Centre for Public Health Forecasting

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Update PATH Performance Indicators

Short-term assignment WHO Europe

rivm
National Institute for Public Health and the Environment

This investigation has been performed by order and for the account of WHO Europe.

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Background

In November 2005, the WHO Regional Office for Europe, Division of Country Support, Country Policies, Systems and Services evaluated the 'Pilot test of the performance assessment tool for quality improvement in hospitals (PATH)'. During this workshop the PATH expert group discussed the issue of revising the indicator descriptive sheets. Based on this discussion and a systematic assessment by the individual country coordinators, it was agreed to review and update the descriptive sheets.

During the last two months, researchers form the National Institute of Public Health and the Environment (RIVM) were tasked with reviewing and updating the indicator descriptive sheets. For this purpose, the workshop document 'Pilot test of the performance assessment tool for quality improvement in hospitals (PATH), November 2005 was taken as the leading document (particularly section 'Review of PATH indicators', on page 4 and 5). Additionally, discussions with Oliver Groene, Technical Officer Quality of Health Systems and Services and prof. dr. Niek Klazinga, Academic Medical Centre, University of Amsterdam, the Netherlands, and the First International Conference on PATH recently held in Brussels provided important input to this work.

In general, the following issues needed to be addressed:

1. Refinement of definitions (ICD codes) and in- and exclusion criteria;

2. Clarification of targets for interpretation/comparisons;

3. Harmonization of indicators with definitions by other agencies.

Given the resource constraints (time and budget), this work addresses only the most important issues that were brought up during the PATH workshop in 2005. Clear instructions were given to the researchers at the RIVM not to go 'too much' into detail.

1. Review of core indicators

Clinical effectiveness

1. Caesarean section (p.44)

PATH discussion:
Not too much variation in the pilot, but can be explained by a small sample. In new EU and Eastern European member states useful, as there are differences in public/private institution.

PATH Action:
Keep. Review AHRQ definition. Do not focus on primary C-section, but repeated C-section (review tailored indicators set).

Useful information provided by AHRQ:

- Providers may wish to break down Cesarean section into primary and repeat Cesarean delivery rates. Empirical analyses demonstrated that Cesarean delivery rate is measured with good precision.

- Recently, the principle focus of quality initiatives has been primary cesarean deliveries. However, some users, particularly when comparing with historical data, may wish to examine both the primary and total cesarean delivery rate.

Comments researchers:
We have reviewed the AHRQ definitions and definitions by CIHI. With respect to definition no.33 (see below) 'Primary Cesarean Delivery Rate', this indicator includes previous cesarean deliveries. Clearly, this indicator has a focus on 'primary' which is not advisable for PATH. Indicator no. 21 (see below) 'Cesarean Delivery Rate' includes all deliveries, i.e. primary, secondary or more deliveries. The Canadian Institute for Health Information uses Vaginal Birth After Caesarean Section (VBAC) Rate. This indicator distinguishes between previous C-section and '*Repeated C-section'*. Repeated C-section suggested by PATH.

AHRQ: Primary Cesarean Delivery Rate (Inpatient Quality Indicator no. 33)

Relationship to Quality	Cesarean delivery has been identified as an overused procedure. As such, lower rates represent better quality.
Benchmark	State, regional, or peer-group average.
Definition	Provider-level number of Cesarean deliveries per 100 deliveries.
Numerator	Number of Cesarean deliveries, identified by DRG, or by ICD-9-CM procedure codes if they are reported without a 7491 hysterotomy procedure. 7491 hysterotomy procedure: hysterotomy to terminate pregnancy, a therapeutic abortion by hysterotomy.
Denominator	All deliveries. Exclude cases: • abnormal presentation, preterm, fetal death, multiple gestation diagnosis codes • breech procedure codes • previous Cesarean delivery diagnosis in any diagnosis field.
Type of Indicator	Provider Level, Procedure Utilization Indicator
Empirical Performance	Population Rate (2003): 15.26 per 100 discharges at risk
Empirical Rating	Not evaluated

AHRQ: Cesarean Delivery Rate (Inpatient Quality Indicator no. 21).

Relationship to Quality	Cesarean delivery has been identified as an overused procedure. As such, lower rates represent better quality.
Benchmark	State, regional, or peer-group average.
Definition	Provider-level number of Cesarean deliveries per 100 deliveries.
Numerator	Number of Cesarean deliveries, identified by DRG, or by ICD-9-CM procedure codes if they are reported without a 7491 hysterotomy procedure.
Denominator	All deliveries. Exclude cases: • abnormal presentation, preterm, fetal death, multiple gestation diagnosis codes • breech procedure codes
Type of Indicator	Provider Level, Procedure Utilization Indicator
Empirical Performance	Population Rate (2003): 24.47 per 100 discharges at risk
Empirical Rating	17

Numerator (ICD-9-CM):
Cesarean delivery procedure codes:
740 CLASSICAL C-SECTION
744 CESAREAN SECTION NEC
741 LOW CERVICAL C-SECTION
7499 CESAREAN SECTION NOS
742 EXTRAPERITONEAL C-SECT

Denominator:
All deliveries (DRG).
370 CESAREAN SECTION W CC
373 VAG DELIVERY W/O COMPL
371 CESAREAN SECTION W/O CC
374 VAG DELIV W STERIL OR DC
372 VAGINAL DELIVERY W COMPL
375 VAG DELIV W OTH OR PROC

Exclude cases:
• abnormal presentation, preterm, fetal death, multiple gestation diagnosis codes
• breech procedure codes.

From the Canadian Institute for Health Information

Caesarean Section Rate

Definition: proportion of women delivering babies in acute care hospitals by Caesarean section.

Numerator
The numerator is a subset of the denominator. Caesarean section is identified as any procedure code* of:
CCP: 86.0-86.2, 86.8 or 86.9
CCI: 5.MD.60

*Code may be recorded in any position. Procedures coded as cancelled, previous, out-of-hospital and “abandoned after onset” are excluded.

Denominator (delivery):
Inclusion:
Delivery coded in any diagnosis field:
ICD-9: 640-676 with a fifth digit of 1 or 2; 650 or V27

ICD-10-CA: O1, O2, O4, O6-O8, O30-O37, O90-O92, O95, O98, O99 with a sixth digit of 1 or 2; or Z37

Exclusion:
Delivery in which an abortive procedure was recorded*:
CCP: 78.52, 86.3, 86.4, 87.0, 87.1 or 87.2
CCI: 5.CA.88, 5.CA.89, 5.CA.90 or 5.CA.93

Vaginal Birth After Caesarean Section (VBAC) Rate

- Previous C-section
ICD-9 diagnoses codes: 640-676 (with a fifth digit of 1* or 2*; Note: a diagnosis of 650 does not require a fifth digit), V27.0.

ICD-9-CM procedures codes: 640-676 (with a fifth digit of 1* or 2*; Note: a diagnosis of 650 does not require a fifth digit), V27.0.

- Repeated C-section:
ICD-9 procedures codes: C-section codes: 86.0-86.2, 86.8, 86.9, and ICD9 code: 654.2.

ICD-9-CM procedures codes: C-section codes: 74.0-74.2, 74.4, 74.99, and ICD-9CM code: 654.2

* 1 delivered, with or without mention of antepartum condition
* 2 delivered, with mention of postpartum complication

2. Prophylactic antibiotic over and under use (p.53)

PATH discussion:
Major variation in overuse between countries for selected tracer conditions. Not routinely available, but not too difficult to obtain. Keep. Reflects major quality and /safety concerns, evidence-based guidelines available for QI. Guidelines should be specified.
PATH Action:
Keep. Reflects major quality/safety concerns, evidence-based guidelines available for QI. Guidelines should be specified.

References (guidelines)

Mangram AJ, Horan TC, Pearson ML, Christine Silver L, Jarvis WR. **Guideline** for prevention of surgical site infection, 1999. Am J Infect Cont 1999; 97-132.

Goldmann DA, Weinstein RA, Wenzel RP, Tablan OC, Duma RJ, Gaynes RP, et al. **Strategies** to Prevent and Control the Emergence and Spread of Antimicrobial-Resistant Microorganisms in Hospitals. A challenge to hospital leadership. JAMA 1996; 275: 234-40.

Alicia J. Mangram, MD; Teresa C. Horan, MPH, CIC; Michele L. Pearson, MD; Leah Christine Silver, BS; William R. Jarvis, MD. **Guideline** for Prevention of Surgical Site Infection. The Hospital Infection Control Practices Advisory Committee, 1999. Infection Control and Hospital Epidemiology;1999, 247-278;20;4.

Scottish Intercollegiate Guidelines Network (SIGN). Antibiotic Prophylaxis in Surgery **Guideline**. SIGN Publication No. 45. 2000.

Shlaes, D. M., Gerding, D. N., John, J. F., Craig, W., Bornstein, D. L., Duncan, R. A. et al. (1997). Society for Healthcare Epidemiology of America and Infectious Diseases Society of America Joint Committee on the Prevention of Antimicrobial Resistance: **Guidelines** for the prevention of antimicrobial resistance in hospitals. Clinical Infectious Diseases 25, 584–99.

Comments researchers:
Within these guidelines a variety of recommendations to improve quality standards in prevention of surgical site infection and reduction of antimicrobial resistance in hospitals is described. Do we need to make summaries of proposed management strategies in hospitals on this topic…?

Three measures used by Centers for Medicare & Medicaid Services (in NQMC no. 184, 185, 186).

1. Surgical infection prevention: percent of patients who received prophylactic antibiotics **consistent with current guidelines** (not specific).

2. Surgical infection prevention: percent of patients who received prophylactic antibiotics **within 1 hour prior to surgical incision** (specific).
3. Surgical infection prevention: percent of patients whose prophylactic antibiotics were **discontinued within 24 hours after surgery end time** (specific).

Comments researchers:
Above-mentioned indicators, particular number 2 and 3 can be measured with precision. Indicators described in PATH are broad 'too early, too long, too high dose, too broad'.

JCAHO

Has three measures on this topic:

1. Prophylactic Antibiotic Selection for Surgical Patients

Description: Surgical patients who received prophylactic antibiotics consistent with current guidelines (specific to each type of surgical procedure). Measured: overall rate, CABG, other cardiac surgery, hip arthroplasty, knee arthroplasty, colon surgery, hysterectomy and vascular surgery.

Rationale: A goal of prophylaxis with antibiotics is to use an agent that is safe, cost-effective, and has a spectrum of action that covers most of the probable intraoperative contaminants for the operation.

2. Prophylactic Antibiotic Received Within One Hour Prior to Surgical Incision

Specifications:

Numerator: number of surgical patients who received prophylactic antibiotics within one hour prior to surgical incision.

Denominator: all selected surgical patients with no evidence of prior infection

Description: Surgical patients who received prophylactic antibiotics within one hour prior to surgical incision. *Patients who received vancomycin or a fluoroquinolone for prophylactic antibiotics should have the antibiotics administered within two hours prior to surgical incision. Due to the longer infusion time required for vancomycin or a fluoroquinolone, it is acceptable to start these antibiotics within two hours prior to incision time. Measured: overall rate, CABG, other cardiac surgery, hip arthroplasty, knee arthroplasty, colon surgery, hysterectomy and vascular surgery.

Rationale: A goal of prophylaxis with antibiotics is to establish bactericidal tissue and serum levels at the time of skin incision. Studies performed in the 1960's and 1970's demonstrated that a common reason for failure of prophylaxis was delay of antibiotic administration until after the operation. In a study of 2,847 surgery patients at LDS Hospital in Salt Lake City, it was found that the lowest incidence of post-operative infection was associated with antibiotic administration during the one hour prior to surgery. The risk of infection increased progressively with greater time intervals between administration and skin incision. This relationship was observed whether antibiotics preceded or followed skin incision (Classen 1993). Opportunities to improve care have been demonstrated and timely administration has been recommended. For example, at

LDS Hospital, administration of the first antibiotic dose “on call” to the operating room was frequently associated with timing errors. Altering the system there resulted in an increase in appropriate timing from 40% of cases in 1985 to 99% of cases in 1998. Type of Measure: Process

3. Prophylactic Antibiotics Discontinued Within 24 Hours After Surgery End Time

Numerator: number of surgical patients whose prophylactic antibiotics were discontinued within 24 hours after surgery end time (48 hours for CABG or Other Cardiac Surgery, check…!)

Denominator: all selected surgical patients with no evidence of prior infection

Description: Surgical patients whose prophylactic antibiotics were discontinued within 24 hours after surgery end time. *The Society of Thoracic Surgeons (STS) Practice Guideline for Antibiotic Prophylaxis in Cardiac Surgery (2005) has been published. Because of this new guideline, CMS and JCAHO have revised SCIP-Inf-3 relevant to cardiac surgery (CABG and Other Cardiac Surgery) only. The published STS guideline indicates that there is no reason to extend antibiotics beyond 48 hours for cardiac surgery and very explicitly states that antibiotics should not be extended beyond 48 hours even with tubes and drains in place for cardiac surgery.

Rationale: A goal of prophylaxis with antibiotics is to provide benefit to the patient with as little risk as possible. It is important to maintain therapeutic serum and tissue levels throughout the operation. Intraoperative re-dosing may be needed for long operations. However, administration of antibiotics for more than a few hours after the incision is closed offers no additional benefit to the surgical patient. Prolonged administration does increase the risk of Clostridium difficile infection and the development of antimicrobial resistant pathogens.

Specifications

ICD-9-CM procedure codes for JCAHO indicators:

CABG:
Code: 36.1

Other cardiac surgery:
Code: 35

Hip arthroplasty
Code: 81.51 Total hip replacement
81.52 Partial hip replacement

Knee arthroplasty
Code: 81.54 Total knee replacement

Colon surgery

Code: 45.03 Incision of large intestine
45.49 Other destruction of lesion of large intestine
45.50 Isolation of intestinal segment, not otherwise specified
45.71 Multiple segmental resection of large intestine
45.72 Cecectomy
45.73 Right hemicolectomy
45.74 Resection of transverse colon
45.75 Left hemicolectomy
45.76 Sigmoidectomy
45.79 Other partial excision of large intestine
45.8 Total intra-abdominal colectomy
45.90 Intestinal anastomosis not otherwise specified
45.92 Anastomosis of small intestine to rectal stump
45.93 Other small-to-large intestinal anastomosis
45.94 Large-to-large intestinal anastomosis
45.95 Anastomosis to anus
46.03 Exteriorization of large intestine

Hysterectomy

- Abdominal

Code: 68.39 Other subtotal abdominal hysterectomy
68.4 Total abdominal hysterectomy
68.6 Radical abdominal hysterectomy

- Vaginal

Code: 68.51 Laparoscopically assisted vaginal hysterectomy
68.59 Other vaginal hysterectomy
68.7 Radical vaginal hysterectomy

Vascular surgery.

Code: 38.14 Endarterectomy
38.16 Endarterectomy, abdominal arteries
38.18 Endarterectomy, lower limb arteries
38.34 Resection of vessel with anastomosis, aorta
38.36 Resection of vessel with anastomosis, abdominal arteries
38.37 Resection of vessel with anastomosis, abdominal veins
38.44 Resection of vessel with replacement, aorta, abdominal
38.48 Resection of vessel with replacement, lower limb arteries
38.49 Resection of vessel with replacement, lower limb veins
38.59 Ligation and stripping of varicose veins, lower limb veins
38.64 Other excision of vessels, aorta, abdominal
39.25 Aorta-iliac-femoral bypass
39.26 Other intra-abdominal vascular shunt or bypass
39.29 Other (peripheral) vascular shunt or bypass

The International Quality Indicator Project

These indicators are used by the International QIP. To be considered for indicator: 'Prophylactic antibiotic cover and under use'.

Prophylaxis for CABG:
Prophylaxis Within 30 Minutes Prior to Incision for CABG
Prophylaxis Within 1 Hour Prior to Incision for CABG
Prophylaxis Within 2 Hours Prior to Incision for CABG
Prophylaxis for 24 Hours or Less for CABG

Prophylaxis for Hip Arthroplasty:
Prophylaxis Within 30 Minutes Prior to Incision for Non-Revision Hip Arthroplasty
Prophylaxis Within 1 Hour Prior to Incision for Non-Revision Hip Arthroplasty
Prophylaxis Within 2 Hours Prior to Incision for Non-Revision Hip Arthroplasty
Prophylaxis for 24 Hours or Less for Hip Arthroplasty

Prophylaxis for Knee Arthroplasty:
Prophylaxis Within 30 Minutes Prior to Incision for Non-Revision Knee Arthroplasty
Prophylaxis Within 1 Hour Prior to Incision for Non-Revision Knee Arthroplasty
Prophylaxis Within 2 Hours Prior to Incision for Non-Revision Knee Arthroplasty
Prophylaxis for 24 Hours or Less for Knee Arthroplasty

Prophylaxis for Appendectomy:
Prophylaxis Within 30 Minutes Prior to Incision for Appendectomy
Prophylaxis Within 1 Hour Prior to Incision for Appendectomy
Prophylaxis Within 2 Hours Prior to Incision for Appendectomy
Prophylaxis for 24 Hours or Less for Appendectomy

Prophylaxis for Abdominal Hysterectomy:
Prophylaxis Within 30 Minutes Prior to Incision for Abdominal Hysterectomy
Prophylaxis Within 1 Hour Prior to Incision for Abdominal Hysterectomy
Prophylaxis Within 2 Hours Prior to Incision for Abdominal Hysterectomy
Prophylaxis for 24 Hours or Less for Abdominal Hysterectomy

Prophylaxis for Vaginal Hysterectomy:
Prophylaxis Within 30 Minutes Prior to Incision for Vaginal Hysterectomy
Prophylaxis Within 1 Hour Prior to Incision for Vaginal Hysterectomy
Prophylaxis Within 2 Hours Prior to Incision for Vaginal Hysterectomy
Prophylaxis for 24 Hours or Less for Vaginal Hysterectomy

Comments researchers:
Do we stick to the indicator presented in PATH…? If yes, I guess we need to further develop this indicator and determine, for each procedure, what we mean by over and under use. It appears that these definitions vary widely in different EU countries.

The indicator (both versions) proposed in PATH are based on data collection case-by-case. Indicators like b) and c) of JCAHO and those by Int. QIP can be routinely collected, and therefore reduce efforts of data collection and assessment. However, it must be detemined whether such indicators refer to critical aspects of prophylaxis and

whether variation between hospitals is large enough. In addition, exact time-intervals must be determined (30 min., 1hr, 2 hrs, 24 hrs or less) and these time-intervals should be different for different procedures. Clearly, above-mentioned indicators, if selected, need further detailing (e.g. in- and exclusion, data elements). Can be done in a later stage.

3. Mortality (all tracer) (p.25)

PATH discussion:
All tracers considered useful, except all-cause mortality. Should be retained, but concern: is in-patient mortality relevant? What about severity adjustment? Indicators included: acute myocardial infarction, coronary artery bypass graft, stroke, congestive heart failure, hip replacement, perinatal mortality. Very little variation for hip replacement. There is no paediatric condition in the whole PATH. Suggestion: use of post-operative mortality

PATH Action:
Review and harmonize ICD definitions, exclusion and inclusion. Hip replacement taken out and moved to sentinel events. Review ICD codes for stroke.

We reviewed other indicator projects, of which some had a more public health focus and others a focus on quality of hospital care. We looked at tracer conditions for mortality (AMI, stroke, hip fracture) and tracer conditions for readmission (AMI, community acquired pneumonia, asthma, diabetes). This resulted in some discussion points. At the end of this section we present an overview of the used ICD-codes in the reviewed projects.
We excluded congestive heart failure because it is not clear to us whether this is a tracer condition for mortality (and readmission).

AMI:
Nowadays often one uses the diagnosis acute coronary syndrome, adding the ECG-finding with or without ST-elevation. Acute coronary syndrome contains AMI and unstable angina pectoris. To distinguish an AMI from unstable angina pectoris, diagnostic procedures are needed: ECG and measuring of bio-markers.
AMI can be coded under both ICD-10 code I21 and I22, dependent on being the first or a recurrent infarction. We propose to select both codes, and, if a distinction between first and recurrent infarction is needed, to make this distinction on different data. Reason is that it is not known what the sensitivity and specificity of these specific codes are. Besides, if one chose only I21, one have to chose also ICD-9 code 410.x1. It is not known whether this code is valid (too specific).

Stroke:
- Coding practices for stroke may differ between physicians and countries. It depends from the availability and use of diagnostic procedures and the attention health care workers spent on registration of hospital discharges. Also differences in the used version of the ICD-classification exist. Stroke can cause additional problems because often comorbidity is present, which makes it difficult to assign a primary or secondary diagnosis to stroke. Also making a specific stroke diagnosis can be difficult, resulting in a low sensitivity and specificity of diagnoses.

- ICD-9 code 436 (Acute, but ill-defined, cerebrovascular disease) is often used by physicians and/or coding staff, instead of a specific code.
- Outcome (mortality and institutionalization) of interventions may differ according to the type of ischemic stroke. Evans et al. (2002) showed an effect of stroke units for large-vessel ischemic stroke but not for small-vessel ischemic stroke. Large-vessel ischemic stroke was defined as a cortical or sub-cortical syndrome with infarct>1.5 cm on CT scan and small-vessel ischemic stroke was defined as lacunar syndrome with infarct<1.5 cm or no lesions on CT scan. However, this division in large and small-vessel infarctions can not be made on the basis of ICD-codes.
- To decide which codes to include, it is important to know what the reason is to measure the indicator. What is the subject of the indicator, and to which processes and dimensions in health care does it refer? Most interventions are about *ischemic* stroke: stroke units, thrombolysis, anti-platelet agents (aspirin), carotid endarterectomy. The question is whether PATH should only select inschemic stroke.
- For outcome measurement it is important to define a homogenous patient population. An option is to select only ischemic stroke, excluding cases with stroke not specified as hemorrhagic or ischemic. A disadvantage of this selection is the diminishing specificity and representatively: a lot of ischemic stroke patients are coded on ill-defined codes and as a consequence are not included.
- In an audit by Dennis et al. (1999) three ICD-9 codes of the group cerebrovascular disease appeared as being insufficiently accurate markers of acute stroke: code 435 (transient cerebral ischemia), code 433 (occlusion and stenosis of precerebral arteries) and code 439 (late effects of cerebrovascular disease). However, the Scottish Clinical Outcomes Working Group (1999) concluded that including ICD-codes 433 and 439, including a number of patients who would not be confirmed as having suffered an acute stroke, is not a real problem, because it is highly unlikely that inter-hospital variation in the proportion of patients with codes 430-434 and 436-438 not having had a stroke, will cause differences in the overall survival rate of stroke. In one of several other studies about the validity of ICD-classification of stroke, it was concluded that excluding codes 432 (other and unspecified intracranial hemorrhage), 433, 435 and 439 increased the specificity and positive predictive value of the diagnosis of stroke (Ellekjaer et al., 1999).
- It is not always possible to make a distinction between five-digit codes, because people use only four digits or the used classification has codes with only 4 digits. For example, in the Netherlands for codes 433 and 434 no distinction can be made between 433.x0 / 434.x0 and 433.x1 / 434.x1.

Proposal: it is not clear to which processes of health care the stroke-indicators refer. We assume that ischemic stroke is the main subject for the PATH-indicators. In order to achieve a high specificity and homogenous patient group, it could be considered to select only distinct diagnoses and to omit the 5th digit.
ICD-9-CM codes: 433, 434, 436.
ICD-10 codes: I63, I64, I65, I66.
A problem with this selection is the inclusion of narrowing of arteries without infarction. This problem arise from the fact that ICD-9 codes 433 and 434 do not make a distinction between narrowing with infarctions and narrowing without infarctions (only 5 digits, not used in all countries). As a consequence we also included ICD-10 codes I65 and I66.

Literature:

Scottish Clinical Outcomes Working Group of the Clinical Resource and Audit Group. Clinical Outcome Indicators. Edinburgh: July 1999.

Dennis M, et al. A project to develop and test a system of monitoring the quality and effectiveness of hospital stroke services in Scotland by routinely measuring patient outcomes. Final Report to Chief Scientist Office, 29th March 1999.

Ellekjaer H, Holmen J, Kruger O, Terent A. Identification of incident stroke in Norway: hospital discharge data compared with a population-based stroke register. Stroke 1999;30(1):56-60.

Hip fracture:

- Hip fractures include fracture of neck and petrochanteric fracture. It is not clear whether the subtronchanteric fracture appertain to hip fracture (ICD-10 code S72.2 and ICD-9 codes 820.22 and 820.32). It is a proximal fracture, but distal of the trochanter. The ICD-9 codes of subtronchateric are very specific to exclude (five digits); it is easier to select ICD-code 820 completely. In that case, for comparability we have to select also ICD-10 code S72.2.
- Another question is whether we have to select fractures of unspecified parts of the femur: ICD-10 code S72.9 and ICD-9 codes 821.00 en 821.10).
- The last question is whether we have to select multiple fractures of femur (ICD-10 code S72.7). There is no equivalent in ICD-9, although it is likely that multiple fractures will be classified under ICD-9 codes 821.0 or 821.1.

Our proposal is to select ICD-10 codes S72.0, S72.1 and S72.2, and ICD-9 code 820. If all countries would use ICD-10, we would advise to include S72.9 as well, but because most countries use ICD-9 for the hospitals registry, we do not advise to include codes with five digits (821.00 and 821.10).

Community acquired pneumonia

- No ICD-codes exist for community acquired or originating from outside the hospital. This characteristic has to be added to the registry.
- One has to decide whether viral pneumonia will be included or only bacterial pneumonia. Of the evaluated indicator projects, only the Ontario studies excludes viral pneumonia. Viral pneumonia is considered a less serious disease than bacterial pneumonia. As for example, in the Netherlands the hospital lethality for cases with a code of viral pneumonia is about 1%, for cases with a code of bacterial pneumonia about 10% (community, hospital as well nursing home acquired pneumonia). However, in the Netherlands total mortality of viral pneumonia is larger than mortality of bacterial pneumonia (although mortality of non-specified microorganisms is many times larger).
- A comparable question is whether pneumonia due to other infectious organisms (no virus, no bacteria) has to be selected. It is a small group but with a possible somewhat different disease course. Only the Ontario Hospital Project excluded this code.
- Also pneumonia in diseases classified elsewhere is a small group. We estimate that a large proportion is non-community acquired.
- Legionnaires' disease is included in ICD-9 code 482, but not in ICD-10 code J15 (A48.1 instead). It should be considered to add code A48.1 to the PATH definition (like Ontario Hospital Project and the Dutch Public Health Compass).

- Pneumonitis due to solids and liquids is included in the AHRQ inpatient indicators, the Ontario Hospital Report (not for mortality) and the Dutch Public Health Compass. It should be considered to add code A48.1 to the PATH definition.
- The AHRQ inpatient indicators included a lot of seldom used codes. In other indicator sets these codes are not included.

Asthma

All projects use ICD-10 codes J45 (asthma) and J46 (status asthmaticus) or ICD-9 code 493 (asthma). Only the Canadian section of PATH excluded J46. We do not know why. The Institute for Clinical Systems Improvement excluded some very specific subcategories: exercise induced bronchospasm, cough variant asthma, and all cases of asthma with acute exacerbation.

Diabetes mellitus

Most indicator sets define diabetes as ICD-10 codes E10-E14 and ICD-9 code 250. Non of the set include diabetes in pregnancy or neonatal diabetes. Only the Ontario Hospital Project restricted diabetes to diabetes without mention of complications and diabetes with ketoacidosis or hyperosmolarity. Diabetes with other coma or with non-acute specified or unspecified complications was excluded. We do not have background information about the reasons for that. The January workshop of PATH proposed only diabetes with acute complications: ketoacidosis, hyperosmolarity and other coma. It is suggested that this is a very specific group of conditions. However, the etiology of diabetes with hyperglycaemia and diabetes with hypoglycaemia is different. Besides, it is the question whether physicians do use always such a specific diagnosis.

ICD-codes to consider for AMI

Codes	*Definition*	*Proposed PATH*	*EU Hospital Data Project*	*AHRQ inpatient indicators*	*ECHI*	*Ontario*	*JCAHO*
ICD-10:	**ICD-10:**			not defined for ICD-10	not defined for ICD-10	Canadian manual of PATH (codes used for mortality)	not defined for ICD-10
I20	Angina pectoris	-	-			-	
I21	Acute myocardial infarction	+	+			+	
I22	Subsequent myocardial infarction	+	+			+	
I51.3	Intracardiac thrombosis, not elsewhere classified (under complications and ill-defined descriptions of heart disease)	-	-			+	
ICD-9:	**ICD-9:**			indicator: mortality	mortality (Eurostat New Cronos)	Ontario Hospital Report 2003 (codes used in selecting patients)	process indicators
410	Acute myocardial infarction	+	+	specified:	+	+	specified:
410.x0	episode of care unspecified			-			-
410.x1	initial episode of care			+			+
410.x2	subsequent episode of care			-			-
411	Other acute and subacute forms of ischemic heart disease	-	-	-	-	-	-

ICD-codes to consider for stroke

Codes	*Definition*	*Proposed PATH*	*EU Hospital Data Project*	*AHRQ inpatient indicators*	*ECHI*	*Ontario*	*JCAHO (not mortality)*	*Ellekjaer et al., 1999*	*UK, NHS*
ICD-10:	**ICD-10:**			not defined for ICD-10	mortality (Eurostat New Cronos)	Canadian manual of PATH (codes used for prevalence of pressure ulcers)	not defined for ICD-10		indicator: admitted to stroke unit
I60	Subarachnoid haemorrhage	-	+		+	-			-
I61	Intracerebral haemorrhage	-	+		+	+			+
I62	Other nontraumatic intracranial haemorrhage (subdural, extradural/epidural, unspecified)	-	+		+	-			-
I63	Cerebral infarction (by occlusion and stenosis of cerebral or precerebral arteries)	+	+		+	+			+
I64	Stroke, not specified as haemorrhage or infarction	+	+		+	+			+
I65	Occlusion and stenosis of precerebral arteries, not resulting in cerebral infarction	-	+		+	+			-
I66	Occlusion and stenosis of cerebral arteries, not resulting in cerebral infarction	-	+		+	+			-
I67	Other cerebrovascular diseases	-	+		+	-			-
I68	Cerebrovascular disorders in diseases classified elsewhere	-	+		+	-			-
I69	Sequelae of cerebrovascular disease	-	+		+	-			-
G45	Transient cerebral ischaemic attacks and related syndromes	-	-		-	-			-
G46	Vascular syndromes of brain in cerebrovascular diseases	-	-	-	-	specified:			-

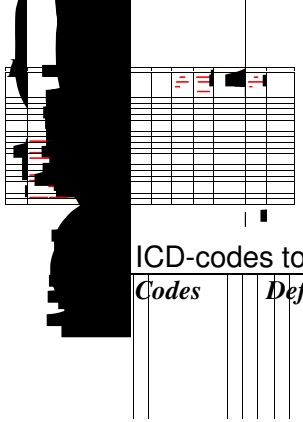
Codes	*Definition*	*Proposed PATH*	*EU Hospital Data Project*	*AHRQ inpatient indicators*	*ECHI*	*Ontario*	*JCAHO (not mortality)*	*Ellekjaer et al., 1999*	*UK, NHS*
G46.0	middle cerebral artery syndrome					+			
G46.1	anterior cerebral artery syndrome					+			
G46.2	posterior cerebral artery syndrome					+			
G46.3	brain stem stroke syndrome					-			
G46.4	cerebellar stroke syndrome					+			
G46.5	pure motor lacunar syndrome					+			
G46.6	pure sensory lacunar syndrome					+			
G46.7	other lacunar syndromes					+			
G46.8	other vascular syndromes of brain in cerebrovascular diseases					-			
F01	Vascular dementia	-	-		-	-			-
S06	Intracranial injury	-	-		-	-			-
H34	Retinal vascular occlusions	-	-		-	-			-
ICD-9:	**ICD-9:**			indicator: mortality	not defined for ICD-9	Ontario Hospital Report 2003 (codes used in selecting patients)	process indicators		not defined for ICD-9
430	Subarachnoid hemorrhage	-	+	+		-	+	+	
431	intracerebral hemorrhage	+	+	+		+	+	+	
.0	nontraumatic extradural / epidural hemorrhage								
.1	subdural hemorrhage, nontraumatic								
.9	unspecified intracranial hemorrhage								
432	Other and unspecified intracranial hemorrhage	-	+	+		-	+	-	

Codes	*Definition*	*Proposed PATH*	*EU Hospital Data Project*	*AHRQ inpatient indicators*	*ECHI*	*Ontario*	*JCAHO (not mortality)*	*Ellekjaer et al., 1999*	*UK, NHS*
433	Occlusion and stenosis (embolism, narrowing, obstruction, thrombosis) of precerebral arteries	+	+	specified:		+	specified:	-	
.x0	without mention of cerebral infarction			-			-		
.x1	with cerebral infarction			+			+		
434	Occlusion of cerebral arteries	+	+	specified:		+	specified:	+	
.x0	without mention of cerebral infarction			-			-		
.x1	with cerebral infarction			+			+		
435	Transient cerebral ischemia	-	-	-		-	-	-	
436	Acute, but ill-defined, cerebrovascular disease	+	+	+		+	+	+	
437	Other and ill-defined cerebrovascular disease	-	+	-		- and +	-	-	
438	Late effects of cerebrovascular disease	-	+	-		-	-	-	
290.4	Arteriosclerotic dementia	-	-	-		-	-	-	
362.3	Retinal vascular occlusions	-	-	-		-	-	-	
852	Subarachnoid, subdural, and extradural hemorrhage, following injury	-	-	-		-	-	-	
853	Other and unspecified intracranial hemorrhage following injury	-	-	-		-	-	-	
997.02	Iatrogenic cerebrovascular infarction or hemorrhage	-	-	-		+	-	-	

ICD-codes to consider for hip fracture

Codes	*Definition*	*Proposed PATH*	*EU Hospital Data Project*	*AHRQ inpatient indicators*	*ECHI*	*Ontario*	*JCAHO*	*Dutch Public Health Compass*
ICD-10:	**ICD-10:**			not defined for ICD-10	not defined for ICD-9	Canadian manual of PATH (codes used for mortality)	no hip fracture in set	
S72	Fracture of femur	specified:	+			specified:		specified:
S72.0	Fracture of neck of femur	+				+		+
S72.1	Pertrochanteric fracture	+				+		+
S72.2	Subtrochanteric fracture	+				+		-
S72.3	Fracture of shaft of femur	-				-		-
S72.4	Fracture of lower end of femur	-				-		-
S72.7	Multiple fractures of femur	-				-		-
S72.8	Fractures of other parts of femur	-				-		-
S72.9	Fracture of femur, part unspecified	-				-		+
ICD-9:	**ICD-9:**			indicator: mortality	not defined for ICD-10	not defined for ICD-9	no hip fracture in set	
820	Fracture of neck of femur	+	+	+				+
(820.22)	subtrochanteric fracture, closed							
(820.32)	subtrochanteric fracture, open							
821	Fracture of other and unspecified parts of femur	-	+	-				specified:
821.0	Fracture of shaft or unspecified part, closed							specified:
821.00	- fracture of unspecified part of femur, closed							+
821.01	- fracture of shaft of femur, closed							-
821.1	Fracture of shaft or unspecified part, open							specified:

Codes	*Definition*	*Proposed PATH*	*EU Hospital Data Project*	*AHRQ inpatient indicators*	*ECHI*	*Ontario*	*JCAHO*	*Dutch Public Health Compass*
821.10	- fracture of unspecified part of femur, open							+
821.11	- fracture of shaft of femur, open							-
821.2	Fracture of lower end of femur, open							-
821.3	Fracture of lower end of femur, closed							-



ICD-codes to consider for community acquired pneumonia

Codes	*Definition*	*Proposed PATH*	*EU Hospital Data Project*	*AHRQ inpatient indicators*	*ECHI*	*Ontario*	*JCAHO*	*Dutch Public Health Compass*

Codes	*Definition*	*Proposed PATH*	*EU Hospital Data Project*	*AHRQ inpatient indicators*	*ECHI*	*Ontario*	*JCAHO*	*Dutch Public Health Compass*
ICD-9:	**ICD-9:**			indicator: mortality	not defined for ICD-10	Ontario Hospital Report 2003 (codes used in selecting patients)	no pneumonia in set	
480	Viral pneumonia (including sars)	+	+	+		-		+
481	Pneumococcal pneumonia [Streptococcus pneumoniae pneumonia]	+	+	+		+		+
482	Other bacterial pneumonia (including 482.84: Legionnaires' disease)	+	+	+		+		+
483	Pneumonia due to other specified organism	+	+	+		-		+
484	Pneumonia in infectious diseases classified elsewhere	+	+	+		-		+
485	Bronchopneumonia, organism unspecified	+	+	+		+		+
486	Pneumonia, organism unspecified	+	+	+		+		+
3.22	Salmonella pneumonia	-	-	+		-		-
21.2	Pulmonary tularemia	-		+		-		
39.1	Pulmonary actinomycosis	-		+		-		
52.1	Varicella pneumonitis	-		+		-		
55.1	Postmeasles pneumonia	-	-	+		-		-
73.0	Ornithosis with pneumonia	-	-	+		-		-
112.4	Candidiasis of lung	-		+		-		
114.0	Primary coccidioidomycos (pulmonary)	-		+		-		
114.4	Chronic pulmonary coccidioidomycosis	-	-	+		-		-
114.5	Pulmonary coccidioidomycosis, unspecified	-	-	+		-		-
115.05	Infection by Histoplasma capsulatum, with pneumonia	-	-	+		-		-
115.15	Infection by Histoplasma duboisii, with pneumonia	-	-	+		-		-
115.95	Histoplasmosis unspecified, with pneumonia	-	-	+		-		-
130.4	Pneumonitis due to toxoplasmosis	-	-	+		-		-

Codes	*Definition*	*Proposed PATH*	*EU Hospital Data Project*	*AHRQ inpatient indicators*	*ECHI*	*Ontario*	*JCAHO*	*Dutch Public Health Compass*
136.3	Pneumocystosis	-	-	+		-		-
507.0	Pneumonitis due to solids and liquids	-	-	+		+		+
510.0	Empyema with fistula	-	-	+		-		
510.9	Empyema without mention of fistula	-	-	+		-		
511.0	Pleurisy without mention of effusion or current tuberculosis	-	-	+		-		
513.0	Abscess of lung	-	-	+		-		
770.0	Congenital pneumonia	-	-	-		-		-

ICD-codes to consider for asthma

Codes	*Definition*	*Proposed PATH*	*EU Hospital Data Project*	*AHRQ prevention indicators*	*ECHI*	*Ontario*	*JCAHO*	*Dutch Public Health Compass*	*Scotland NHS*	*Institute for Clinical Systems Improvement*	*Via Clearinghouse: State of Wisconsin*
ICD-10:	**ICD-10:**			not defined for ICD-10	mortality (Eurostat New Cronos)	Canadian manual of PATH (codes used for read-mission)	no asthma in set		indicator: emergency admission	not defined for ICD-10	not defined for ICD-10
J45	Asthma	+	+		+	+		+	+		
J46	Status asthmaticus	+	+		+	-		+	+		
ICD-9:	**ICD-9:**			indicator: admission rate	not defined for ICD-9	Ontario Hospital Report 2003 (codes used in selecting patients)	no asthma in set		not defined for ICD-9	Set: diagnosis and outpatient management of asthma	indicator: admissions and A&E visits
493	Asthma	+	+	+		+		+		specified:	+
493.0	Extrinsic asthma									+	
493.1	Intrinsic asthma (late onset)									+	
493.2	Chronic obstruc-tive asthma									-	
493.8	Other forms of asthma										
493.80	-Unspecified										
493.81	-Exercise induced bronchospasm									-	
493.82	-Cough variant asthma									-	
493.9	Asthma, un-									+	

	specified										
493.0, -.1, -.2, -.9:											
493.x0	without mention of status asth-maticus or acute exacerbation or unspecified									+	
493.x1	with status asthmaticus									+	
493.x2	with acute exacerbation									-	

ICD-codes to consider for diabetes

Codes	*Definition*	*Proposed PATH*	*EU Hospital Data Project*	*AHRQ prevention indicators*	*ECHI*	*Ontario*	*JCAHO*	*Dutch Public Health Compass*	*Scotland NHS*
ICD-10:	**ICD-10:**			not defined for ICD-10	mortality (Eurostat New Cronos)	Canadian manual of PATH (codes used for readmission)	no diabetes in set		indicator: emergency admission
E10	Insulin-dependent diabetes mellitus	specified	+		+	+		+	+
E11	Non-insulin-dependent diabetes mellitus	specified	+		+	+		+	+
E12	Malnutrition-related diabetes mellitus	specified	+		+	+		+	+
E13	Other specified diabetes mellitus	specified	+		+	+		+	+
E14	Unspecified diabetes mellitus	specified	+		+	+		+	+
E10.x0-E14.x0	Diabetes with coma	+							
E10.x1-E14.x1	Diabetes with ketoacidosis	+							
E10.x2-E14.x2	Diabetes with renal complications	-							
E10.x3-E14.x3	Diabetes with ophthalmic complications	-							
E10.x4-E14.x4	Diabetes with neurological complications	-							
E10.x5-E14.x5	Diabetes with peripheral circulatory complications	-							
E10.x6-E14.x6	Diabetes with other specified complications	-							
E10.x7-E14.x7	Diabetes with multiple complications	-							
E10.x8-E14.x8	Diabetes with unspecified complications	-							

Codes	*Definition*	*Proposed PATH*	*EU Hospital Data Project*	*AHRQ prevention indicators*	*ECHI*	*Ontario*	*JCAHO*	*Dutch Public Health Compass*	*Scotland NHS*
E10.x9E14.x9	Diabetes without complications	-							
O24.0 - .3	Diabetes mellitus in pregnancy, pre-existing	-	-		-	-		-	-
O24.4	Diabetes mellitus in pregnancy, arising in pregnancy	-	-		-	-		-	-
O24.9	Diabetes mellitus in pregnancy, unspecified	-	-		-	-		-	-
P70.02	Neonatal diabetes mellitus	-	-		-	-		-	-
ICD-9:	**ICD-9:**			Indicator: amputions among diabetes patients	not defined for ICD-9	Ontario Hospital Report 2003 (codes used for readmission and LOS)	no diabetes in set		not defined for ICD-9
250	Diabetes mellitus	specified:	+	+		specified:		+	
250.0	Diabetes mellitus without mention of complication	-				+			
250.1	Diabetes with ketoacidosis	+				+			
250.2	Diabetes with hyperosmolarity	+				+			
250.3	Diabetes with other coma	+				-			
250.4	Diabetes with renal manifestations	-				-			
250.5	Diabetes with ophthalmic manifestations	-				-			
250.6	Diabetes with neurological manifestations	-				-			
250.7	Diabetes with peripheral circulatory disorders	-				-			
250.8	Diabetes with other specified manifestations	-				-			
250.9	Diabetes with unspecified complication	-				-			
648.0	Diabetes mellitus, complicating pregnancy, childbirth, or the puerperium	-	-	-	-	-	-	-	-
648.8	Abnormal glucose tolerance, gestational diabetes	-	-	-	-	-	-	-	-

Codes	*Definition*	*Proposed PATH*	*EU Hospital Data Project*	*AHRQ prevention indicators*	*ECHI*	*Ontario*	*JCAHO*	*Dutch Public Health Compass*	*Scotland NHS*
775.1	Neonatal diabetes mellitus	-	-	-	-	-	-	-	-

4. Readmission (all tracers) (p.35)

PATH discussion:
For acute myocardial infarction, community-acquired pneumonia, asthma, diabetes, hysterectomy, total hip replacement. Suggestion: consider only crude readmission rate, all readmissions, but vague definitions may not be useful.

PATH Action:
Keep, but drop admitted through emergency room. Select only two readmissions with higher frequency (based on pilot data). Indicators for chronic and surgical conditions need to be kept, i.e. all indicators are kept.

The Australian Council on Healthcare Standards (ACHS) uses a hospital re-admission indicator with clear definitions (see below).

1. Hospital re-admission *(Path: for tracer conditions?)*. (ACHS)

Topic: Unplanned and unexpected hospital readmissions *(PATH: for tracer conditions?)*.

Type of Indicator: a comparative rate based indicator addressing the outcome of patient care *(PATH: for tracer conditions?)*.

Numerator: The total number of unplanned and unexpected readmissions within 28 days of separation *(PATH: for tracer conditions?).*
Denominator: The total number of separations (excluding deaths) *(PATH: for tracer conditions?).*

Definitions:
- Unplanned hospital re-admission refers to an:
    - Unexpected admission for further treatment of the same condition for which the patient was previously hospitalized.
    - Unexpected admission for treatment of a condition related to one for which the patient was previously hospitalized
    - Unexpected admission for a complication of the condition for which the patient was previously hospitalized.

- Day stay patients are included in both the numerator and denominator figures. Day stay patients are those whose admission date equals the discharge date.

- Hospital in the Home patients and emergency department patients readmitted to the emergency department only, are not included in this indicator.

- This indicator addresses patients readmitted to the same organization.

ICD-9-CM codes (tracers):

For AMI, Pneumonia, Asthma, and Diabetes see Mortality (above).

Hysterectomy
- Abdominal
68.39 Other subtotal abdominal hysterectomy
68.4 Total abdominal hysterectomy
68.6 Radical abdominal hysterectomy
- Vaginal
68.51 Laparoscopically assisted vaginal hysterectomy
68.59 Other vaginal hysterectomy
68.7 Radical vaginal hysterectomy

Total hip replacement
81.51 Total hip replacement incl. fem. head+acetab. replacement; reconstruction
81.52 Partial hip replacement
81.53 Revision of hip replacement, includes partial AND total
81.59 Revision of joint of replacement.

Comments researchers:
As compared to other indicators, this ACHS indicator on hospital re-admission is rather specified with clear definitions. This indicator can be considered for use or adjusted so it can be used in the PATH indicator set.

We do not have PATH pilot data (frequencies) on readmissions in hospitals. Therefore, we suggest using the pilot results to identify two conditions (chronic and acute).

5. Admission after day surgery (p.49)

PATH discussion:
Cataract surgery, knee arthroscopy, inguinal hernia, curettage of the uterus, tonsillectomy and/or adenoidectomy, cholecystectomy, tube litigation, varicose veins – stripping and ligation. Little data from pilot. Can be measured in Denmark: compound measure of quality, safety and appropriateness,

PATH Action:
Should possibly be kept as a case-based indicator, not rate-based indicator, due to low number of events. Should be moved to sentinel events dimension.

Comments researchers:

Although PATH suggests making this indicator a case-based indicator, ACHS has two indicators about delayed discharge after day surgery: 'unplanned overnight admission' and 'unplanned delay in discharge'. The first one has substantial numbers (see below). The second one is to our opinion difficult to register, because an expected point of time and the actual point of time of the discharge are required.

In PATH low numbers were observed for admission after day surgery. Our question is, why? Is it due to unclear definition or registration?

Indicators in ACHS

1. Unplanned overnight admission

Rationale: this indicator may reflect possible problems in the performance of procedures or in the appropriate selection of patients for management in a day procedure facility.

Numerator: Number of patients having a discharge intention of one day, who had an overnight admission following an operation/procedure.

Denominator: Total number of patients who have an operation/ procedure performed in the day procedure facility.

Dimensions: Safety, Effectiveness, Efficiency

In 2004 in Australia and New Zealand, 1.63 % of patients having a day surgery, had an overnight admission (17,773/1,058,884).

2. Unplanned delay in discharge of a patient following operation/procedure

Rationale: This indicator may reflect possible problems in the administration of anaesthesia or sedation or the selection of patients or other aspects of management

in a day procedure facility.

Type of Indicator: This indicator is a comparative rate based indicator, which addresses the outcome of patient care.

Definitions: - Unplanned delayed discharge is measured from the time of leaving the operating / procedure room to the time of patient discharge from the facility.

Numerator: Number of patients who have an unplanned delayed discharge from a day procedure facility.
Denominator: Total number of patients who are discharged from a day procedure facility following operation/procedure.

Delayed discharge is defined as a discharge beyond the expected time of discharge of 6 hours or more. From 2006 onwards, 1 hour delay is required.

In 2004 in Australia and New Zealand, 0.28 % of patients having a day surgery, had an unplanned delayed discharge of 6 hours or more (2,490/878,175).

6. Readmission to higher level of care within 48 hours (p.40)

PATH discussion:
Return to ICU Very high burden of data collection. Major variation in data from pilot test.

PATH Action:
Moved to sentinel event section. Can data collection be reduced…?

Indicator (ACHS): Unplanned readmission into an intensive care unit, up to (and including) 72 hours post discharge from the intensive care unit.

Numerator: The total number of unplanned re-admissions (defined below) into an intensive care unit within 72 hours of discharge from an intensive care unit, during the time period under study.

Denominator: The total number of admissions into an intensive care unit, during the time period under study.

Definitions:

Unplanned re-admission:

= unexpected re-admission for further treatment of the 'same condition' for which the patient was previously admitted to the intensive care unit

= Unexpected re-admission for treatment of a condition related to one for which the patient was previously admitted to the intensive care unit

= unexpected admission for a complication of the condition for which the patient was previously admitted to the intensive care unit.

(The time frame of 72 hours is an arbitrary measure, which aims to identify deficiencies in management rather than complications/progression of the disease process. Admissions after this time are more likely to be complications of the disease process).

(ACHS 2006-2007)

Point of interest / discussion:

The PATH-indicator desciptive sheet refers to an article by AL Rosenberg and C Watts. Below we have highlighted part of the conclusion which has not been mentioned in the descriptive sheet.

"Unplanned readmission is often due to recurrent problems associated with a patient's specific disease and the inherent instability of a severely ill patient. **However there has**

been no theoretical or experimental evaluation of the factors that might separate appropriate ICU readmission from those resulting from poor quality care. Other work has found that unplanned hospital readmission can be an indicator of poor quality care only when considered at the level of specific medical and surgical diagnoses. No evidence was found that hospital readmission were correlated with the overall quality of the hospital".

"There is no agreed standard for an appropriate readmission rate to an ICU. It may be reasonable to assume that when a significant number of patients are readmitted within 48 hours the quality of care may be sub optimal. However no evidence indicates that a longer ICU stay would prevent readmission, nor can poor care outside the ICU be ruled out as a cause for readmission. Prompt return might indicate high quality of care: many readmitted patients are among the sickest in the ICU and a readmission may be a necessary. It is also possible that a low readmission rate may be an indicator of patients who are having inappropriately long stays".

Reference: AL Rosenberg and C Watts. Patients Readmitted to ICUs. A systematic review of risk factors and outcomes. Critical Care Reviews. Chest 2000 118: 492 - 502.

In other articles that were cited in the PATH descriptive sheet (no. 6-8, 10-13), comparable problems with this indicator were described.

Comments researchers:
We have checked a number of indicator databases and found 'Unplanned readmission into an intensive care unit, up to 72 hours post discharge from the intensive care unit' as an alternative indicator in ACHS indictor set. No specifications on data collection specifications are provided by the ACHS.

Because of the expected low / unclear validity, proper case-mix correction for this indicator appears to be important. Consequently, a reduction in data collection is therefore not possible.

Efficiency

10. Intensity of use of surgical theatre (p 74).

PATH discussion:
Will be retained but needs more specification of definition.

PATH Action:
Keep.

Clarification of terms used in PATH-indicator 'Intensity of use of surgical theatre'.

PATH-definition: Number of patient hours under anesthesia / number of theatres * 24 hours. The following terms are related with the time patients are being under anesthesia.

Procedural times:

Anesthesia Start = Time when a member of the anesthesia team begins preparing the patient for an anesthetic.

Anesthesia Induction = Time when the anesthesiologist begins the administration of agents intended to provide the level of anesthesia required for the scheduled procedure.

Anesthesia Ready = Time at which the patient has a sufficient level of anesthesia established to begin surgical preparation of the patient, and remaining anesthetic chores do not preclude positioning and prepping the patient.

Anesthesia Finish (AF) = Time at which anesthesiologist turns over care of the patient to a post anesthesia care team (either PACU or ICU).

Procedural and scheduling definitions and time periods:

Anesthesia Preparation Time (APT) = Time from Anesthesia Start to Anesthesia Ready Time (to maximize efficiency, surgical preparation of the patient should begin as soon as an adequate level of anesthesia has been obtained. In some instances however, the anesthesiologist may need to continue anesthetic preparation of the patient (e.g., insertion of Swan-Ganz catheter) that precludes moving or prepping the patient. Anesthesia Ready is thus defined as that time when the anesthesiologist may allow surgical preparation to begin).

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For discussion:

Extensive operating room (OR) utilization is a goal of OR directors and hospital administrators (i.e. achieve optimum utilization). We point out two articles that used accurate definitions of OR utilization.

Definitions of classic utilization:

1. OR utilization is defined '**as the ratio of the total OR time used to the total OR time allocated or budgeted'** *(Strum DP et al., 1999).* However, according to Strum, this definition of OR utilization needs to be improved because it fails to differentiate the quality of utilization.

Example (by Strum): A single OR is budgeted for 8 h with two surgeries scheduled, each of 4-h duration. If the surgeries are performed consecutively within the budgeted work day, classic utilization is measured as 100 (4 + 4) [divided by] 8 = 100%, with no wasted resources. By contrast, consider the same OR when one 4-h surgery is performed during regular hours and the other is performed entirely after hours. In the latter scenario there are 4 h in which an expensive OR sits unused and 4 additional h for which personnel must be recalled and overtime costs apply. Each scenario is an example of 100% classic utilization, but in the latter there is both under- and over-utilization, with penalties to the staff and institution inherent in each. If the exact OR time allotment is used, i.e., no under- or over-utilization, then scheduled (budgeted) time is used efficiently. Underutilization and over-utilization, as defined herein, are important measures because they may be used to evaluate the quality of OR schedules and the efficiency of OR utilization.

2. OR utilization is **the sum of the time it takes to perform each surgical procedure (including preparation of the patient in the OR, anesthesia induction, and emergence) plus the total turnover time, divided by the time available** *(Donald C. Determining Optimum Operating Room Utilization. Anesth Analg 2003;96:1114 –21).*

Example: if the average "patient in to patient out" time for a herniorrhaphy is 45 min and the average turnover time is 15 min, then 10 herniorrhaphy cases can be performed in a 10-h period in that OR, for an OR utilization of 100%. With this definition, if cases extend beyond the scheduled end of the day, the time used after the scheduled end of the day is counted as utilization, even though the hospital may be paying overtime to provide the staffing.

Above definitions are taken from publications by Strum (1999) and Donald (2003). We continue describing *utilization* and *efficiency indices* frequently reported in the literature.

Common utilization and efficiency *indices* reported in the literature:

1. Adjusted-Percent Service Utilization (ASU) = (IBH + OBH) x 100 / BT.
This measures the percentage of time a Service utilizes their Block Time during Resource Hours. It is adjusted, compared to Raw Utilization, in that it gives a Service "credit" for the time necessary to set-up and clean-up a room, during which time a patient can not be in the room. It may exceed 100% because of the inclusion of cases performed during Resource Hours that are Outside-own Block Hours.

Terms used in definition:

In-own Block Hours (IBH) = Hours of Case Time performed during a Service's own Block Time. (N.B., for a case to be counted in IBH, it must begin during that given Service's Block Time.).

Outside-own Block Hours (OBH) = Hours of Case Time performed during Resource Hours but outside of the Service's Block Time.

Block Time (BT) = Hours of OR/PR time reserved for a given service or physician / surgeon. Within a defined cutoff period (e.g., 72 hours prior to day of surgery), this is time into which only the given service may schedule. (N.B., in some institutions, this is known as Available or Allocated Time.).

Service = a group of physicians or surgeons that together perform a circumscribed set of operative or diagnostic procedures (e.g., Cardiothoracic Surgery, Interventional Radiology). Generally, any member of a service may schedule into that service's block time. Similarly, OR/PR time used by a given physician or surgeon is credited to his/her service's Total Hours.

Resource Hours (RH) = Total number of hours scheduled to be available for performance of procedures (i.e., the sum of all available Block Time and Open Time). This is typically provided for on a weekly recurring basis, but may be analyzed on a daily, weekly, monthly, or annual basis.

Raw Utilization (RU) = For the system as a whole, this is the percent of time that patients are in the room during Resource Hours (see Adjusted-Percent Utilized Resource Hours). For an individual service, this is the percent of its Block Time during which a service has a patient in the OR /PR (see Adjusted-Percent Service Utilization).

2. Adjusted-Percent Utilized Resource Hours (AURH) = (Total Hours -Evening / Weekend / Holiday Hours) x 100/ Resource Hours.
This calculation provides the percentage of time that the OR / PR's are being prepared for a patient, are occupied by a patient, or are being cleaned after taking care of a patient during Resource Hours. It is adjusted, compared to Raw Utilization, in that it includes the time necessary to set-up and clean-up a room, during which time a patient can not be in the room.

Terms used in this definition:

Total Hours = Evening / Weekend / Holiday Hours

3. Early Start = When Patient In Room, Actual, is prior to Patient In Room, Scheduled.

- with overlap - when a case starts early but prior to the Room Clean-up Finished, Actual, of the case originally scheduled to precede it (this occurs when either the preceding or following case is moved to a different OR/PR than originally scheduled).

- without overlap - when a case starts early but after the Room Clean-up Finished, Actual, of the case originally scheduled to precede it (this may occur because there is no preceding case or because the preceding case finishes earlier than scheduled).

4. Late Start = When Patient In Room, Actual, is after Patient In Room, Scheduled.

- with no-interference - when the Room Clean-up Finished, Actual, of the preceding case occurs before the Room Set-up Start, Scheduled, of the following case (i.e., the OR /PR is available prior to or at the time that preparation for the next case is supposed to begin).

- with interference - when Room Clean-up Finished, Actual, of the preceding case occurs after the Room Set-up Start, Scheduled, of the following case (i.e., the OR /PR is not available at the time that preparation for the next case is supposed to begin, either because it is still occupied or because it has not been cleaned).

5. Overrun = When Room Clean-up Finished, Actual, for the last scheduled case of the day is later than Room Close. This may be caused by a late start, a Case Time, Actual, greater than Case Time, Scheduled, or a combination of late start and longer than scheduled Case Time.

6. Productivity Index (PI) = Percent of time per hour that a patient is in the OR/PR during the prime shift time (e.g., first 8 hours).

7. Raw Utilization (RU) = For the system as a whole, this is the percent of time that patients are in the room during Resource Hours. For an individual service, this is the percent of its Block Time during which a service has a patient in the OR /PR (see Adjusted-Percent Service Utilization).

8. Room Gap = Time OR/PRs are vacant during Resource Hours

- Empty Room (or Late Start) Gap (LSG)
Planned - When Patient In Room, Scheduled, is later than Room Open.
Unplanned - When Patient In Room, Actual, is later than Room Open.

- Between Case Gaps (BCG)
Planned - When Patient In Room, Scheduled, is later than the Room Clean-up Finished, Actual, of the preceding case.
Unplanned - When Patient In Room, Actual, is later than the Room Clean-up Finished, Actual, of the preceding case.

- End of Schedule Gaps (ESG)
Planned - When Room Clean-up Finished, Scheduled, occurs before Room Close.
Unplanned - When Room Clean-up Finished, Actual, occurs before Room Close.

- Total Gap Hours (TGH) = LSG + BCG + ESG

Discussion in the literature with respect to 'Adjusted-Percent Service Utilization (ASU)', 'Adjusted-Percent Utilized Resource Hours (AURH)' and 'Raw Utilization (RU)'.

Frequently, institutions attempt to assess the extent to which a service uses its allotted Block Time by calculating a utilization percentage. Such a calculation should be performed for the system as a whole to measure the extent to which the "normal" hours of operation are actually used for patient care. If one considers only the time that a patient is in the OR / PR (Raw Utilization), then the percent of time that a service uses their block time is artificially lowered because the time necessary to set-up and clean-up a room, during which time a patient can not be in the room, is not accounted for. Similarly, the calculation of percentage utilization of Resource Hours is artificially reduced if only patient in room time is used. The larger the number of procedures done in a given room during Resource Hours, the greater the error.

Cost effective utilization requires highly effective scheduling and optimum utilization of the Resource Hours, with minimal overtime and/or uses of more highly paid on-call personnel. For proper assessment of the extent to which a service or system utilizes its Block or Resource Hours, respectively, the utilization calculations should be adjusted as defined above. For the individual service, this provides a fairer determination of how much of their Block Time is truly used. For the system as a whole, it provides the actual percentage of time that the OR / PRs are being used for patient care. Perhaps as important, it provides an accurate percentage of time that is not used and therefore available for efficiency improvements.

Discussion in the literature with respect to 'case time' (Time from Room Set-up Start to Room Clean-up Finished).

This definition includes all of the time for which a given procedure requires an OR/PR. It allows for the different duration of Room Set-up and Room Clean-up Times that occur because of the varying supply and equipment needs for a particular procedure. For purposes of scheduling and efficiency analysis, this definition is ideal because it includes all of the time that an OR/PR must be reserved for a given procedure.

Discussion in the literature with respect to 'resource hours'.

This is typically provided for on a weekly recurring basis, but may be analyzed on a daily, weekly, monthly, or annual basis.

For a given institution, this is the time during which an optimum number of appropriate personnel are available to do cases. This may include more than one shift of personnel, or personnel working extended shifts (i.e., greater than 8 hours), in order to gain vertical expansion of OR / PR hours. It may also include electively scheduled time on weekends to gain horizontal expansion of OR /PR hours. Resource hours do not include time gained through overtime or use of on-call personnel, even though this time may be routinely accrued at a given institution.

Discussion in the literature with respect to 'start time' (Patient In Room Time).

Significant debate, indeed, even argument, exists over the proper definition of Start Time. Operating and procedural room nurses generally feel that they have properly accomplished their preparatory tasks if the room is ready at the scheduled start time (Room Ready = Start Time, Estimated), regardless of where the patient is at that time. Anesthesiologists often feel that they are "on time" if anesthesia induction has been completed by the scheduled start time (Anesthesia Ready = Start Time, Estimated). Surgeons generally believe start time should be the time at which the procedure is begun (Procedure / Surgery Start Time = Start Time, Estimated). Since Room Set-up Time is procedure specific and therefore generally known at the time of scheduling, one can reasonably predict Room Ready Time. Anesthesia Preparation Time, however, depends on both the procedure and patient needs. It is thus more variable and not known at the time a procedure is scheduled, making accurate prediction of Anesthesia Ready Time impossible. This variability in Anesthesia Preparation Time also makes prediction of Procedure / Surgery Start Time inaccurate. Variability in Case Times, due to varying length of surgery, makes prediction of Start Times after the first scheduled case of the day even more inaccurate.

Much of the concern over Start Time is for the first case of the day, particularly when a service or surgeon follows her/himself in the same OR /PR throughout the day. Prediction, then, of accurate Start Times for the first case of the day appears to be most critical. Once the procedure is known, it is almost always possible to have the Room Ready at any time that is desired for the start of the day. It should also be possible, and desirable for maximizing efficiency, to have the patient in the room for the first case of the day as soon as the room is ready. For maximizing scheduling accuracy and attempting to encourage the most efficient patient flow, the authors have elected to define Start Time as Patient In Room Time.

Discussion in the literature with respect to 'turnover time' (Time from prior Patient Out of Room to succeeding Patient in Room Time).

Strong perceptual differences exist over the definition of Turnover Time. Anesthesiologists and OR/PR Nurses usually consider turnover time to be the time between cases when the room is not occupied by a patient. Surgeons consider any time when they are unable to operate as "down time", and thus more often consider turnover time to be the time between the end of surgery on one case and the beginning of

surgery on the next case. The latter may appear to be particularly long to an academic surgeon who leaves an OR before the wound is closed (allowing the residents to close and dress the incision) and does not re-enter the OR until the next patient is ready for incision.

As with Start Time, the variability of Anesthesia Preparation Time makes prediction of turnover times inaccurate if APT were to be included. Thus, to maximize scheduling accuracy and to encourage distinction of time spent preparing the OR/PR from time spent preparing the patient, the authors have elected to define Turnover Time as time from prior Patient Out of Room to succeeding Patient In Room Time for sequentially scheduled cases. As this definition attempts to include the time spent cleaning and preparing the OR/PR for the next case, it should only be calculated if a subsequent case is scheduled to immediately follow. With non-sequential cases, idle time between Room Clean-up Finished for the prior case to Room Set-up Start for the subsequent case should be identified and recorded under the appropriate room-gap category.

Main reference used: Donham RT, Mazzei WJ, Jones RL: Glossary of times used for scheduling and monitoring of diagnostic and therapeutic procedures. Am J Anesth 1996; 23:5-9.

Comments researchers:
Above, we have tried to provide more in-depth inside in how efficiency in surgical theatre use is measured in hospitals. To our opinion, PATH needs to decide whether to keep the definition described in the implementation manual or to use another measure. The information we have provided can serve as background information on which we can make this decision.

Staff orientation

11. Training expenditure (p..?).

PATH discussion:
Very difficult to make any international comparisons, also difficult to interpret at local level, many questions around in and exclusion criteria.

PATH Action:
Revise. Need to clarify definition. It is not specific enough and needs to be refined. It may be easier to say what it is not, rather than what it is.

Comments researchers:
Not available in the document…!

13. Absenteeism (p 80).

PATH discussion:
Burden of data collection can be high, but sampling may facilitate data collection. Sex and age does not explain variation, but rather professional group.

PATH Action:
Keep. Data by professional group, age and sex. Can sampling be made easier? Suggestion on how to generate indicator information.

In line with the PATH discussion, tracking absenteeism never appears to be straightforward. Although hospitals usually have absenteeism data, definitions of absenteeism are not uniform. In many countries there're no national measurement standards.

Forms of absenteeism:
- short and long-term disability days
- absences due to injury
- absences for family reasons.

Generally it is recognized that hospitals should track, at a minimum, absence rates over time to identify unique contributing factors in the work environments of different types of nursing units. Further, reporting periods (ideally) would be monthly, but annual roll-ups would be a minimum requirement. Breaking down data by professional group (and unit) would greatly enhance the data's usefulness in identifying an organization's strengths and weaknesses in quality of work life issues.

Reviewing the literature on human resource indicators, we did find indicator definitions less complex as compared to suggested PATH indicator.

Definition (CAN, 2002)

Absenteeism:
Alternative 1: Average no. of days absent per nurse, reported annually.
Alternative 2: Absenteeism as percent of total earned hours for nurses.

Reference: Canadian Nurses Association (2002).

Definition (WHO)

Monthly Absenteeism Rate:
Numerator: No. of days absent
Denominator: No. of staff X workdays in month

Reference: (www.who.int/entity/hrh/tools/contents.pdf).

Definition (Centre Health Planning and Management, Keele University, 2002)

Absenteeism:
Numerator: No. of days absent
Denominator: No. of staff

Comment on this indicator: for operational management: can also explore days of week on which absences occur; frequency of absences of an individual; distribution of absences by duration. Need to consider how secondment / maternity leave is handled in definitions.

Absenteeism:
Numerator: No. days uncertified absence
Denominator: Total available staff days

Personnel records for uncertified leave. By different staff group? May be subsumed under indicator above.

Reference: P Hornby, P Forte. Guidelines for Introducing Human Resource Indicators to Monitor Health Service Performance. The Centre for Health Planning and Management, Keele University, Keele, Staffordshire, ST5 5BG, England. 2002.

Some international organizations collect data on absenteeism. From the documentation of these organizations, it can be concluded that it is difficult to collect data that are comparable between countries.

European Commission.
Under the authority of the European Commission, Eurostat collects data about accidents at work and work-related health problems. One of their statistics is the “European statistics on accidents at work” (ESAW). A lot of effort has been put in studying the different registries about absence from work in European countries. Although the subject of study is accidents at work, the definitions about absenteeism are also interesting in a broader context.

The ESAW counts accidents leading to an absence of *more than three calendar days*. An accident is included if the person is unfit for work for more than 3 days, even if these days include Saturdays, Sundays or other days where the person is not usually working. The reason the ESAW starts at more than 3 days is that they consider absence from work of less than 4 days has a lower reporting level. More than 3 days allows achieving better data quality. The day of the accident does not count to the sick leave period. Another aspect is that ESAW counts calendar days instead of working days, because using calendar days is the most common practice in the Member States in calculating the number of days with an absence from work; a large number of States can not make a distinction between working days or not.

Cases of *permanent incapacity* and *fatal accident* are identified with specific codes and in such cases the days lost before the recognition of the permanent incapacity or death are not considered. However, this information is not available for Germany, Ireland, the Netherlands, Portugal, Finland and Norway.

Literature:

European Commission/Eurostat. European social statistics on accidents at work and work-related health problems. Data 1994-2000. Luxembourg: Office des publications officielles des Communautés européennes, 2002. Website: http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-BP-02-002-3A/EN/KS-BP-02-002-3A-EN.PDF

European statistics on accidents at work (ESAW). Methodology 2001 Edition. Website: http://ec.europa.eu/employment_social/publications/2002/ke4202569_en.pdf

Eurostat, prepared by Instituto Nacional de Seguridad e Higiene en el Trabajo (SPAIN). Eurostat questionnaire on National declaration systems of Accidents at work. Eurostat grants for 2002 Inventory and Analysis of National Reporting Systems on Accidents at Work. April 2004. Website: http://forum.europa.eu.int/irc/DownLoad/kfecAJJRmmGGcVU-2P-RHWGd9ITNgEzRmuOGf-_g5eUsgFZFZVSfTI0PV0YggS_Ud/INHST%20final%20report.pdf

OECD

The OECD collects self-reported data from household surveys and data from administrative sources (often social security and other insurance agencies) providing estimates of compensated absence from work due to illness. Often, administrative sources cover only certain segments of the working population. Administrative sources can be registries owned by organizations which are responsible for compensating absence from work due to illness (e.g., social security, public or private insurance agencies). The OECD notifies that differences in the coverage of the working population and in reporting systems limit the comparability of data across countries.
Indicator in OECD database: Compensated absence from work due to illness, counted as number of days lost per person per year. The OECD database contains data from several countries. Exact definitions used in these countries differ.

Reference: OECD Health Data 2006, June 2006

European Foundation for the Improvement of Living and Working Conditions

They conduct surveys about sickness absence for 15 EU members. Data are collected by face-to-face interviews at home. Sickness absence was defined as absence of at least one day in the past 12 months for a health related cause: (a) an accident at work; (b) health problems caused by work; (c) other health problems. According to the Foundation, data from registries are liable to differences in country legislation, employer practices and case definition across countries. So comprehensive, reliable, and comparable data on absenteeism are insufficient available. To their opinion, results from surveys are better comparable.

Reference: Gimeno D, Benavides FG, Benach J, Amick BC. Distribution of sickness absence in the European Union countries Occup Environ Med 2004;61:867-9.

Data collection issues

JCAHO provides recommendations for collecting information on HR indicators.

For example:
- requires health care organizations to collect data on HR indicators for a minimum of two units/divisions, determine the desired performance for each indicator, trend the data over time, and analyze variation from desired performance.

- it may be appropriate to rotate the units/divisions being monitored over time, after sufficient data have been reviewed to conclude that care on these units is stable.

- The organization determines the detail and frequency of data collection. Items to be considered in making the decision on data collection are: 1. Annual data analysis limits timely & effective evaluation of staffing, and restricts the ability to take action needed, 2. Shorter time periods (i.e. monthly or quarterly) are of more practical use to evaluate staffing effectiveness. Quarterly may be acceptable to improve outcomes, but monthly is more useful in facilitating timely and appropriate action as needed based upon the data collected and analyzed.

Comments researchers:
- An important issue to consider is whether this human recourse indicator information is used by hospital management (local level) or by national policy makers. The latter determines the frequency of data use. At local level it is recommended monthly for absenteeism or staff budget monitoring.

- It is important that definitions are the same across hospitals and countries, which, at present, is not the case (see efforts of EC, OECD, European Foundation). The solution might be to set up separate registries for PATH in participating countries.

- Because of a lack of sufficient comparable data on absenteeism in administrative data bases, it might be advised to collect data by means of annual surveys.

- Points to consider:
  - working at different locations.
  - defining start end endpoint of absenteeism.
  - for what period do you calculate a persons absence from work?
  - what to do with absenteeism of one yr. (365 days)?
  - Calendar or working days?

14. Excessive working hours (p 93).

PATH discussion:
It is a critical safety indicator, but may need refinement in definition.

PATH Action:
Keep, but refine definition.

To be able to refine definitions on excessive working hours it is important to consider the EU legislation (link: http://europa.eu/scadplus/leg/en/cha/c10405.htm). We have highlighted, in bold, sections in the legislation relevant for discussion (see below).

EU Summaries of Legislation

Organization of working time (basic Directive)

1) OBJECTIVE

To adopt minimum requirements covering certain aspects of the organization of working time connected with workers' health and safety.

2) COMMUNITY MEASURES

Council Directive 93/104/EC, of 23 November 1993, concerning certain aspects of the organisation of working time.

Amended by Directive 2000/34/EC of 22 June 2000 of the European Parliament and of the Council.

3) CONTENTS

Scope: Initially, all sectors of activity (except transport, activities at sea and the activities of doctors undergoing training). Since the amendment of June 2000, workers belonging to these three categories have been covered by certain provisions governing rest periods, breaks, working hours, paid holidays and night work. Certain articles of the initial directive do not apply to these categories, but *ad hoc* measures have been adopted, such as the establishment of a maximum number of working hours or, alternatively, a minimum number of rest hours for workers on board shipping vessels at sea.

Definition of the terms "working time", "rest period", "night work": any period of not less than seven hours, as defined by national legislation and including in all cases the period from 12 midnight to 5 a.m.; "night worker": any worker who performs at least three hours of his daily work or a part of his annual work (as defined by the Member States) during the night work period; "shift work": any method of organizing work whereby workers

succeed each other in the same tasks in accordance with a given time schedule at different times over a given period of days or weeks.
Directive 2000/34/EC amending Directive 93/104/EC adds the terms "adequate rest"; "mobile worker": any worker employed as a member of travelling or flying personnel by an undertaking which operates transport services for passengers or goods by road, air, or inland waterway; "offshore work": work performed mainly on or from offshore installations.

Member States shall take measures to ensure that workers enjoy:

- **the *minimum daily rest period of 11 consecutive hours* per period of 24 hours;**
- **the minimum period of *one rest day* on average immediately following the daily rest period in *every seven-day period*;**
- **for a daily period of work of more than six hours, a break as defined by the provisions of collective agreements, agreements concluded between social partners or national legislation;**
- ***not less than four weeks' annual paid holiday*, qualification for which shall be determined by reference to national practice/legislation;**
- **an *average weekly working period of not more than 48 hours*, including the overtime for each seven-day period.**

Normal hours of work for night workers must not exceed an average of eight hours in any 24-hour period. Workers shall be entitled to a free health check-up before being employed on night work and at regular intervals thereafter. Anyone suffering from health problems connected with night work must be transferred, wherever possible, to day work.

Employers who regularly use night workers must duly inform the authorities responsible for health and safety matters.

Night workers must enjoy a level of health and safety protection commensurate with the nature of their work. Protection and prevention facilities must be equivalent to those of other workers and must be available at all times.

Employers who organize work in accordance with a certain time schedule must abide by the general principle of adapting the work to man, especially in the case of monotonous tasks required to be performed in quick succession.

Member States may stipulate reference periods:

- **not exceeding 14 days for the weekly rest period;**
- **not exceeding four months for the maximum weekly working period;**
- **and for the duration of night work.**

Derogations are permitted:

- on condition that the general principles of the protection of workers' health and safety are complied with, where the duration of work is not measured and/or predetermined by the worker himself;

- in the case of activities where the worker's place of work and his place of residence are distant from one another;
- in the case of security and surveillance activities in order to protect property and persons;
- in the case of activities involving the need for continuity of service or production, such as treatment and/or care provided by hospitals; agriculture; or again press and information services;
- where there is a foreseeable surge of activity, particularly in agriculture, tourism and the postal services; in the case of persons working in railway transport.
- provided that equivalent compensatory rest periods are granted to the workers concerned:

  - in accordance with the criteria listed in the directive, for example in the case of activities where the service or production has to be continuous;
  - by means of collective agreements or agreements concluded between social partners.

A transitional period of five years from 1 August 2004 has been laid down for doctors in training. During the first three years of the transitional period, the number of weekly working hours may not exceed an average of 58. Subsequently, in the two following years, it may not exceed an average of 56. A sixth transitional year may be granted to certain Member States. In this case, the ceiling is 52 weekly working hours. At the end of this transitional period, the ceiling will be 48 hours weekly.

4) DEADLINE FOR IMPLEMENTATION OF THE LEGISLATION IN THE MEMBER STATES

Directive 93/104/EC: 23.11.1996
Directive 2000/34/EC: 01.08.2003 (for doctors in training: 01.08.2004)

5) DATE OF ENTRY INTO FORCE (if different from the above)

Directive 2000/34/EC: 01.08.2000.

6) REFERENCES

Official Journal L 307, 13.12.1993
Official Journal L 195, 01.08.2000

Reference: http://europa.eu/scadplus/leg/en/cha/c10405.htm

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Other definitions:

STATISTICAL COMMISSION and STATISTICAL OFFICE OF THE UN ECONOMIC COMMISSION FOR EUROPEAN COMMUNITIES EUROPE (UNECE) (EUROSTAT), CONFERENCE OF EUROPEAN INTERNATIONAL LABOUR STATISTICIANS ORGANIZATION, UNECE/ILO/Eurostat Seminar on the Quality of Work. Working Paper No.14. Geneva, 11-13 May 2005.

Definition UNECE / EUROSTAT

Excessive hours:

Excessive hours occur when a person works structurally more hours than usual. For employees, it is the case, when someone works more than the contractual hours on a structural basis. This means that excessive hours can be analyzed by studying working overtime (% of employees usually work more than 48 hours a week).

An EU employee has a right to have at least eleven hours of rest a day. The maximum weekly working time can not exceed 48 hours while the yearly leave has to last at least four weeks.

Comments researchers:
As we are not specialists in this particular (complex) field, we believe we can only provide the information we have presented above. Further review needed.

15. Needle injuries (p 88).

PATH discussion:
Signal indicator, to alert management.

PATH Action:
Keep, but clarify definition of needle stick injuries.

Although the title of the indicator is "Work-related injuries, Occupational Percutaneous Exposure (PCE) and Mucocutaneous Exposures (MCE) to blood or potentially infective biological fluids" we assume that the subject of this indicator is PCE only (highest risk of morbidity). Next a working definition PCE has to be given.

In PATH, PCE includes needle stick injuries and sharp devices injuries.

Definitions by Committee on Employment and Social Affairs:

- A needle stick injury occurs when the skin is accidentally punctured with a needle that is potentially contaminated with a patient's blood.

- "Medical sharp": includes hollow-bore needles (such as those incorporated in syringes, lancets, specialised blood sampling devices, winged needles and IV catheters), suture needles, scalpels and other medical cutting implements.

- Percutaneous injury from hollow-bore blood-filled sharp objects is the primary route through which healthcare workers occupationally acquire blood borne and potentially fatal diseases.

Reference: Recommendations to the Commission on protecting European healthcare workers from blood borne infections due to needle stick injuries (2006/2015(INI)). Committee on Employment and Social Affairs.

Other definitions:

- A **needle stick injury** can be defined as a 'penetrating stab wound from a needle, or other sharp object, that may result in exposure to blood or other body fluids' (from another person).

- **Sharps and Needle stick Injuries**: a range of equipment that has sharp edges, points and needles, all of which are called sharps – hence sharps injuries. Accidents which involve needles are called "needle stick injuries" (www.unison.org.uk).

Comments researchers:
The indicator title "Work-related injuries, Occupational Percutaneous Exposure (PCE) and Mucocutaneous Exposures (MCE) to blood or potentially infective biological fluids"

does not reflect the indicator definition. MCE clearly is not included in this indicator…! Therefore we suggest excluding MCE in title.

Point of interest / discussion:
If we consider the following statements (see below), it might be interesting to only include specific professional groups (e.g. nurses) and types of injuries (needle stick injuries from hollow-bore needles).

- It might be advisable to use data on needle stick injuries only from particular specialties (e.g. nurses only?). According to the National Institute for Occupational Safety and Health (NIOSH) Health in the US, **most reported needle stick injuries involve nursing staff** (http://www.cdc.gov/niosh/homepage.html).

- Many types of needles and other sharp devices are used in health care. However, only a few needles and other sharp devices are associated with the majority of injuries. Of nearly 5,000 percutaneous injuries reported by hospitals in the US (between June 1995 and July 1999), **62% were associated with hollow-bore needles**—primarily hypodermic needles attached to disposable syringes (29%) and winged-steel (butterfly-type) needles (13%).

16. Work-related injuries (p 88).

PATH discussion:
How to address depression/smoking/low back pain/suicide?

PATH Action:
Should be moved to core set.

Comments researchers:
Do not have descriptive sheet available.

Mail received from Oliver Groene:
Oliver contacted the Ludwig Boltzmann Institute on information on work-related injuries. The head of the institute and the researcher Oliver knows are on holidays. Will be contacted by Oliver.

Responsive governance

16. Breastfeeding at discharge (p 98).

PATH discussion:
Hospitals provided data, but the baby friendly hospital initiate uses different indicators.

PATH Action:
Same definition should be used as in BFHI.

WHO

WHO has developed a set of definitions and indicators of infant feeding patterns that can be applied in assessing breastfeeding practices (Aarts et al., 2000). Exclusive breastfeeding, that is, the use of mother's milk as the child's sole source of nourishment, excluding even consumption of water or teas, is regarded and internationally promoted as the ideal method of feeding infants during the first 6 months of an infant's life (WHO, 1991; WHO, 2001).

Definitions of WHO, 2001:

Exclusive breastfeeding = the infant receives breast milk (including expressed milk) and is allowed to receive drops or syrups (vitamins, minerals, and medicines). The infant may not receive anything else.

Predominant breastfeeding = the infant receives breast milk (including expressed milk) and is allowed non-nutritive liquids (water and water-based drinks, fruit-juice, ORS (Oral rehydration salt), ritual fluids), and drops or syrups (vitamins, minerals, medicines). The infant is not allowed to receive anything else (in particular, non-human milk, food-based fluids).

Complementary/Replacement feeding = (The terms 'Replacement feeding' and 'non-human milk' are not included in the WHO definition 'Complementary feeding'): The infant receives breast milk and is allowed any food or liquid, including non-human milk.

Breastfeeding = the infant receives breast milk.

Taste = ≦10 ml of any liquid or food.

Calculation of above indicators is based on survey data using the 24-hour recall methodology. For example: all mothers with children less than 24 months of age would be asked the current age of the child and the kind of foods given during the previous 24 hours. (WHO, 2001).

References:
Clara Aarts, et al. How exclusive is exclusive breastfeeding? A comparison of data since birth with current status data. International Journal of Epidemiology 2000;29:1041-1046.
WHO, World Health Organization. Indicators for Assessing Breastfeeding Practices: Report from an Informal Meeting, 11–12 June 1991. Geneva, 1991.
WHO, World Health Organization. The Optimal Duration of Exclusive Breastfeeding. Geneva, 2001.

The Breastfeeding Committee for Canada - The National Authority for the WHO/UNICEF Baby-Friendly Hospital Initiative in Canada

One of the objectives of the Baby-friendly Hospital Initiative (BFHI) is to promote exclusive breastfeeding for the first 6 months. Recently (January 2006), the Breastfeeding Committee for Canada determined definitions about breastfeeding. These were based on the WHO definitions, but additionally they made a review of the recent literature and consulted experts. Results are presented in the report "Breastfeeding Definitions and Data Collection Periods" (http://www.breastfeedingcanada.ca, through 'documents'). The definitions and processes for data collection as presented in this report, are simple, facilitating collection of relevant, accurate and consistent data. Definitions were based on:

1. Auerbach KG, Renfrew MJ, & Minchin MA. Infant feeding comparisons: A hazard to infant health? J Hum Lact 1991;7:63-71.
2. Dettwyler, KA, & Fishman, C. Infant feeding practices and growth. Annual Rev of Anthro 1992; 21: 171-204.
3. Labbok, M. What is the definition of breastfeeding? Breastfeeding Abs: 19(3):19-21, 2000.
4. Labbok M & Krasovec K. Towards consistency in breastfeeding definitions. Stud Fam Plann 1990; 21(4):226-30.
5. Labbok MH & Coffin CJ. A call for consistency in definition of breastfeeding behaviors. Soc Sci Med 1997 44:1931-32.
6. Martens, PJ. "Real World" breastfeeding definitions – where the clinician meets the survey researcher. Current Issues in Clinical Lactations 2000;15-23.
7. World Health Organization. Indicators for assessing breastfeeding practices. Report of an informal meeting in June 1991. Geneva.
8. World Health Organization. WHO Global Data Bank on Breastfeeding. Geneva: 1996.
9. World Health Organization. WHO Global Data Bank on Breastfeeding. Updated 2003. http://www.who.int/nut/db_bfd.htm.).

Definitions of the Breastfeeding Committee for Canada, based on the BFHI of WHO/Unicef:

Breast milk = includes breastfeeding, expressed breast milk or donor milk and undiluted drops or syrups consisting of vitamins, mineral supplements or medicines.

Exclusive breast milk = no food or liquid other than breast milk, not even water, is given to the infant from birth by the mother, health care provider, or family member/supporter.

Total breast milk = no food or liquid other than breast milk, not even water, is given to the infant from birth by the mother, health care provider, or family member/supporter during the past 7 days. (This definition identifies infants who are exclusively breastfeeding at the time of data collection but not from birth. There are many infants who initially receive a supplement(s) at some point but exclusively breastfeed following this temporary intervention. However, based on the above definition they can no longer be classified as having exclusive breast milk).

Predominant breast milk = breast milk, given by the mother, health care provider, or family member/supporter plus 1 or a maximum of 2 feeds of any food or liquid including non-human milk, during the past 7 days.

Partial breast milk = breast milk, given by the mother, health care provider, or family member/supporter plus 3 or more feeds of any food or liquid including non-human milk, during the past 7 days.

No breast milk = the infant/child receives no breast milk.

Data collection guideline:

Hospitals are required to record data on initiation rates and rates of exclusive breastfeeding on discharge.

Age of Infant at recommended data collection time periods:

- Initiation - at birth
- Hospital/clinic discharge (not applicable for home births)
- 2 weeks - includes the period between hospital discharge to 4 weeks
- 2 months - includes the period between 5 weeks and 12 weeks
- 6 months - includes the period between 21 weeks and 27 weeks

Additional data collection time periods (optional):
- 4 months - includes the period between 13 weeks and 20 weeks
- 8 months - includes the period between 28 weeks and 40 weeks
- 12 months - includes the period of 11 to 15 months
- 18 months - includes the period of 16 to 21 months
- 24 months - includes the period of 22 to 25 months

Footnote:
Exclusive breastfeeding is recommended to 6 months of age. After six months breastfeeding should be continued with the introduction of complementary solids.
Rationale regarding essential time frames for data collection:
2 weeks - A critical time frame for women to receive support for continuation of breastfeeding (i.e. many cease breastfeeding prematurely due to lack of appropriate support)
2 months - An important time for support of exclusive breastfeeding and counsel regarding the recommendation of delaying the introduction of complementary foods until the infant is six months of age.
6 months - An important time for reinforcing breastfeeding to one year and beyond and appropriate introduction of complementary foods.

The recommended time frames have been suggested but this does not preclude Health Regions/Authorities collecting data at the additional times provided.

Reference: The Breastfeeding Committee for Canada. The National Authority for the WHO/UNICEF Baby-Friendly Hospital Initiative in Canada. Breastfeeding Definitions and Data Collection Periods. January 2006. Website: http://www.breastfeedingcanada.ca, through 'documents'

2. Classification Operative Procedures in EU Countries

(Reference: Hospital Data Project. Final Report (Annex 2), June 2003)

Country	Classification	Number recorded
Austria	Collecting data on 'medical services items', based on a catalogue of services published by the Federal Ministry for Social Security and Generations, which contains 940 procedures (720 operative and 220 non-operatives).	Maximum of 9 procedures per case until end of the year 2000; no restriction of number of procedures to be recorded per case since 1.1.2001.
Belgium	ICD-9-CM procedures.	Unlimited coding of procedures. We don't code primary and secondary procedures.
Denmark	Nordic Classification of Surgical Procedures.	
United Kingdom of which:		
- England	4th revision of the OPCS Operation Classification.	Up to 4 procedures can be coded for each consultant episode.
- Northern Ireland	4th revision of the OPCS Operation Classification.	Up to 4 procedures can be coded for each consultant episode.
- Scotland	OPCS4.	Up to four pairs of procedures may be recorded (main operation plus three other operations) (M).
Wales	4th revision of the OPCS Operation Classification.	Up to 12 operative procedures can be recorded per episode.
Finland	Nordic classification of surgical procedures used from 1997. And prior to 1997 the classification of 'Federation of hospitals' was used since 1983.	No information given Code 1 main operation with 3 codes + 2 other operations. This may be extended to 7 or 20 next year. The Main Procedure is the procedure demanding most of the resources. It is a clinical decision.
France	cdAM catalogue The CdAM comprises the following 7 fields: Alpha: diagnostic and therapeutic Beta: anaesthesia Gamma: X-ray? Mu: radiotherapy Rho: Pathology?	The PMSI counts up to 99 codes for each hospital stay.

	Tau: biology Omega: resuscitation The operative procedures are coded under the Alpha field under the following 17 chapters. The codes are alphanumeric in 4 positions. They start with a letter followed by 3 numbers. An example for operative procedures on the appendix – L260: acute appendectomy L261: etc.	
Germany	No coding of surgical procedures, just the question (to answer with yes/no): Has there been a surgery in context with the main diagnosis?	
Greece	Surgical procedures are not coded in Greece.	
Iceland	Nordic Classification of Surgical Procedures (NCSP) from 1997. Prior to 1997 the WHO Classification of Procedures in Medicine were used.	Code for main procedure is placed first. No limit on numbers recorded; however, only 6 are collected. Code for main procedure is placed first and subsequent codes are placed by order of importance. A total number of 6 procedures are collected. Main procedure is determined by the surgeon based on complexity, relevance to primary diagnosis and amount of resources used. Prior to 1997 the WHO Classification of procedures in Medicine were used.
Ireland	ICD-9-CM procedures (4-digit).	As of 1/1/2002 one principal procedure and up to 9 additional procedures. Prior to this it was one principal procedure and 3 additional procedures.
Italy	Since 1995, the beginning of this data collection, Regions have used ICD-9-CM. Procedures (4 digit).	The main surgical procedure or delivery. The main surgical procedure is most likely to connect with the main diagnosis of discharge. It is possible to indicate up to five secondary surgical or not surgical procedures. The surgical procedures have the priority, because they are likely to require more resources.
Luxembourg	Classification of operative procedures according to the national tariff scheme for medical services.	

Netherlands	Adaptation from originally International Classification of Procedures in Medicine (ICPM, WHO, 1978). – in use since 1990.	- Per admission max. 99 responsibility periods (RP) are possible and per R.P. 1 main and max. 99 additional procedures. - But at the end we've per admission one main diagnosis and one main procedure.
Portugal	ICD-9-CM procedures in used since 1993.	We code surgical interventions and procedures of obligatory notification for the classification in diagnoses related groups
Spain	ICD-9-CM.	10 operative procedures and in addition 5 obstetric procedures.
Sweden	Nordic classification of surgical Procedures.	Up to 12 surgical procedures. Main procedure is not identified.

3. Indicators for Patient Safety

Presently, the PATH Indicator set makes limited use of patient safety indicators. We were tasked to identify patient safety indicators of which data availability is known across different countries. As data availability was the leading criterion, we reviewed the OECD Patient Safety Indicators, as this set has been developed by an expert group representing a number of countries within and outside Europe (Austria, Australia, Canada, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Japan, Mexico, The Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the United States). All OECD indicators for patient safety address hospital safety events and provide specific comments on each patient safety indicator, including comments with respect to data availability (based on expert opinion and experiences from variety of countries). For its development, the experts used a variety of indicator sources:

- AHRQ Safety Indicators: developed by UCSF for the US Agency for Healthcare Research and Quality (AHRQ).

- AHRQ/CIHI Safety Indicators: AHRQ safety indicators adapted for use in Canada by the Canadian Institute for Health Information (CIHI).

- The Australian Council for Safety and Quality in Health Care: developed indicators for sentinel events (binomial, catastrophic, symptomatic of system failure).

- Complications Screening Programme BIH: developed at the Beth Israel Hospital (BIH) in Boston, US.

- JCAHO Indicator Measurement (IM) System and JACHO Sentinel Events: developed by the Joint Commission on Accreditation of Healthcare Organisations (JCAHO).

Below we provide an overview of the OECD indicators for patient safety. We have indicated whether data are expected to be available.

Domain	Indicator	Availability	Specific comment
Hospital-acquired infections	Ventilator pneumonia	±	Expected differential reporting.
	Wound infection	-	Difficult to get consistent, accurate data on severity of wound infections.
	Infection due to medical care	+	Expected variation in coding practices.
	Decubitus ulcer	+	Well operationalised! However, precise distinction between pre-existing and hospital acquired decubitus ulcers expected
Operative and post-operative complications	Complications of anaesthesia	?	Key problem: difficulty in classifying majority of avoidable adverse events. Expected underreporting.
	Postoperative hip fracture	+	Quality of coding practices is high!
	Postoperative pulmonary embolism (PE) or deep vein thrombosis (DVT)	+	PE/DVT frequently undiagnosed.
	Postoperative sepsis	+	Usually coded reliable.
Sentinel events	Transfusion reaction	± / --	Only by countries that have invested in specific reporting schemes / programs.
	Wrong blood type	± / --	Only by countries that have invested in specific reporting schemes / programs.
	Wrong-site surgery	±	May suffer from underreporting.
	Foreign body left in during procedure	±	May suffer from underreporting.
	Medical equipment-related adverse events	?	No widely used standardised protocol for equipment maintenance for clinical engineering departments.

Domain	Indicator	Availability	Specific comment
	Medication errors	-	Although incident reporting is an area of growing importance in health care, reliable data are difficult to obtain (e.g. legal actions).
Obstetrics	Birth trauma - injury to neonate	+	Well operationalised! Often based on chart review not on administrative data.
	Obstetric trauma – vaginal delivery	+	Well operationalised! Use of administrative data.
	Obstetric trauma - caesarean section	+	Well operationalised! Use of administrative data.
	Problems with childbirth	+	Problems = maternal death or serious morbidity associated with labour or delivery.
Other care-related adverse events	Patient falls	-	Expected lack of recording.
	In-hospital hip fracture or fall	-	Expected lack of recording.

Reference: OECD Health Technical Papers No. 18. Selecting indicators for patient safety at health systems level in OECD countries (2004).