 months following successful dilatation. Prevention of restenosis and major adverse cardiac events (cardiac death, nonfatal myocardial infarction, re-intervention procedures) after PTCA is of great public health importance.

Because mortality and recurrent ischemia peak in the first year after discharge for acute MI with PTCA, frequent follow-up visits and careful revaluation of these patients are required during that time frame. Appropriate secondary coronary heart disease (CHD) prevention programmes, i.e. early initiation of lipid lowering therapy with statins, behaviour modifications contribute to reduce morbidity and mortality.

This indicator compares mortality rates of different hospitals/populations and identifies situations where the number of observed deaths results higher/lower than expected. It serve as a useful starting point to raise questions about mortality after PTCA, and which might merit further investigation.

**NUMERATOR:** The number of ordinary admissions with PTCA where the patient dies between 0-12 months (inclusive) of the procedure, included deaths in hospital and after discharge.

**DENOMINATOR:** The number of ordinary hospital admissions with PTCA.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Death rate within 12 months of PTCA procedure may vary between organizations because of many factors, such as age, gender, left ventricle ejection fraction, multivessel coronary artery disease, unstable angina, congestive heart failure and comorbidities. Standardization or stratification is highly recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for comparative evaluation of coronary heart disease management after PTCA between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


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## A9: In-hospital deaths following admission to hospital with Acute Myocardial Infarction (AMI)

Rate of deaths occurring in hospital following an admission for AMI.

**RATIONALE:** Timely and effective treatments for acute myocardial infarction are essential for patient survival. Some people with AMI die before admission to hospital; other patients survive long enough to be admitted but die in hospital. Some of these deaths could be avoided by shortening the time from symptom onset to definitive treatment (reperfusion therapy, mainly by fibrinolysis or balloon angioplasty). Evidence exists that expeditious restoration of flow in the obstructed infarct artery after the onset of symptoms in patients with ST-Elevation Myocardial Infarction (STEMI) is a key determinant of short- and long-term outcomes regardless of whether reperfusion is achieved by fibrinolysis or percutaneous transluminal coronary angioplasty (PTCA).

It has been demonstrated that appropriate treatment of acute myocardial infarction can substantially reduce short-term mortality. This indicator compares mortality rates of different hospitals/populations and identifies situations where the number of observed deaths is higher/lower than expected. It serves as a useful starting point to raise questions about AMI mortality, and which might merit further investigation.

Mortality rates may vary among different organizations because of different discharge policies: lower rates could be observed for hospitals where discharges occur earlier. Therefore, the 30day mortality rate should be preferred over in-hospital mortality rate when comparing hospitals and/or organizations.

**NUMERATOR:** The number of emergency admissions for patients aged over 18 with a primary diagnosis of AMI on admission, where the patient dies in hospital (before the discharge).

**DENOMINATOR:** The number of emergency admissions for patients aged over 18, with a primary diagnosis of AMI.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

In-hospital death rate of an AMI admission may vary between organizations because of many factors, such as age, gender, events prior to hospitalization, severity of the myocardial infarction, socio-economic status, comorbidities and other potential risk factors. Standardization or stratification is highly recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

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## A10: Death within 30 days of admission to hospital with an Acute Myocardial Infarction (AMI)

Rate of deaths occurring within 30 days of a hospital admission for AMI.

**RATIONALE:** Timely and effective treatments for acute myocardial infarction are essential for patient survival. Some people with AMI die before admission to hospital; other patients survive long enough to be admitted but die in hospital. Some of these deaths could be avoided by shortening the time from symptom onset to definitive treatment (reperfusion therapy by fibrinolysis or balloon angioplasty). Evidence exists that expeditious restoration of flow in the obstructed infarct artery after the onset of symptoms in patients with ST-Elevation Myocardial Infarction (STEMI) is a key determinant of short- and long-term outcomes regardless of whether reperfusion is achieved by fibrinolysis or percutaneous transluminal coronary angioplasty (PTCA).

It has been demonstrated that appropriate treatment of acute myocardial infarction can substantially reduce short-term mortality. The 30 day mortality rate after admission for AMI represents a good indicator of hospital performances.

This indicator compares mortality rates of different hospitals/populations and identifies situations where the number of observed deaths results higher/lower than expected. It serves as a useful starting point to raise questions about AMI mortality, and which might merit further investigation.

The 30 day mortality rate is a more accurate indicator than in-hospital mortality rate because it is less susceptible to different discharge policies (lower rates could be observed for hospitals where discharges occur earlier).

**NUMERATOR:** The number of emergency admissions for patients aged over 18 with a primary diagnosis of AMI on admission, where the patient dies in hospital and after discharge between 0-29 days (inclusive) of admission.

**DENOMINATOR:** The number of emergency admissions for patients aged over 18 with a primary diagnosis of AMI.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Death rate within 30 days of an AMI admission may vary between organizations because of many factors, such as age, gender, events prior to hospitalization, severity of the myocardial infarction, socio-economic status, comorbidities and other potential risk factors. Standardization or stratification is highly recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

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## A11: Death within 30 days of admission to hospital with Congestive Heart Failure (CHF)

Rate of deaths occurring within 30 days of an admission to hospital with CHF.

**RATIONALE:** Heart failure is a complex clinical syndrome that can result from any structural or functional cardiac disorder that impairs the ability of the ventricle to fill with or eject blood. It is a progressive, chronic disease considered a world-wide major public health problem: its rising incidence and prevalence render it almost a global epidemic. Although a number of therapeutic interventions have been shown to improve outcomes in patients with CHF, this disease is associated with high hospital admission and short-term mortality rates.

Better processes of care may reduce short-term mortality, however, the impact of these practices on provider-level mortality is unknown.

CHF mortality rate has been widely used as a healthcare quality indicator, although the accuracy of ICD-9-CM coding for CHF has been questioned. However, considering only the admissions with a primary diagnosis of CHF should allow a better identification of cases.

The 30 day mortality is a more accurate indicator than in-hospital mortality because it is less susceptible to different discharge policies between hospitals/trusts (lower rates could be observed for hospitals where discharges occur earlier).

This indicator compares mortality rates of different hospitals/populations and identifies situations where the number of observed deaths results higher/lower than expected. It serves as a useful starting point to raise questions about CHF mortality, and which might merit further investigation.

**NUMERATOR:** The number of emergency admissions for patients aged over 18 with a primary diagnosis of CHF on admission, where the patient dies in hospital and after discharge between 0-29 days (inclusive) of admission.

**DENOMINATOR:** The number of emergency admissions for patients aged over 18 with a primary diagnosis of CHF.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Death rate within 30 days following admission to hospital with a CHF may vary between organizations because of many factors, such as age, gender, comorbidities (i.e., cerebrovascular disease, chronic obstructive pulmonary disease, liver disease, malignancy, renal disease) and patient severity at admission. Standardization or stratification is highly recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

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## A12: Hospital admission for Congestive Heart Failure (CHF)

Rate of hospital admissions for Congestive Heart Failure (CHF).

**RATIONALE:** Heart failure is a complex clinical syndrome that can result from any structural or functional cardiac disorder that impairs the ability of the ventricle to fill with or eject blood. It is a progressive, chronic disease considered a world-wide major public health problem. Although a number of therapeutic interventions have been shown to improve outcomes in patients with CHF, this disease is associated with high short-term mortality and hospital admission rates.

Some hospitalizations are appropriate, but CHF can be controlled in an outpatient setting for the most part. The causes for admissions may include inadequate medical prescription, poor treatment compliance, inadequate follow-up care, or problems accessing care.

Evidence suggests that proper outpatient treatment can potentially prevent the need for hospitalization. Although factors outside the direct control of the healthcare system, such as poor environmental conditions, can substantially influence the hospital admission rate, this indicator can be considered a valuable tool for identifying potential quality problems in outpatient care that help to set the direction for more in-depth investigation.

**NUMERATOR:** The number of ordinary admission episodes for patients aged over 18 with a primary diagnosis of CHF.

**DENOMINATOR:** Resident population aged over 18.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Hospital admission rates for CHF may vary between organizations because of some factors, such as age, gender, socio-economic status and clinical characteristics of patients. Standardization or stratification is recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- to comparatively evaluate the quality of the management of heart failure patients between populations resident in different areas or of different socio-economic status;
- to evaluate the effectiveness of HF education programmes in a specific area and compare populations resident in different areas or of different socio-economic status;
- to identify problems accessing care in a specific area and compare populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


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## A13: In hospital deaths and neurological complications following carotid stenting procedures

The number of patients who die or have neurological complications in hospital (before discharge) after previous carotid stenting procedure.

**RATIONALE:** Carotid stenting procedure can not yet be considered a common procedure, but currently represents a valid alternative to the surgical treatment of the occlusion of extracranial carotid. Death or neurological (peri or post procedure) complications represent adverse outcomes of carotid stenting procedure. Comparing the death and neurological complications rates of populations or organizations could help to identify the most critical situations.

**NUMERATOR:** The number of ordinary admissions with carotid stenting where the patient dies or has neurological complications in hospital (before the discharge).

**DENOMINATOR:** The number of ordinary hospital admissions with carotid stenting.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Death and neurological complications rates following carotid stenting procedure may vary between organizations because of many factors. Age and gender standardization is highly recommended to account for at least those aspects of case mix which can be certainly identified.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

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## A14: Deaths and neurological complications within 30 days from carotid stenting procedures

The number of patients who die or have neurological complications within 30 days previous to carotid stenting procedure (include deaths and neurological complications before or after discharge).

**RATIONALE:** Carotid stenting procedure can not yet be considered a common procedure, but currently represents a valid alternative to the surgical treatment of the occlusion of extracranial carotid. Comparing death or neurological (peri or post procedure) complications represent adverse outcomes of carotid stenting procedure. Death and neurological complications rates may vary among different organizations because of different discharge policies. Those geographical areas or hospitals where discharge occurs before could present lowers rates but this may not mean better performance. For these reasons, it is more appropriate to consider 30 day mortality and complications rates rather than in-hospital rates to compare hospitals and/or organizations.

**NUMERATOR:** The number of ordinary admissions with carotid stenting where the patient dies or has neurological complications in hospital and after discharge between 0-29 days (inclusive) of admission.

**DENOMINATOR:** The number of ordinary hospital admissions with carotid stenting.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Death and neurological complications rates following carotid stenting procedure may vary between organizations because of many factors. Age and gender standardization is highly recommended to account for at least those aspects of case mix which can be certainly identified.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


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# B: CANCER

## B1: Breast cancer relative survival

**RATIONALE:** Breast cancer is the most frequent female cancer in the Western world. This pathology has a good prognosis after modern preventive strategies and novel therapies have been introduced. Today, 80% of women with a diagnosis of breast cancer are alive at 5 years.

Breast cancer patients undergo hospitalization for diagnostic purposes, surgery and or medical therapy. The therapeutic scheme is internationally standardized.

Risk factors for breast cancer are still not well known; family history, reproductive history, environmental exposure to chemical agents are associated with breast cancer risk.

Five years survival after breast cancer diagnosis is a good indicator of early diagnosis because of appropriate screening procedures, of the quality and efficiency of the health structure providing care, and of the quality of the surgical/medical treatment after hospital admission.

**Important:** It is very difficult to date back cancer onset. It depends on the timeliness of specialist examinations patients do. A good proxy, even if not free from distortion, is represented by the date of first diagnosis. Unfortunately, nowadays it is not possible to date back first cancer diagnosis from administrative data. Thus, survival 5 years after breast cancer diagnosis is possible only in those areas where ad hoc cancer registers are available.
Moreover, because survival rate after cancer diagnosis depends largely on care and treatment after diagnosis, not necessarily supplied from a single trust, comparisons are allowed only between macro-geographical areas.

**NUMERATOR:** The observed five year survival rate of patients diagnosed with breast cancer.

**DENOMINATOR:** The expected survival rate among a population with the same age structure.

**STATISTICAL METHODS:** Breast cancer death rates may vary between organizations because of many factors, such as demographics (age, body mass index), concomitant pathologies, stage, histology, family history for the same or a different tumour, genetic diagnosis of a high risk family, and therapy. Standardization or stratification is highly recommended to account for at least those aspects of case mix which can be certainly identified.

### HOW TO USE THIS INDICATOR:

- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time;
- for evaluation of new preventive techniques (i.e.: mammography).

### REFERENCES:


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## B2: Lung cancer relative survival

**RATIONALE:** Lung cancer is a pathology with high mortality rates (roughly 70% of subjects die within one year of diagnosis). Lung cancer patients always undergo hospitalization, either for diagnostic or therapeutic reasons. Therapeutic lines are standardized with some variability across health structures within the standard of care. The main risk factor for lung cancer is tobacco smoking.

Lung cancer survival at 5 years after first diagnosis is an indicator of the quality and efficiency of the health structure providing prevention, care, and of the quality of the surgical/medical treatment after hospital admission.

**Important:** It is very difficult to date back cancer onset. It depends on the timeliness of specialist examinations patients do. A good proxy, even if not free from distortion, is represented by the date of first diagnosis. Unfortunately, nowadays it is not possible to date back first cancer diagnosis from administrative data. Thus, survival 5 years after colon cancer diagnosis is possible only in those areas where ad hoc cancer registers are available.
Moreover, because survival rate after cancer diagnosis depends largely on care and treatment after diagnosis, not necessarily supplied from a single trust, comparisons are allowed only between macro-geographical areas.

**NUMERATOR:** The observed five year survival rate of patients diagnosed with lung cancer.

**DENOMINATOR:** The expected survival rate among a population with the same age structure.

**STATISTICAL METHODS:** Lung cancer death rates may vary between organizations because of many factors, such as demographics (age, gender), concomitant pathologies, and therapy. Standardization or stratification is highly recommended to account for at least those aspects of case mix which can be certainly identified.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time;
- for evaluation of new preventive techniques (i.e.: Spiral CAT).

**REFERENCES:**


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- Iezzoni LI, Ash AS, Shwartz M, Daley J, Hughes JS, Mackierman YD. Judging hospitals by severity-adjusted mortality rates: the influence of the severity-adjustment method. *Am J Public Health* 1996; 86:1379-87.
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- Luft HS. From observing the relationship between volume and outcome to making policy recommendations. *Med Care* 2003; 41:1118-22.
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## B3: Colon cancer relative survival

**RATIONALE:** Colon cancer is a pathology with roughly 50% overall survival, which undergoes hospitalization for either diagnostic or therapeutic reasons. Treatment includes either radiotherapy, or chemotherapy or both.

Risk factors include a high fat/low vegetables and fruit diet, a positive family history, pre-existing inflammatory intestinal diseases, and intestinal polyposis.

Colon cancer survival at 5 years after diagnosis is an indicator of the quality and efficiency of the health structure providing prevention (colonoscopy), care, and of the quality of the surgical/medical treatment after hospital admission.

**Important:** It is very difficult to date back cancer onset. It depends on the timeliness of specialist examinations patients do. A good proxy, even if not free from distortion, is represented by the date of first diagnosis. Unfortunately, nowadays it is not possible to date back first cancer diagnosis from administrative data. Thus, survival 5 years after colon cancer diagnosis is possible only in those areas where ad hoc cancer registers are available.

Moreover, because survival rate after cancer diagnosis depends largely on care and treatment after diagnosis, not necessarily supplied from a single trust, comparisons are allowed only between macro-geographical areas.

**NUMERATOR:** The observed five year survival rate of patients diagnosed with colon cancer.

**DENOMINATOR:** The expected survival rate among a population with the same age structure.

**STATISTICAL METHODS:** Colon cancer death rates may vary between organizations because of many factors, such as demographics (age, gender, body mass index), concomitant pathologies, stage, histology, family history, previous colon inflammatory diseases or colon polyps, and therapy. Standardization or stratification is highly recommended to account for at least those aspects of case mix which can be certainly identified.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time;
- for evaluation of new preventive techniques (i.e.: colonoscopy).

**REFERENCES:**


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# C. INFECTIOUS DISEASES

## C1: Emergency admissions to hospital of children with lower respiratory infections

Rate of emergency hospital admissions of children with lower respiratory tract infections.

**RATIONALE:** Lower respiratory tract infections (bronchiolitis, bronchopneumonia and pneumonia) are one of the most common reasons for hospital admission in infants and children. No strict guidelines exist on when to admit children with a lower respiratory tract infection, but in daily practice physicians' discretion in decision making and factors associated with socio-economic status are important determinants. It has been shown that emergency admission rates vary between health authorities, even when socio-economic deprivation is taken into account, probably also reflecting variation in access to health services. Some preventive measures, e.g. encouraging breast feeding, reducing exposure to tobacco smoke, supporting parents in management of illnesses in the home (i.e. facilitating access to health advice and therapy through primary care) have demonstrated to be helpful in the control of lower respiratory tract infections in children.

Factors outside the direct control of the healthcare system, such as socio-economic mix of local populations or poor environmental conditions, may influence the hospital admission rate. However, this indicator can be considered a valuable tool for identifying potential problems in prevention and outpatient care that encourage a more in-depth investigation.

**NUMERATOR:** The number of emergency admissions of children aged under 16 with lower respiratory tract infections. (Primary diagnosis – ICD 10 codes: J10.0, J11.0, J11.1,J12.-,J13,J14,J15.-,J16.-,J18.0,J18.1,J18.9,J21.-)

**DENOMINATOR:** Resident population aged under 16.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Emergency admission rates of children with lower respiratory tract infections may vary between organizations because of some factors, such as age, gender and socio-economic status. Standardization or stratification is recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- to comparatively evaluate the quality of prevention and outpatient care between populations resident in different areas or of different socio-economic status;
- to evaluate the effectiveness of parents' educational programmes in a specific area and compare populations resident in different areas or of different socio-economic status;
- to identify problems accessing care in a specific area and compare populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


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## C2: AIDS survival

Rate of patient survival within 1/2/5 years from first hospital admission with any mention of AIDS diagnosis.

**RATIONALE:** One of the goals of any AIDS programme should be to increase survival among infected individuals.

Identify those populations where survival rates among infected people are lower may help public health providers to improve the situation by learning lessons from those situations where there is a better survival rate.

**NUMERATOR:** The observed 1/2/5 year survival rate of patients diagnosed with AIDS.

**DENOMINATOR:** The expected survival rate among a population with the same age structure.

**STATISTICAL METHODS:** This indicator is presented at population level.

1/2/5 years survival rate following first AIDS diagnosis may vary between organizations because of many factors. Age and gender standardization or stratification is highly recommended.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


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## C3: Death within 30 days of admission to hospital with pneumonia

Number of patient who die within 30 days of admission to hospital with a diagnosis of pneumonia.

**RATIONALE:** Pneumonia is an inflammatory illness of the lung. Pneumonia can result from a variety of causes, including infection with bacteria, viruses, fungi, or parasites, and chemical or physical injury to the lungs. Treatment depends on the cause of pneumonia; bacterial pneumonia is treated with antibiotics. Pneumonia is a common illness which occurs in all age groups, and is a leading cause of death among the elderly and people who are chronically and terminally ill. Vaccines to prevent certain types of pneumonia are available. The prognosis depends on the type of pneumonia, the appropriate treatment, any complications, and the person's underlying health. Pneumonia is typically treated with antibiotics, sometimes in an outpatient setting. However, death may occur even when the patient is in the hospital, especially in patients with weakened respiratory systems or other chronic health problems. Variations in death rates after admission with pneumonia between 'like' populations suggest that some of these deaths are potentially avoidable. The health systems may be helped to prevent some of these deaths in hospital by seeing comparative figures and learning lessons from follow-up investigations.

**NUMERATOR:** The number of admissions for patients with a primary diagnosis of pneumonia where the patient dies in hospital and after discharge between 0-29 days (inclusive) of admission.

**DENOMINATOR:** The number of admissions for patients of all ages with a primary diagnosis of pneumonia.

**STATISTICAL METHODS:** This indicator is presented at population level. Death rate within 30 days following pneumonia diagnosis may vary between organisations because of many factors. Age, gender standardization or stratification is highly recommended to account for at least those aspects of case mix which can be certainly identified.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


- AHRQ Quality Indicators. *Guide to Prevention Quality Indicators.*
  Available from: http://www.qualityindicators.ahrq.gov/downloads/pqi/pqi_guide_v31.pdf
- Pneumonia: Risk-Adjusted Mortality Rate; Indicators of Inpatient Care in Texas Hospitals, 2003; Texas Health Care Information Collection.
  Available from: http://www.dshs.state.tx.us/THCIC/publications/hospitals/IQIReport2003/Chart20.pdf

## C4: Hospital admissions for paediatric gastroenteritis

**RATIONALE:** Gastroenteritis is one of the most common reasons for paediatric hospital admission but several studies have shown that proper ambulatory treatment can reduce the incidence of patients with gastroenteritis that require hospitalization. Furthermore, by comparing the hospitalization rate for paediatric gastroenteritis in different communities, the health care providers may identify those areas with potential access or quality-of-care problems related to prevention so as to plan specific interventions, and to evaluate how well these interventions meet the goals of preventing illness and disability.

**NUMERATOR:** The number of ordinary admission episodes for children aged under 18 diagnosed with paediatric gastroenteritis.

**DENOMINATOR:** Resident population aged under 18.

**STATISTICAL METHODS:** This indicator is presented at population level.
Age and gender standardization or stratification is recommended.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


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## C5: Hospital admissions for influenza

Rate of hospital admissions for influenza.

**RATIONALE:** Influenza is a common infection recognised as a major health problem in terms of morbidity and mortality worldwide. It has been shown that healthy young children, individuals with chronic conditions and the elderly are at risk of serious illness with influenza and hospital admission. Influenza vaccination should be a useful means to prevent hospitalization or respiratory illness, mainly for high-risk groups. Moreover, implementation of clinical practice guidelines to paediatricians has shown to be a means of reducing the number of hospital admissions for influenza-like illness.

Factors outside the direct control of the healthcare system can influence the hospital admission rate, such as the socio-economic mix of local populations that could reflect on disparities in the use of preventive services, or poor environmental conditions.. However, this indicator can be considered a valuable tool for identifying potential quality problems in prevention and outpatient care that encourage a more in-depth investigation.

**NUMERATOR:** The number of ordinary admission episodes for patients diagnosed with influenza.

**DENOMINATOR:** Resident population.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Hospital admission rate for influenza may vary between organizations because of some factors, such as age, gender, socio-economic status. Standardization or stratification is recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- to comparatively evaluate the quality of prevention and outpatient care between populations resident in different areas or of different socio-economic status;
- to evaluate the effectiveness of vaccination programmes in a specific area and compare populations resident in different areas or of different socio-economic status;
- to identify problems accessing care in a specific area and compare populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


- De Marco G, Mangani S, Correra A, Di Caro S, Tarallo L, De Franciscis A, Jefferson T and Guarino A. Reduction of Inappropriate Hospital Admissions of Children With Influenza-Like Illness Through the Implementation of Specific Guidelines: A Case-Controlled Study. *Pediatrics* 2005; 116(4):e506-11.
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## C6: Hospital admissions for tuberculosis

Rate of hospital admissions for tuberculosis.

**RATIONALE:** Tuberculosis (abbreviated as TB for tubercle bacillus or Tuberculosis) is a common and deadly infectious disease caused by mycobacteria. Tuberculosis most commonly attacks the lungs (as pulmonary TB) but can also affect the central nervous system, the lymphatic system, the circulatory system, the genitourinary system, bones, joints and even the skin. Factors outside the direct control of the healthcare system, such as socio-economic mix of local populations - that could reflect on disparities in the use of preventive services - or poor environmental conditions, can influence the hospital admission rate. However, this indicator can be considered a valuable tool for identifying potential quality problems in prevention and outpatient care that encourage a more in-depth investigation.

**NUMERATOR:** The number of ordinary admission episodes for patients diagnosed with tuberculosis.

**DENOMINATOR:** Resident population.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Hospital admission rate for tuberculosis may vary between organisations because of some factors, such as age, gender, and socio-economic status. Standardization or stratification is recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- to comparatively evaluate the quality of the prevention and outpatient care between populations resident in different areas or of different socio-economic status;
- to evaluate the effectiveness of vaccination or preventive programs in a specific area and compare populations resident in different areas or of different socio-economic status;
- to identify problems accessing care in a specific area and compare populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


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- Singleton L, Turner M, Haskal R, Etkind S, Tricarico M, Nardell E. Long-term hospitalization for tuberculosis control. Experience with a medical-psychosocial inpatient unit. *JAMA* 1997;278(10).
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- Wicks CA. Tuberculosis: Hospitalization and Outpatient Treatment. *Canad Med Ass J* 1964;91.

# D. OTHER CHRONIC DISEASES

## D1: Hospital admissions for uncontrolled diabetes

Rate of hospital admissions for uncontrolled diabetes.

**RATIONALE:** Diabetes mellitus is defined as a metabolic disorder of multiple aetiology characterised by chronic hyperglycaemia with disturbances of carbohydrate, protein and fat metabolism resulting from defects in insulin secretion, insulin action, or both. Diabetes mellitus is a major and increasing health problem in all age groups. Type 1 diabetes, previously called insulin-dependent diabetes mellitus or juvenile-onset diabetes, usually strikes children and young adults, although disease onset can occur at any age. Type 2 diabetes, previously called non-insulin-dependent diabetes mellitus or adult-onset diabetes, may account for about 90% of all diagnosed cases of diabetes.

Proper outpatient management of diabetic patients has been shown to lead to reductions in almost all types of serious avoidable hospitalizations. The causes for admissions may include inadequate diabetes monitoring or self-management, and problems accessing care.

Although factors outside the direct control of the healthcare system can influence the hospital admission rate, this indicator can be considered a valuable tool for identifying potential quality problems in outpatient care that help to set the direction for more in-depth investigation.

Uncontrolled diabetes should be used in conjunction with short-term complications of diabetes.

**NUMERATOR:** The number of ordinary admission episodes for patients aged over 18 diagnosed with uncontrolled diabetes.

**DENOMINATOR:** Resident population aged over 18.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Hospital admission rate for uncontrolled diabetes may vary between organizations because of some factors, such as age, gender, and socio-economic status. Standardization or stratification is recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- to comparatively evaluate the quality of the management of diabetes patients between populations resident in different areas or of different socio-economic status;
- to evaluate the effectiveness of diabetes education programmes in a specific area and compare populations resident in different areas or of different socio-economic status;
- to identify problems accessing care in a specific area and compare populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


- AHRQ Quality Indicators. *Guide to inpatient quality indicators. Quality of care in hospitals - Volume, mortality, and utilization.* Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); version 3.1; March 2007. Available from: http://www.qualityindicators.ahrq.gov
- WHO Consultation. *Definition, diagnosis and classification of diabetes mellitus and its complications.* Geneva: World Health Organization, WHO/NCD/NCS/99.2; 1999.

## D2: Hospital admissions for short term complications of diabetes

Rate of hospital admissions for short term complications of diabetes.

**RATIONALE:** Diabetes mellitus is defined as a metabolic disorder of multiple aetiology characterized by chronic hyperglycaemia with disturbances of carbohydrate, protein and fat metabolism resulting from defects in insulin secretion, insulin action, or both. Diabetes mellitus is a major and increasing health problem in all age groups. Type 1 diabetes, previously called insulin-dependent diabetes mellitus or juvenile-onset diabetes, usually strikes children and young adults, although disease onset can occur at any age. Type 2 diabetes, previously called non-insulin-dependent diabetes mellitus or adult-onset diabetes, may account for about 90% of all diagnosed cases of diabetes.

Short-term complications of diabetes mellitus include diabetic ketoacidosis, hyperosmolarity, and coma. These emergencies arise from inadequate diabetes management, misadministration of insulin, and failure to follow a proper diet. Proper outpatient management of diabetic patients has been shown to lead to reductions in the incidence of diabetic short-term complications and in almost all types of serious avoidable hospitalizations.

Although factors outside the direct control of the healthcare system can influence the hospital admission rate, this indicator can be considered a valuable tool for identifying potential quality problems in outpatient care that help to set the direction for more in-depth investigation.

Uncontrolled diabetes should be used in conjunction with short-term complications of diabetes.

**NUMERATOR:** The number of ordinary admission episodes for patients aged over 18 diagnosed with short term complications of diabetes.

**DENOMINATOR:** Resident population aged over 18.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Hospital admission rate for uncontrolled diabetes may vary between organizations because of some factors, such as age, gender, and socio-economic status. Standardization or stratification is recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- to comparatively evaluate the quality of the management of diabetes patients between populations resident in different areas or of different socio-economic status;
- to evaluate the effectiveness of diabetes education programmes in a specific area and compare populations resident in different areas or of different socio-economic status;
- to identify problems accessing care in a specific area and compare populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


- AHRQ Quality Indicators. *Guide to inpatient quality indicators. Quality of care in hospitals - Volume, mortality, and utilization.* Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); version 3.1; March 2007. Available from: http://www.qualityindicators.ahrq.gov
- WHO Consultation. *Definition, diagnosis and classification of diabetes mellitus and its complications.* Geneva: World Health Organization. WHO/NCD/NCS/99.2; 1999.

## D3: Hospital admissions for long term complications of diabetes

Rate of hospital admissions for long term complications of diabetes.

**RATIONALE:** Diabetes mellitus is defined as a metabolic disorder of multiple aetiology characterized by chronic hyperglycaemia with disturbances of carbohydrate, protein and fat metabolism resulting from defects in insulin secretion, insulin action, or both. Diabetes mellitus is a major and increasing health problem in all age groups. Type 1 diabetes, previously called insulin-dependent diabetes mellitus or juvenile-onset diabetes, usually strikes children and young adults, although disease onset can occur at any age. Type 2 diabetes, previously called non-insulin-dependent diabetes mellitus or adult-onset diabetes, may account for about 90% of all diagnosed cases of diabetes.

Diabetes is associated with a range of serious complications which result in reduced quality of life and premature mortality. The duration of diabetes is positively associated with the development of complications. Long-term complications of diabetes mellitus include renal, eye, neurological, and circulatory disorders. They are thought to arise from sustained long-term poor control of diabetes. The causes may include poor treatment compliance, inadequate monitoring of glycaemic control, lack of self management education, or problems accessing care.

Although factors outside the direct control of the healthcare system can substantially influence the hospital admission rate, this indicator can be considered a valuable tool for identifying potential quality problems in outpatient care that help to set the direction for more in-depth investigation.

**NUMERATOR:** The number of ordinary admission episodes for patients aged over 18 diagnosed with long term complications of diabetes.

**DENOMINATOR**: Resident population aged over 18.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Hospital admission rate for uncontrolled diabetes may vary between organizations because of some factors, such as age, gender, and socio-economic status. Standardization or stratification is recommended to account those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- to comparatively evaluate the quality of the management of diabetes patients between populations resident in different areas or of different socio-economic status;
- to evaluate the effectiveness of diabetes education programmes in a specific area and compare populations resident in different areas or of different socio-economic status;
- to comparatively evaluate adherence to guidelines aimed at reducing or early identifying complications between populations resident in different areas or of different socio-economic status;
- to identify problems accessing care in a specific area and compare populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


- AHRQ Quality Indicators. *Guide to inpatient quality indicators. Quality of care in hospitals - Volume, mortality, and utilization.* Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); version 3.1; March 2007. Available from: http://www.qualityindicators.ahrq.gov
- WHO Consultation. *Definition, diagnosis and classification of diabetes mellitus and its complications.* Geneva: World Health Organization. WHO/NCD/NCS/99.2; 1999.

## D4: Hospital admissions for lower extremity amputations in patients with diabetes

Rate of hospital admissions for lower extremity amputations in patients with diabetes.

**RATIONALE:** Diabetes mellitus is defined as a metabolic disorder of multiple aetiology characterized by chronic hyperglycaemia with disturbances of carbohydrate, protein and fat metabolism resulting from defects in insulin secretion, insulin action, or both. Diabetes mellitus is a major and increasing health problem in all age groups. Type 1 diabetes, previously called insulin-dependent diabetes mellitus or juvenile-onset diabetes, usually strikes children and young adults, although disease onset can occur at any age. Type 2 diabetes, previously called non-insulin-dependent diabetes mellitus or adult-onset diabetes, may account for about 90% of all diagnosed cases of diabetes.

Diabetes is associated with a range of serious complications which result in reduced quality of life and premature mortality. Lower extremity amputation is one of the most disabling complications of diabetes. Foot ulcers usually precede amputation and are caused by several underlying problems, including neuropathy and microvascular diseases that lead to injury and poor healing. Proper long-term glucose control, diabetes education, and foot care are some of the interventions that may reduce the incidence of lower extremity amputation.

Although factors outside the direct control of the healthcare system can substantially influence the hospital admission rate, this indicator can be considered a valuable tool for identifying potential quality problems in outpatient care that help to set the direction for more in-depth investigation.

**NUMERATOR:** The number of ordinary admission episodes for lower extremity amputations in patients aged over 18 with diabetes.

**DENOMINATOR:** Resident population aged over 18.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Hospital admission rate for lower extremity amputations in patients with diabetes may vary between organizations because of some factors, such as age, gender, and socio-economic status. Standardization or stratification is recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- to comparatively evaluate the quality of the management of diabetes patients between populations resident in different areas or of different socio-economic status;
- to evaluate the effectiveness of diabetes education programmes in a specific area and compare populations resident in different areas or of different socio-economic status;
- to comparatively evaluate adherence to guidelines aimed at reducing or early identifying complications between populations resident in different areas or of different socio-economic status;
- to identify problems accessing care in a specific area and compare populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

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## D5: Hospital admissions for adult asthma

The number of admissions for asthma in adult patients aged over 18 and under 65 per 100,000 population.

**RATIONALE:** Asthma is one of the most common reasons for hospital admission but several studies have shown that a proper treatment out of the hospital can reduce the incidence of patients with asthma that require hospitalization. Furthermore, by comparing the hospitalization rate for asthma in different communities, the health care providers may identify those areas with potential access or quality-of-care problems related to prevention so as to plan specific interventions, and to evaluate how well these interventions meet the goals of preventing illness and disability.

**NUMERATOR:** Discharged patients aged over 18 and under 65 with ICD-9-CM principal diagnosis codes for asthma. Patients with any diagnosis code of cystic fibrosis and anomalies of the respiratory system, transferring from another institution, or Major Diagnostic Category (MDC) 14 (pregnancy, childbirth, and puerperium) are excluded.

**DENOMINATOR:** Population aged over 18 and under 65 in a selected area or country.

**STATISTICAL METHODS:** This indicator is presented at population level.
Age and gender standardization or stratification is recommended.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

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## D6: Hospital admissions for paediatric asthma

The number of admissions for asthma in paediatric patients (aged under 18) per 100,000 population.

**RATIONALE:** Asthma is one of the most common reasons for hospital admission but several studies have shown that proper treatment out of hospital can reduce the incidence of patients with asthma that require hospitalization. Furthermore, by comparing the hospitalization rate for asthma in different communities, the health care providers may identify those areas with potential access or quality-of-care problems related to prevention so as to plan specific interventions, and to evaluate how well these interventions meet the goals of preventing illness and disability.

**NUMERATOR:** Discharged patients aged under 18 years with ICD-9-CM principal diagnosis codes for asthma. Patients with any diagnosis code of cystic fibrosis and anomalies of the respiratory system, transferring from another institution, or Major Diagnostic Category (MDC) 14 (pregnancy, childbirth, and puerperium) are excluded.

**DENOMINATOR:** Population aged under 18 in a selected area or country.

**STATISTICAL METHODS:** This indicator is presented at population level.

Age and gender standardization or stratification is recommended.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


- AHRQ quality indicators. *Guide to prevention quality indicators: hospital admission for ambulatory care sensitive conditions* [version 3.0a]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); (AHRQ Pub; no. 02-R0203); 2006 Feb 20: 58 p.

## D7: Hospital admissions for senile asthma

The number of admissions for asthma in senile patients (65 years and older) per 100,000 population.

**RATIONALE:** Asthma is one of the most common reasons for hospital admission but several studies have shown that proper treatment out of hospital can reduce the incidence of patients with asthma that require hospitalization. Furthermore, by comparing the hospitalization rate for asthma in different communities, the health care providers may identify those areas with potential access or quality-of-care problems related to prevention so as to plan specific interventions, and to evaluate how well these interventions meet the goals of preventing illness and disability.

**NUMERATOR:** Discharged patients aged 65 years and older with principal diagnosis codes for asthma. Patients with any diagnosis code of cystic fibrosis and anomalies of the respiratory system, transferring from another institution, or Major Diagnostic Category (MDC) 14 (pregnancy, childbirth, and puerperium) are excluded.

**DENOMINATOR:** Population aged 65 years and older in selected area or country.

**STATISTICAL METHODS:** This indicator is presented at population level.

Age and gender standardization or stratification is recommended.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

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# E. ORTHOPAEDICS

## E1: Emergency readmission to hospital following treatment for a fractured hip

Emergency readmission to hospital within 28 days of discharge following treatment for a fractured hip, as a percentage of live hip fractured discharges (age and sex standardized)

**RATIONALE:** Readmissions may be as a result of poor treatment in hospital, or badly organized rehabilitation and support services when a person is transferred home following treatment. There is wide variation between 'like' hospitals in rates of such readmissions. Not all emergency readmissions are likely to be a part of the originally planned treatment and some may be potentially avoidable. The health systems may be helped to prevent potentially avoidable readmissions by seeing comparative figures and learning lessons from the experiences of hospitals with low readmission rates.

**NUMERATOR:** The number of emergency admissions within 0-27 days (inclusive), previous discharge from hospital (excluding psychiatric and obstetric readmission episodes).

**DENOMINATOR:** The number of discharges excluding those coded under mental health and obstetric specialities and those where discharge is coded as death.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Readmission at hospital within 27 days after a treatment of a fractured proximal femur may vary between organizations because of many factors such as age, gender, events prior to hospitalization, socio-economic status, comorbidities and other potential risk factors. Standardization or stratification (at least by age and sex) is highly recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

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## E2: Death within 30 days of admission to hospital with a fractured hip

**RATIONALE:** Hip fractures are relatively common, particularly among elderly people, and can result in premature deaths, some of which may be avoidable. This indicator measures deaths occurring in hospital and after discharge from hospital among people who are admitted with a hip fracture within a month from the admission. The indicator relates to emergency admissions because patients with a hip fracture are admitted to hospital as emergencies. Variations in death rates for fractured proximal femur between similar populations suggest that some of these deaths are potentially avoidable. The health systems may be helped to prevent some of these deaths in hospital by seeing comparative figures and learning lessons from follow-up investigations.

**NUMERATOR:** The number of emergency admissions for patients aged 65 years and over with a primary diagnosis on admission of fractured proximal femur (ICD 10 codes S72.0,S72.1 and S72.2) where the patient dies in hospital and after discharge between 0-29 days (inclusive) of admission.

**DENOMINATOR:** The number of emergency admissions for patients aged 65 years and over with a primary diagnosis on admission of fractured proximal femur (ICD 10 codes S72.0,S72.1 and S72.2).

**STATISTICAL METHODS:** This indicator is presented at trust and population level. In-hospital and after discharge deaths following admission with a fractured hip may vary between organizations because of many factors such as age, gender, events prior to hospitalization, socio-economic status, comorbidities and other potential risk factors. Standardization or stratification is highly recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

### HOW TO USE THIS INDICATOR:

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

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## E3: In-hospital death following admission with a fractured hip

**RATIONALE:** Hip fractures are relatively common, particularly among elderly people, and can result in premature deaths, some of which may be avoidable. This indicator measures deaths occurring in hospital from hospital amongst people who are admitted with a hip fracture. The indicator relates to emergency admissions because patients with a hip fracture are admitted to hospital as emergencies. Variations in death rates for a fractured proximal femur between 'like' populations suggest that some of these deaths are potentially avoidable. The health systems may be helped to prevent some of these deaths in hospital by seeing comparative figures and learning lessons from follow-up investigations.

**NUMERATOR:** The number of emergency admissions for patients aged 65 years and over with a primary diagnosis on admission of fractured proximal femur (ICD 10 codes S72.0, S72.1 and S72.2) where the patient dies in hospital (before the discharge).

**DENOMINATOR:** The number of emergency admissions for patients aged 65 years and over with a primary diagnosis on admission of fractured proximal femur (ICD 10 codes S72.0,S72.1 and S72.2).

**STATISTICAL METHODS:** This indicator is presented at trust and population level. In-hospital death following admission with a fractured hip may vary between organizations because of many factors such as age, gender, events prior to hospitalization, socio-economic status, comorbidities and other potential risk factors. Standardization or stratification is highly recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

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- Scottish Intercollegiate Guidelines Network. *Prevention and Management of Hip Fracture in Older People. A National clinical guideline.* SIGN 56; Jan 2002.

## E4: Returning home following hospital treatment for fractured hip

**RATIONALE:** In the absence of routine data on patient levels of function and well-being, a return to the usual residence following a fracture of the neck of the femur may act as a proxy for successful outcome of rehabilitation. Although the proportion of those who return to the pre-fracture category of accommodation will depend partly on the availability of the support they might receive there and partly on the quality of community services, a change in the category of accommodation may suggest an important change in functional ability and health status. There are variations between 'like' populations in the proportions who return to the usual residence. The health systems may be able to avoid unnecessarily prolonged hospital stays by learning lessons from the experience of others and alerting those responsible for social care problems.

**NUMERATOR:** The number of emergency admissions for patients aged 65 years and over with a primary diagnosis on admission of fractured proximal femur (ICD 10 codes S72.0, S72.1 and S72.2 – see denominator data) where the patient is discharged to the pre-admission category of accommodation between 0 and 27 days (inclusive) of admission.

**DENOMINATOR:** The number of emergency admissions for patients aged 65 years and over with a primary diagnosis on admission of fractured proximal femur (ICD 10 codes S72.0, S72.1 and S72.2). The denominator excludes admissions where the first episode has an admission source coded other than 19, 29, 30, 37, 38, 48, 50, 54, 65, 66, 69, 84, 85, 86, 88, 89.

**STATISTICAL METHODS:** This indicator is presented at trust and population level. Returning home following hospital treatment for fractured hip may vary between organizations because of many factors such as age, gender, events prior to hospitalization, socio-economic status, comorbidities and other potential risk factors. Standardization or stratification is highly recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

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## E5: In-hospital waiting time for femur fracture surgery

**RATIONALE:** Evidence from clinical trials of surgery after a upper femur fracture shows that surgery should be performed within 48 hours, preferably within 24 hours. Taking into account age, sex and pre-existing medical conditions, delays in surgery after a hip fracture of more than two days, approximately doubled the risk of death within one year. Rapid surgery after a hip fracture can reduce the incidence of life-threatening complications such as pulmonary embolism.

No known studies have examined the reliability of this indicator.

**NUMERATOR:** The number of patients aged 65 and over admitted to the hospital with a diagnosis of upper femur fracture with surgery initiated within 48 hours.

**DENOMINATOR:** The number of patients aged 65 and over admitted to the hospital with a diagnosis of upper femur fracture.

**STATISTICAL METHODS:** Standardization by age and sex.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
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## E6: Total hip replacement in-hospital mortality rate

**RATIONALE:** This indicator measures deaths that occurred in hospital and after total hip replacement procedure. In most cases, total hip arthroplasty is an elective procedure performed to improve function and relieve the pain of those patients affected by chronic osteoarthritis, rheumatoid arthritis, or other degenerative processes involving the hip joint. Better processes of care may reduce mortality for hip replacement, which represents better quality care. The mortality rate (measured as a percentage) provides general information about the quality of care delivery, and can be an important quality indicator. However, hospitals that care about patients with a greater severity of illness might have a higher mortality rate. Total hip replacement as an elective surgery has a relative low mortality rate. Variations in death rates for total hip replacement between similar populations suggest that some of these deaths are potentially avoidable. The health systems may be helped to prevent some of these deaths in hospital by considering comparative figures and learning lessons from follow-up investigations.

**NUMERATOR:** The number of in-hospital deaths with a code of total hip replacement in any procedure field (ICD-9-CM procedure code: 81.51 total hip replacement).

**DENOMINATOR:** All discharges with a procedure code of total hip replacement in any field (ICD-9-CM procedure code: 81.51 total hip replacement).

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Total hip replacement in-hospital mortality rate may vary between organizations because of many factors such as age, gender, events prior to hospitalization, socio-economic status, comorbidities and other potential risk factors. The known predictors of in-patient mortality include age, presence or type of hip fracture, and the presence of any significant coexisting conditions. Standardization or stratification is highly recommended to account those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


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## E7: Partial hip replacement in-hospital mortality rate

**RATIONALE:** This indicator measures deaths occurring in hospital and after partial hip replacement procedure. Partial hip arthroplasty is an emergency procedure because the patients are, in many cases, admitted to hospital with a hip fracture. Better processes of care may reduce mortality for hip replacement, which represents better quality care. The mortality rate (measured as a percentage) provides general information about the quality of care delivery, and can be an important quality indicator. However, some hospitals care for patients with a greater severity of illness and therefore may have a higher mortality rate. Variations in death rates for partial hip replacement between 'like' populations suggest that some of these deaths are potentially avoidable. The health systems may be helped to prevent some of these deaths in hospital by considering comparative figures and learning lessons from follow-up investigations.

**NUMERATOR:** The number of in-hospital deaths with a code of partial hip replacement in any procedure field (ICD-9-CM procedure code: 81.52 partial hip replacement).

**DENOMINATOR:** All discharges with a procedure code of partial hip replacement in any field (ICD-9-CM procedure code: 81.52 partial hip replacement).

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Partial in-hospital hip replacement mortality rate may vary between organizations because of many factors such as age, gender, events prior to hospitalization, severity of the myocardial infarction, socio-economic status, comorbidities and other potential risk factors. The known predictors of in-patient mortality include age, presence or type of hip fracture, and the presence of any significant coexisting conditions. Standardization or stratification is highly recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


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## E8: Revision rate

Rate of revision surgery at a defined follow-up period. Definition of a revision is when at least a part of the implant has to be removed.

Note: Survival rate =1 - Revision rate.

**RATIONALE:** The goal of lifelong proper function is of the highest importance for the patient, but also for surgeons and public health institutions. Even if failure should remain an exception, it can never be completely avoided. However, the number of failures should be decreased to a minimum. The differences in revision rates between implants, medical procedures and health systems are high and have multifactor reasons.

Generally, the time period between primary surgery and revision surgery has a high variety and a long term perspective. Revision surgery is a relative rare procedure, but has a high impact on the quality of life of the patient and high costs for public health budgets.

According to an agreement among orthopaedic societies, an up-to-date implant requires at least a 95% survival rate after 10 years of follow-up (= max. 5% revision rate).

In addition to the crude revision rate, it is important to get access to information about the reasons for failure for analyses and quality control issues.

**NUMERATOR:** Number of revisions (= exchange or removal of at least a part of the implant) at follow-up period X.

**DENOMINATOR:** Total number of primary implantations included in the evaluation sample.

**STATISTICAL METHODS:** The data are used to generate the probability of the event. This indicator is most commonly presented using a graphical plot, the Kaplan-Meier Survival curves, with the follow-up period on the x-axis, while the y-axis displays the cumulative proportion of subjects who have experienced the event of interest (survival, i.e. the device is already implanted - not removed - at the time x). The plot consists of steps reflecting either the occurrence of an event at a particular time point (revision), or removal of an individual due to censoring (for example when an implanted patient dies before the removal of the implant). Generally, the charts are adjusted by influence factors like gender, age or geographical regions.

For adjustments in general, Cox-regression analyses are used, but for now these procedures are not standardized in detail in the different national and regional European projects.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of implants and types of medical devices;
- for comparative evaluation of surgical techniques;
- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for analysis of trend over time.

**REFERENCES:**


- Consensual agreement at the Scientific Board, European Arthroplasty Register.

## E9: Revision burden rate

Quotient of number of revisions in the form of replacement or extraction of the whole or parts of the prosthesis

and the number of all operations (primary and revision) (1). This indicator is computed in a defined geographical area.

(1) Annual Report 2006 Swedish National Hip Arthroplasty Register

**RATIONALE:** The goal of patients, physicians and health institutions is that an implanted medical device remains in the human body the entire life time.

Based on this precondition, every revision surgery related to the medical device has to be stated a failure.

The ratio between the number of revisions and the number of all operations (primary and revision) is a valid general indicator concerning the quality of the medical service.

Some limitations should be taken into consideration. Firstly, the fact that for most of the medical devices, the period between primary intervention and revision surgery is long. Secondly, changes in the numbers of primary operations have an impact on the revision burden figures. Furthermore, increasing numbers of primary implantations are decreasing the revision burden figures since the number of revisions is based on a minor collective from the past.

For the interpretation of revision burden figures, reference to the development of primary interventions is recommended.

**NUMERATOR:** Number of revisions (= exchange or removal of at least a part of the implant) in a period.

**DENOMINATOR:** Number of all operations (primary and revision).

**STATISTICAL METHODS:** This indicator is presented as a ratio referring to periods and geographical regions in general.

This indicator could also be used for defined cohorts of institutions, but a proper adjustment to the background referred is recommended.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of health systems;
- for comparative evaluations on regional and national level;
- for analysis of trend over time.

**REFERENCES:**


- Annual Report 2006 Swedish National Hip Arthroplasty Register( english version), access: http://www.jru.orthop.gu.se
- Consensual agreement at the Scientific Board, European Arthroplasty Register based on Scandinavian Arthroplasty Register procedures

# F. TRANSPLANTATIONS

## F1: Medulla ossium graft relative survival

**RATIONALE:** The medulla ossium graft transplantation procedure is a technique that infuses healthy bone marrow into a patient whose bone marrow is defective. The transplant can be autologous (removed from a patient, treated, and then reinserted into the same patient), or allogeneic (healthy bone marrow obtained from a closely related donor). This procedure is mainly used to treat leukemia, severe forms of anaemia, and disorders of the immune system and can result in premature deaths, some of which may be avoidable. This indicator measures deaths occurring in hospital and after discharge from hospital amongst people who have undergone this procedure. The indicator relates to major complications, such as graft-versus-host disease (as a result of allogeneic transplantation) and/or infections that occur before the transplanted marrow begins to produce leukocytes. Variations in death rates among the different health systems between similar populations (for example, paediatric and adult) suggest that some of these deaths are potentially avoidable. The health systems may be helped to prevent some of these deaths by seeing comparative figures and learning lessons from follow-up investigations.

**Important**: Survival rate after bone marrow transplantation depends largely on care and treatment after procedure, which is not necessarily supplied from the same trust. Comparisons are allowed only between macro-geographical areas.

**NUMERATOR:** The five year survival rate of patients after the medulla ossium graft transplantation procedure.

**DENOMINATOR:** The expected survival rate among a population with the same age structure.

**STATISTICAL METHODS:** Different "categories" of patients could have different results. This is due to many factors, such as age, gender, events prior to hospitalization, socio-economic status, comorbidities and other potential risk factors. Standardization or stratification is highly recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


- *Cleveland clinical transplant center.*
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- Warkentin PI, Nick L, Shpall EJ. FAHCT accreditation: common deficiencies during on-site inspections. *Cytotherapy* 2000;2(3):213-20.

## F2: Liver transplantation relative survival

**RATIONALE:** The liver transplantation procedure is indicated for acute or chronic liver function from any cause, for some metabolic liver diseases, for liver cancer, as well as for some metabolic diseases caused by liver-based inborn errors of metabolism. The efficacy of liver transplantation is better assessed by comparing mortality and morbidity after the transplantation procedure with the natural history of the disease in question. Examples of the diseases treated with liver transplantation are biliary cirrhosis and primary sclerosing cholangiitis. This indicator measures deaths occurring in hospital and after discharge from hospital amongst people who have undergone this procedure. Variations in death rates among the different health systems between similar populations (for example, paediatric and adult) suggest that some of these deaths are potentially avoidable. The health systems may be helped to prevent some of these deaths by seeing comparative figures and learning lessons from follow-up investigations.

**Important**: Survival rate after liver transplantation depends largely on care and treatment after procedure, which is not necessarily supplied from the same trust. Comparisons are allowed only between macro-geographical areas.

**NUMERATOR:** The five year survival rate of patients after the liver transplantation procedure.

**DENOMINATOR:** The expected survival rate among a population with the same age structure.

**STATISTICAL METHODS:** Different "categories" of patients could have different results. This is due to many factors, such as age, gender, events prior to hospitalization, socioeconomic status, comorbidities and other potential risk factors. Standardization or stratification is highly recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

### HOW TO USE THIS INDICATOR:

- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

### REFERENCES:


- Barshes NR, Becker NS, Washburn WK, Halff GA, Aloia TA, Goss JA. Geographic disparities in deceased donor liver transplantation within a single UNOS region. *Liver Transpl* 2007;13(5):747-51.
- *Cleveland clinical transplant center*.
  Available from: http://www.clevelandclinic.org/quality/guides/transplant.htm Assessed the 07/01/2008
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  http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4117855.pdf. Assessed the 07/01/2008
- US Scientific Registry of Transplant Recipients. *Annual Report.* 2006 OPTN/SRTR (May 1, 2006). Assessed the 07/01/2008.
- Warkentin PI, Nick L, Shpall EJ. FAHCT accreditation: common deficiencies during on-site inspections. *Cytotherapy* 2000;2(3):213-20.

## F3: Heart transplantation relative survival

**RATIONALE:** The heart transplantation procedure is indicated for those with severe heart failure and who continue to have symptoms despite maximum medical therapy. Survival among cardiac transplant recipients has improved over the past 30 years as a result of improvements in immunosuppression and prevention, and treatment of infection. The efficacy of heart transplantation can be assessed by comparing mortality and morbidity after the transplantation procedure with the natural history of the disease in question. This indicator measures deaths occurring in hospital and after discharge from hospital amongst people who have undergone this procedure. Variations in death rates among the different health systems between similar populations (for example, paediatric and adult) suggest that some of these deaths are potentially avoidable. The health systems may be helped to prevent some of these deaths by seeing comparative figures and learning lessons from follow-up investigations.

**Important**: Survival rate after heart transplantation depends largely on care and treatment after procedure, which is not necessarily supplied from the same trust. Comparisons are allowed only between macro-geographical areas.

**NUMERATOR:** The five year survival rate of patients after the heart transplantation procedure.

**DENOMINATOR:** The expected survival rate among a population with the same age structure.

**STATISTICAL METHODS:** Different "categories" of patients could have different results. This is due to many factors, such as age, gender, events prior to hospitalization, socio-economic status, comorbidities and other potential risk factors. Standardization or stratification is highly recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

Out-of-hospital death is due to acute or chronic rejection and will account for fewer deaths in subsequent years. In contrast, allograft vasculopathy, which is the development of rapidly progressing coronary artery disease in the arteries of the transplanted heart has become the most common cause of death, accounting for around 25 percent of deaths within five years. The number of fatal cancers other than lymphoma has increased as well. Infections, that are a result of immunosuppression, remain a significant cause of late mortality. Finally, post transplant lymphoproliferative disease is another cause. Thus, in order to statistically compare different populations, it is important to account for all these causes of morbidity and mortality.

### HOW TO USE THIS INDICATOR:

- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

### REFERENCES:


- Cleveland clinical transplant center.
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- Warkentin PI, Nick L, Shpall EJ. FAHCT accreditation: common deficiencies during on-site inspections. *Cytotherapy* 2000;2(3):213-20.

## F4: Lung transplantation relative survival

**RATIONALE:** The lung transplantation procedure is indicated for patients with final stage lung disease who have exhausted all other available treatments without improvement. The most common reasons for lung transplantation are chronic obstructive pulmonary disease or COPD, idiopathic pulmonary fibrosis, cystic fibrosis, idiopathic pulmonary hypertension, alpha 1-antitrypsin deficiency, replacement of transplanted lungs that have since failed, and finally bronchiectasis and sarcoidosis. The efficacy of lung transplantation can be assessed by comparing mortality and morbidity after the transplantation procedure with the natural history of the disease in question. This indicator measures deaths occurring in hospital and after discharge from hospital amongst people who have undergone this procedure. Variations in death rates among the different health systems between similar populations (for example, paediatric and adult) suggest that some of these deaths are potentially avoidable. The health systems may be helped to prevent some of these deaths by seeing comparative figures and learning lessons from follow-up investigations.

**Important**: Survival rate after lung transplantation depends largely on care and treatment after procedure, which is not necessarily supplied from the same trust. Comparisons are allowed only between macro-geographical areas.

**NUMERATOR:** The five year survival rate of patients after the lung transplantation procedure.

**DENOMINATOR:** The expected survival rate among a population with the same age structure.

**STATISTICAL METHODS:** Different "categories" of patients could have different results. This is due to many factors, such as age, gender, events prior to hospitalization, socio-economic status, comorbidities and other potential risk factors. Standardization or stratification is highly recommended to account forthose aspects of patients' case mix which can be identified by using the discharge data.

Out-of -hospital death is due to acute or chronic rejection and will account for fewer deaths in subsequent years. Infections, that are a result of immune-suppression, remain a significant cause of late mortality. Thus, in order to statistically compare different populations, it is important to account for all these causes of morbidity and mortality.

### HOW TO USE THIS INDICATOR:

- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

### REFERENCES:


- Cleveland clinical transplant center.
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## F5: Kidney transplantation relative survival

**RATIONALE:** The kidney (renal) transplantation procedure is indicated for a patient with final stage renal disease. Kidney transplantation is classified as deceased donor (formerly known as cadaveric) or living donor transplantation depending on the source of the recipient organ. Living donor renal transplants are further characterized as genetically related (living related) or non-related (living unrelated) transplants. The efficacy of kidney transplantation can be assessed by comparing mortality and morbidity after the transplantation procedure with the natural history of the disease in question. This indicator measures deaths occurring in hospital and after discharge from hospital amongst people who have undergone this procedure. Variations in death rates among the different health systems between similar populations (for example, paediatric and adult) suggest that some of these deaths are potentially avoidable. The health systems may be helped to prevent some of these deaths by seeing comparative figures and learning lessons from follow-up investigations. Important: Survival rate after kidney transplantation depends largely on care and treatment after procedure, which is not necessarily supplied from the same trust. Comparisons are allowed only between macro-geographical areas.

**NUMERATOR:** The five year survival rate of patients after the kidney transplantation procedure.

**DENOMINATOR:** The expected survival rate among a population with the same age structure.

**STATISTICAL METHODS:** Different "categories" of patients could have different results. This is due to many factors, such as age, gender, events prior to hospitalization, socio-economic status, comorbidities and other potential risk factors. Standardization or stratification is highly recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

Out-of -hospital death is due to acute or chronic rejection and will account for fewer deaths in subsequent years.

Other reasons include infections and sepsis due to the immunosuppressant drugs, as well as lymphoproliferative disorders. The average lifetime for a donor kidney is ten to fifteen years. When a transplant fails a patient may opt for a second transplant, and may have to return to dialysis for some intermediary time.

### HOW TO USE THIS INDICATOR:

- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

### REFERENCES:


- Cleveland clinical transplant center.
  Available from: http://www.clevelandclinic.org/quality/guides/transplant.htm Assessed the 07/01/2008
- Warkentin PI, Nick L, Shpall EJ. FAHCT accreditation: common deficiencies during on-site inspections. *Cytotherapy* 2000;2(3):213-20.

# G. EMERGENCY

## G1: Emergency admission to hospital

The number of emergency admissions to hospitals per 10,000 resident people.

**RATIONALE:** The emergency admission rate is an important measure of the effectiveness of preventative strategies, intermediate care (both admission prevention and post-acute rehabilitation), community care arrangements and hospital discharge arrangements for older people. Comparing rates of emergency admissions in different communities may provide policy makers and public health providers indications to identify more disadvantaged areas in terms of primary prevention and rehabilitation.

**NUMERATOR:** The number of emergency admissions to hospital.

**DENOMINATOR:** Population resident in a selected area or country.

**STATISTICAL METHODS:** This indicator is presented at population level.
Age and gender standardization or stratification is recommended.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


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## G2: Emergency readmissions to hospital within 28 days

Percentage of patients of all ages with emergency readmission to any hospital within 27 days (inclusive) of the last, previous discharge from hospital.

**RATIONALE:** Not all emergency readmissions after previous discharge from hospital were part of an originally planned treatment, and some could have been potentially avoided. This indicator can be used as a proxy for adverse outcome of a previous admission. Therefore, this indicator may be useful to identify a situation and/or trust where there are a number of higher than expected emergency readmissions.

**NUMERATOR:** The number of emergency admissions within 0-27 days (inclusive), previous discharge from hospital. The readmission where the patient dies is included, but patients with any mention of a cancer diagnosis or chemotherapy for cancer, or Major Diagnostic Category (MDC) 14 (pregnancy, childbirth, and puerperium), or mental health specialties are excluded. Day cases are also excluded.

**DENOMINATOR:** The number of discharges from every hospital. The following cases are excluded from the calculation of the denominator:

- patients discharged as deceased;
- day cases;
- patients discharged with mention of mental health;
- patients discharged with any mention of cancer or cancer related pathologies or treatment;
- patients discharged with Major Diagnostic Category (MDC) 14 (pregnancy, childbirth, and puerperium).

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Emergency readmissions may vary between organizations because of many factors. Age and gender standardization is highly recommended to account for at least those aspects of case mix which can be certainly identified.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


- Health Commission. 2005 *Performance Indicators. Clinical Indicator AS 403: Emergency readmissions to hospital within 28 days of discharge, as a percentage of live discharges for patients aged 16 years and over*. Available from: http://ratings.healthcarecommission.org.uk/Indicators_2005/Trust/Indicator/indicatorDescriptionShort.asp?indicatorId=1403
- Henderson J, Goldacre MJ, Graveny MJ, Simmons HM. Use of medical record linkage to study readmission rates. *BMJ* 1989;299:709-13

## G3: Emergency hospital admissions for alcohol related pathologies

The number of emergency hospital admissions for alcohol related pathologies per 100,000 population.

**RATIONALE:** Recent studies have shown that alcohol consumption is directly or indirectly responsible for about 9% of all diseases in Europe. It increases the risk of cirrhosis of the liver, some types of cancer, acute myocardial infarction, blood hypertension and congenital malformations. Therefore, by comparing the hospitalization rate for alcohol related pathologies in different communities may help the health care providers to identify those areas with quality-of-care problems related to prevention, to plan specific interventions, and to evaluate how well these interventions meet the goals of preventing illness and disability.

**NUMERATOR:** The number of emergency admission episodes for patients with principal and secondary diagnosis for alcohol related pathologies (ICD9-CM 291;303;305.0;357.5;425.5;535.3).

**DENOMINATOR:** Resident population.

**STATISTICAL METHODS:** This indicator is presented at population level.

Age and gender standardization or stratification is recommended.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


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# H. NEONATAL/MATERNAL

## H1: Maternal mortality rate

The number of maternal deaths related to childbearing divided by the number of live births in that year.

**RATIONALE:** Maternal mortality is an important health indicator reflecting a nation's health status. Though maternal mortality has decreased by 99% since the 1900s, maternal deaths currently remain significant events that may vary between different countries.

**NUMERATOR:** The number of deaths of women while pregnant or within 42 days of termination of pregnancy.

**DENOMINATOR:** Number of live births in year of analysis.

**STATISTICAL METHODS:** Death rate from pregnancy-related causes may vary due to many factors. The most important is the age of women: standardization or stratification, at least for this factor, is also highly recommended.

### HOW TO USE THIS INDICATOR:

- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations residing in different areas or of different socio-economic status;
- for analysis of trend over time.

### REFERENCES:


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## H2-a: Neonatal mortality rate

Number of deaths during the first 28 completed days of life per 1,000 live births in a given year or period.

**RATIONALE:** Neonatal deaths account for a large proportion of child deaths. Mortality during neonatal period is considered a good indicator of both maternal and newborn health and care. The neonatal period commences at birth and ends 28 completed days after birth.

**NUMERATOR:** The number of children dying under 28 days.

**DENOMINATOR:** The number of live births.

**STATISTICAL METHODS:** Neonatal mortality rates may vary due to many factors: age, parity, nativity, marital status and completed schooling of the mother, as well as separate indicators of exposure to tobacco, alcohol and drugs. Because it is not easy to have all that information, at least the standardization or stratification for the age of the mother is highly recommended.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


- Lee KS, Paneth N, Gartner LM, Pearlman MA, Gruss L. Neonatal mortality: an analysis of the recent improvement in the United States. *Am J Public Health* 1980;70(1):15–21.
- Liu K, Moon M, Sulvetta M, Chawla J. International infant mortality rankings: a look behind the numbers. *Health Care Financ Rev* 1992;13(4):105-18.
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## H2-b: Infant mortality rate

Number of deaths during the first 364 completed days of life per 1,000 live births in a given year or period.

**RATIONALE:** Infant mortality rates are considered a good indicator of economic development and of the quality and access of the health system provided. High rates of infant mortality reflect low levels of nutrition, education, and/or health care in a population.

**NUMERATOR:** The number of children dying under one year of age.

**DENOMINATOR:** The number of live births.

**STATISTICAL METHODS:** Infant mortality rates may vary due to many factors: age, parity, nativity, marital status and schooling of the mother, as well as separate indicators of exposure to tobacco, alcohol and drugs. Because it is not easy to have all that information, at least the standardization or stratification for the age of the mother is highly recommended.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

**REFERENCES:**


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## H3: Perinatal mortality rate

The number of perinatal deaths per 1,000 births. The perinatal period starts at the beginning of foetal viability (28 weeks gestation or 1,000g) and ends at the end of the 7th day after delivery. Perinatal deaths are the sum of stillbirths (deaths after 28 weeks of gestation) plus early neonatal deaths.

**RATIONALE:** The perinatal mortality rate is used as an indicator of the quality of antenatal and perinatal care, yet uncritical application of this indicator in international comparisons can be misleading. The perinatal mortality rate depends on a number of factors and important determinants that need to be assessed separately before reaching conclusions about quality-of-care issues. The perinatal mortality rate can serve as a reasonable indicator for the quality of antenatal and perinatal care. In western countries, perinatal mortality could be reduced by as much as 25% with improved standards of care. Death during the perinatal stage occurs for many different reasons, but in many cases maternal exposures to environmental hazards are major risk factors. The perinatal mortality rate thus provides a general measure of the health environment during the earliest stages of life.

**NUMERATOR:** The number of perinatal deaths. The perinatal period starts as the beginning of foetal viability (28 weeks gestation or 1,000g) and ends at the end of the 7th day after delivery. Perinatal deaths are the sum of stillbirths plus early neonatal deaths.

**DENOMINATOR:** The number of live or death births.

**STATISTICAL METHODS:** Perinatal mortality rates may vary due to many factors: age of mother, marital status, poverty, birth weight, and length of gestation. Low birth weight is the principal risk factor associated with infant mortality, but it is difficult to obtain from administrative data.

### HOW TO USE THIS INDICATOR:

- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

### REFERENCES:


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## H4: Perinatal intensive care mortality rate

The number of perinatal deaths per 100 neonatal births that required intensive care hospitalization. The perinatal period starts at the beginning of foetal viability (28 weeks gestation or 1,000g) and ends at the end of the 7th day after delivery. Perinatal deaths are the sum of stillbirths (deaths after 28 weeks of gestation) plus early neonatal deaths.

**RATIONALE:** Roughly forty thousand of newborns require hospitalization, most of them in connection to minor problems adapting to life outside the womb. A small number, however, have more serious problems, often resulting from premature birth, serious infection, hypoxia or serious congenital anomalies. About 6 percent of all newborns consequently require intensive care (IC). The mortality rate among newborns receiving IC has fallen sharply in recent decades, but remains much higher than the average neonatal mortality rate. For most of these children, the risk of death is more than 10 per cent. Serious prematurity and serious illness before, at or shortly after birth also have considerable influence on an individual's health and development in later life. It is increasingly clear that, despite the quality of perinatal care, such problems often have lifelong implications.

**NUMERATOR**: The number of perinatal deaths admitted in intensive care unit. The perinatal period starts as the beginning of foetal viability (28 weeks gestation or 1,000g) and ends at the end of the 7th day after delivery. Perinatal deaths are the sum of stillbirths plus early neonatal deaths.

**DENOMINATOR:** The number of live or death births.

**STATISTICAL METHODS:** Perinatal intensive care mortality rates may vary due to many factors: age of mother, marital status, poverty, birth weight, length of gestation and severity of morbidities associated with intensive care. Low birth weight is the principal risk factor associated with infant mortality, but it is difficult to obtain from administrative data.

### HOW TO USE THIS INDICATOR:

- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

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## H5: Percentage of births carried out by caesarean section

Percentage of births by caesarean section (CS) among all live births in a given time period.

**RATIONALE:** The proportion of births that are by caesarean section has been considered as an indicator of whether essential obstetric care facilities are providing life-saving obstetric services. Of all the procedures used to treat the major obstetric complications, caesarean section is the easiest to study. However, the use of the proportion of caesarean births as an indicator is somewhat controversial because the procedure has been identified as overused in industrialized countries. As such, lower rates should reflect a more appropriate clinical practice.

As CS rates have increased over the last ten to fifteen years, many organizations have aimed to monitor and reduce the rate.

Clinical characteristics, such as repeat CS, parity, breech presentation, placental or cord complications, sexually transmitted diseases, infections, and birth weight have been shown to explain substantial variation in CS rates. Non-clinical factors, such as clinician practice patterns, maternal request, hospital characteristics, and geographic region, have also been related to caesarean delivery rates.

The proportion of caesarean births should be analysed by sub-national areas and institutions. The smaller the unit of analysis, the more likely one is to be able to detect important discrepancies. The overall CS rate cannot determine appropriate use, but the variation in rates across institutions and regions may, if the variations do not merely reflect variations in patient risk factors.

**NUMERATOR:** The number of births carried out by caesarean section.

**DENOMINATOR:** The number of births.

**STATISTICAL METHODS:** This indicator is presented at trust and population level.

Percentage of births by caesarean section may vary between organizations because of some factors, such as age, socio-economic status and patients' clinical characteristics that could be risk factors for caesarean section. Standardization or stratification is recommended to account for those aspects of patients' case mix which can be identified by using the discharge data.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. delivery volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for comparative evaluation of effectiveness of pregnant women education programmes between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

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# I.MISCELLANEA

## I1: Death within 30 days of surgery (elective and non-elective admissions)

This indicator shows mortality rates (per 100 procedures) within 30 days of surgery for patients undergoing any operations on an elective/non-elective basis, i.e. they are not brought/brought in as emergencies.

**RATIONALE:** Some deaths may be avoidable and this indicator may help to identify those critical situations and trusts where there is a higher than expected number of deaths.

**NUMERATOR:** The number of discharges with elective/non-elective admission records where the patient dies between 0 - 29 days (inclusive) of the first procedure while hospitalized.

**DENOMINATOR:** The number of discharges records with elective/non-elective admissions, where an eligible operative procedure was performed. Day cases are excluded.

**STATISTICAL METHODS:** This indicator should be computed at trust and population level.

Elective/non-elective operative mortality may vary between organizations because of many factors including differences in the severity of patients operated on and relative frequencies of the different procedures conducted. Standardization is recommended to account for those aspects of case mix, at least those factors which can be certainly identified: gender, age and risk related to each type of procedure.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation of hospital performances;
- for comparative evaluation between groups of facilities with similar organizational and/or process characteristics (i.e. treatment volume, technological equipment);
- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

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## I2: Hospital admissions for alcohol related pathologies

The number of hospital admissions for alcohol related pathologies per 100,000 population.

**RATIONALE:** Recent studies have shown that alcohol consumption is directly or indirectly responsible for about 9% of all diseases in Europe. It increases the risk of cirrhosis of the liver, some types of cancer, acute myocardial infarction, blood hypertension and congenital malformations. Therefore, by comparing the hospitalization rate for alcohol related pathologies in different communities may help the health care providers to identify those areas with quality-of-care problems related to prevention, to plan specific interventions, and to evaluate how well these interventions meet the goals of preventing illness and disability.

**NUMERATOR:** The number of ordinary admission episodes for patients with principal and secondary diagnosis for alcohol related pathologies (ICD9-CM 291; 303;305.0;357.5;425.5;535.3).

**DENOMINATOR:** Resident population.

**STATISTICAL METHODS:** This indicator is presented at population level.

Age and gender standardization or stratification is recommended.

**HOW TO USE THIS INDICATOR:**

- for comparative evaluation between populations resident in different areas or of different socio-economic status;
- for analysis of trend over time.

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