WORLD HEALTH ORGANIZATION
EUROPE

Performance assessment tool for quality improvement in Hospitals (PATH)

- Implementation Manual -

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ABSTRACT

This manual describes the conceptual model of the Performance Assessment Tool for Quality Improvement (PATH) developed by the WHO Regional Office for Europe. It addresses:

- the PATH conceptual and operational framework
- the process of indicator selection
- the approach chosen to report on performance and
- the construction of descriptive sheets

Full versions of descriptive sheets are included in the annex.

Keywords

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CONTENTS

1. Introduction

The World Health Organization (WHO) Regional Office for Europe launched in 2003 a project aiming to develop and disseminate a flexible and comprehensive tool for the assessment of hospital performance and referred to as the performance assessment tool for quality improvement in hospital (PATH). This project aims at supporting hospitals in assessing their performance, questioning their own results, and translating them into actions for improvement, by providing hospitals with tools for performance assessment and by enabling collegial support and networking among participating hospitals.

The development process of the PATH framework included reviews of the literature, workshops with international experts and a survey in 20 European countries. Thirty-one experts coming from fifteen different countries (western and central European countries, Australia, South Africa and North America) and representing most valuable experiences on hospital performance worldwide met in four workshops. These experts built the framework based on evidence gathered in background articles and on their own experience.

A conceptual model of performance was elaborated to identify dimensions and sub-dimensions of performance. Next, a list of 100 hospital performance indicators was identified through a review of the literature. Indicators were assessed against a series of criteria by the experts panel through a nominal group technique. Indicator selection was based on evidence gathered through the previous review of the literature and on the survey carried out in 20 countries.

This process was iterative in the sense that even though agreement on the conceptual model preceded and guided indicator selection, analysis of the evidence on various performance indicators led to refinements on the conceptual model. Furthermore, even though the main process of indicator selection was one of progressive elimination starting from a comprehensive set to a parsimonious one limited to a range of 20-25 indictors, new indicators had to be sought and introduced throughout the process as new evidence was gathered.

PATH has subsequently been pilot implemented in six countries : Belgium, Canada, Denmark, France, Slovakia and South Africa. This document describes the characteristics of PATH as of this pilot implementation phase. Background documents offer more details on the process of elaboration of PATH and on the justification for design choices that were made throughout this process (available on http://www.euro.who.int/hosmgt/publications/20020312_1).

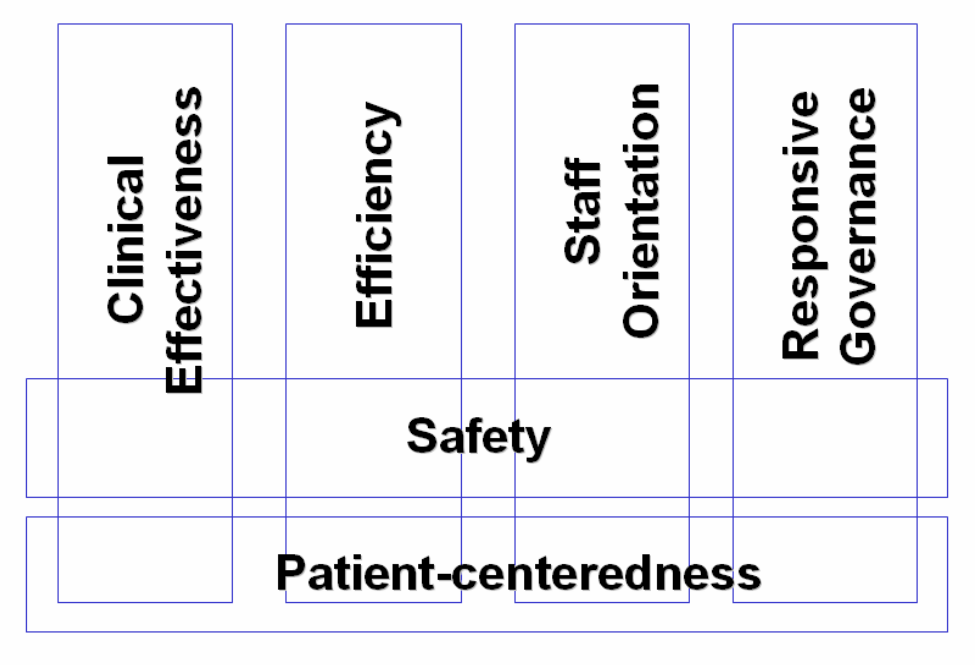
2. The PATH conceptual framework

For this project, an international panel of experts agreed on the following definition of hospital performance.

> "*A satisfactory level of hospital performance is the maintenance of a state of functioning that corresponds to societal, patient and professional norms. High hospital performance should be based on professional competences in application of present knowledge, available technologies and resources; efficiency in the use of resources; minimal risk to the patient; responsiveness to the patient; optimal contribution to health outcomes. Within the health care environment, high hospital performance should further address the responsiveness to community needs and demands, the integration of services in the overall delivery system, and commitment to health promotion. High hospital performance should be assessed in relation to the availability of hospitals' services to all patients irrespective of physical, cultural, social, demographic and economic barriers*." (Veillard & Groene, 2003)

It highlights that performance is a multidimensional construct. Six dimensions of performance were identified: clinical effectiveness, efficiency, staff orientation, responsive governance, safety, patient centeredness. Safety and patient centeredness are two transversal perspectives that cut across all dimensions of performance (figure 1). For instance, patient safety (e.g. medication errors) is a safety perspective on clinical effectiveness and staff safety (e.g. occupational injuries) is a safety perspective on staff orientation. A specific conceptual model was designed for each dimension. Each model highlights sub-dimensions and how the dimension relates to other.

Figure 1: The PATH conceptual model



2.1. Clinical effectiveness and patient safety

There were strong discussions during the elaboration workshops on whether clinical effectiveness and safety represent different dimensions of performance and on what criteria indicators should be classified into one dimension or the other.

The Agency for Healthcare Research and Quality (AHRQ)'s position is that "*patient safety indicators also reflect quality of care inside hospital but focus on surgical complications and other iatrogenic events*". Following this approach, safety becomes an element of clinical effectiveness that could be isolated and highlighted for a number of reasons. Patient safety is a safety perspective on clinical effectiveness that focus on outcomes and can be possibly related to sub-standard care or errors.

An alternative approach is to consider that patient safety stresses the organizational nature of error and adverse outcomes prevention, in line with the Institute Of Medicine (IOM)'s recommendations. According to the IOM, "*most commonly, errors are caused by faulty systems, processes, and conditions that lead people to make mistakes or fail to prevent them (…) mistakes can be best prevented by designing health systems at all levels to make it safer*" (1999, p. 2). It supports the assessment of structural and process indicators to verify if the conditions are implemented to limit the risk or adverse events or errors instead of directly assessing the occurrence of adverse events or errors. According to this approach, patient safety represents a perspective on clinical effectiveness that concentrates on conditions to prevent errors and not on errors themselves. In the frame of the PATH project, it was decided that the development of safety standards and assessment of compliance with quality standards were out of the scope of the project. A survey on quality or safety practices could be developed at a later stage of the project to emphasize the organizational nature of safety and to support interpretation of clinical and patient safety indicators.

Indicators of clinical effectiveness and safety were organized around three components:

- Appropriateness of care
- Conformity of processes of care
- Outcomes of care and safety processes

Donabedian (1980)'s taxonomy supports the distinction between structure, process and outcome of care. Structure will not be evaluated in the PATH framework. The two first components of clinical effectiveness above deal with processes of care and the third one deals with outcomes (including adverse outcomes).

Outcomes of care were measured using tracer conditions selected based on scientific evidence on their validity to reflect variations in quality of care processes.

2.2. Efficiency

Efficiency is a dimension of performance dealing with 1) how well resources (or more generally, inputs) are used to produce services and 2) how well services are used to contribute to optimal outcomes. According to Donabedian (1966), production process can be decomposed in two steps: Resources (staff, capital, expenditures) are used to produce

intermediary services (e.g. days of care, drug administration, diagnostic and therapeutic exams) intended to improve patients' health, which is the final output:

Resources → Services → Outcomes

Based on Donabedian's decomposition, we identify three components of efficiency:

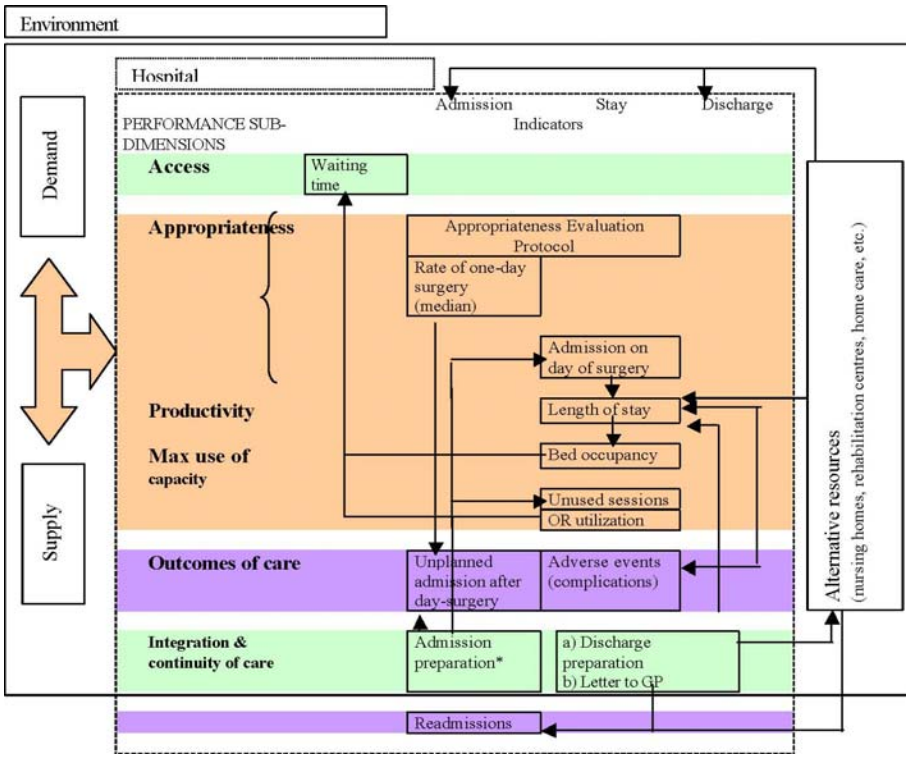
-Appropriateness: Optimal use of services for given outcomes
-Productivity: Amount of resources related to amount of services
-Optimal use of capacity: Optimal use of resources

Financial performance is not properly a component of efficiency but it is related to efficiency. Experts decided during the workshops that it would be worth including at least one indicator on financial performance.

This framework is applicable to different resources including beds, operating theatre, or drugs. For each resource, assessment is obtained ideally by combining the three approaches.

Figure 2 illustrates how those sub-dimensions (and subsequent indicators) relate to each other within the dimension and with other dimensions, for two specific resources, i.e. beds and operating theatre. Efficiency is also influenced by environmental factors such as alternative resource (e.g. long-term beds, home care, natural carers, etc.) and constraints on resources (e.g. ratio of number of acute care beds per inhabitants in the area).

Figure 2: Bed and Operating room use-related indicators



2.3. Staff orientation and staff safety

Staff orientation can be decomposed into three components: antecedents, outcomes and consequences. The three components are described in details at figure 3. Figure 3 is built on a meta-analysis by Irvine and Evans (1995) and an extensive review of the literature by Stordeur et al. (2001). Staff subjective experience, satisfaction and morale and health status are influenced by the work environment, are mediated by individual characteristics (e.g. coping strategies, need for recognition) and impact on organizational commitment (e.g. intent to leave, turnover), health status and ultimately quality of care. Those relationships are extensively studied in the literature. It is out of the scope of this paper to present scientific evidence to support all expected relationships between all staff orientation variables. The description sheets for indicators included in the core set synthesize relevant evidence.

Table 1 synthesizes the conceptual model and potential of data sources. Economic factors and psychological factors are largely out of hospital's control. In order to assess staff orientation, one can assess the process (practice environment, perspective and recognition of individual needs, and health promotion and safety initiatives), the outcomes (staff subjective experience, satisfaction and morale, and health status) and their consequences on turnover, absenteeism. Economic factors and psychological factors are largely out of hospital's control and hence are not considered components of performance. They are to be considered as explanatory variables. When comparing results on a national or international scale, it will be crucial to acknowledge differences in environment.

Table 1: Synthetic conceptual model of staff orientation dimension

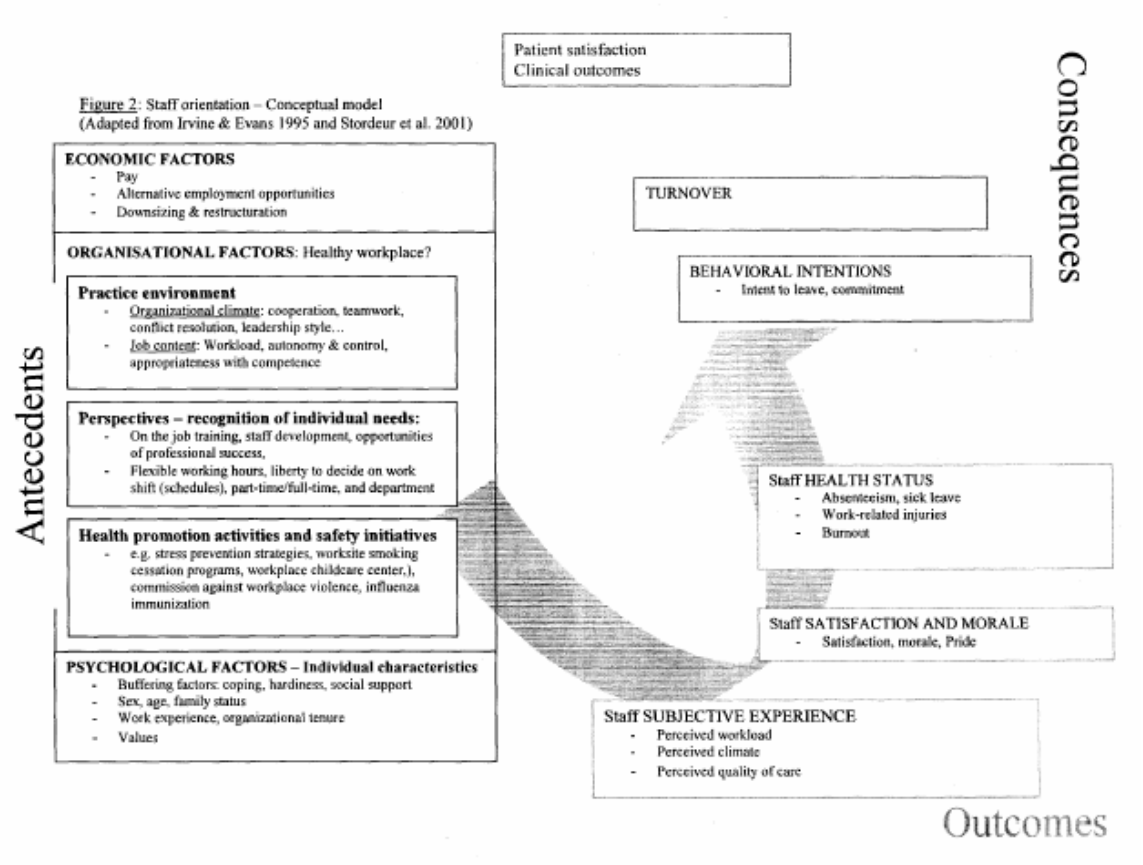
ANTECEDENT Formative indicators	OUTCOMES	CONSEQUENCES Reflective indicators
- Economic factors (1) - Organizational factors • Practice environment (2) • Perspectives & recognition of individual needs (3)(4) • Health promotion and safety initiatives (3) - Psychological factors (2)	- Staff experience (2) - Job satisfaction, morale, affective implication (2) - Staff health status (2)	- Turnover (4) - Absenteeism (4) - Overtime/temporary staff (4)

Data sources:
(1): Area/country statistics and legislation
(2): Staff survey
(3): Self-assessment of strategies implemented
(4): Hospital Human Resources Database

One approach (antecedent, outcome or consequences) cannot be preferred over the other. The type of information –and its potential use– provided by each approach differs. Ultimately,

what matters for the staff are outcomes and for the hospital are consequences. But it is not sufficient to measure outcomes and consequences. It does not give any information on how to improve. Therefore, antecedents should also be assessed. The burden of data collection also varies widely depending on the type of approach chosen. Data sources for each component of staff orientation are provided at table 7. Outcomes are adequately measured using staff surveys. In the frame of PATH, we cannot oblige hospitals to use staff surveys (see discussion below). So, we will strongly rely on measures of antecedents and consequences as proxies for outcomes.

Figure 3: Staff Orientation – Conceptual Model



2.4. Responsive governance and environmental safety

Environmental safety is presented simultaneously with responsive governance as it represents a safety perspective on responsive governance.

Responsive governance includes two main sub-dimensions: system integration (integration and continuity of care) and public health orientation (access, health promotion, equity and ethics, and environmental concerns).

"*Integrated care is a concept bringing together inputs, delivery, management and organization of services related to diagnosis, treatment care, rehabilitation and health promotion. Integration is a means to improve services in relation to access, quality, user satisfaction and efficiency*" (Gröne and Garcia-Barbero 2001).

Shortell et al. (1993) decompose health system integration into three consecutive components: functional integration, physician system integration and clinical integration.

Integrated care refers to organizational arrangements between providers of care to allow patients to access different services. While continuity of care refers to patient's experience and journey through the system of health and social services (Gröne 2002). This approach is supported by Reid et al. (2001): "*Continuity is how patient experience care over time as coherent and linked; this is the result of good information flow, good interpersonal skills, and good coordination of care*". This definition highlights the three components of continuity (Reid et al. 2002)

- Informational continuity: "*means that information on prior events is used to give care that is appropriate to the patient's current circumstance*"
- Relational continuity: "recognizes the importance of knowledge of the patient as a person; an ongoing relationship between patients and providers is undergirding that connects care over time and bridges discontinuous events"
- Management continuity: "ensures that care received from different providers is connected in a coherent way. Management continuity is usually focused on specific, often chronic, health problem".

Those definitions clearly indicate that integration and continuity of care are at the crossroad between patient centeredness (or responsive care) and responsive governance. More specifically, relational continuity integrates the "patient respect" sub-dimension while informational continuity and management continuity integrate the "client orientation" sub-dimension. Relational continuity calls for more "soft" measures based on patient's experience. More objective indicator can be considered for the other two components of continuity.

In the sub-dimension on ethics, patient's empowerment regarding treatment (e.g. informed consent) is at the crossroads of responsive governance and patient centeredness. In this component of responsive governance, the central role of patient is highlighted. We discuss patient experience and satisfaction on patient decision making related to treatment and empowerment on the section on patient surveys in the patient centeredness perspective.

Environmental safety and disaster management and preparedness for disasters are at the crossroad of safety and responsive governance. Environmental safety can be conceptualized as a safety perspective on responsive governance. Because of the decision not to use structural indicators, and the extreme scarcity of reported adverse outcomes on the environment, this dimension is not measured in the current version of the project.

2.5. Patient centeredness

From a conceptual point of view, this dimension is distinct from the others. Patient centeredness –like safety– provides a transversal perspective on clinical effectiveness, efficiency, staff orientation, and responsive governance.

Patient centeredness is an organizational feature that affects all functions of hospitals and dimensions of performance. It is a value that should transcend all hospital activities. A strong

signal to support the re-organization of hospitals from a professional perspective (hospital organized around professional norms) towards a patient perspective (hospitals organized around and for the patients) is sent by including a patient centeredness dimension.

According to Murray and Frank (1999),

"Responsiveness relates to individual welfare enhancement through better interactions with the health system. ***Responsiveness has two main aspects: respect of persons and client orientation****. The first incorporates issues such as dignity, autonomy and confidentiality, while the latter relates to prompt attention, quality of basic amenities, choice of care provider and access to social support networks during care."*

Following the elaboration workshops, the following sub-dimensions of patient centeredness were retained:

- Overall patient perception/satisfaction
- Access
- Quality of amenities
- Comprehensiveness
- Information and empowerment
- Continuity : within the organization
- Continuity : at the interface with the community

3. Process for indicator selection

The steps for selection of indicators were the following:

1. Conceptual model: identification of dimensions and sub-dimensions and how they relate with each other
2. Initial screening of indicators in performance assessment systems and critical reviews
3. Complementary indicators to fill in areas not properly covered after initial screening, based on grey and scientific literature
4. Pre-selection of indicators based on experts' opinion and preliminary evidence
5. Extensive research of the literature for prevalence rates and evidence of burden, reliability and validity; survey in participating countries
6. Final selection based by experts, based on information collected at step 5., using a nominal group technique

All evidence supporting selection of indicators is presented in the descriptive sheets in the section 2, "Rationale – Justification for use".

The review of the literature showed that some dimensions and indicators, such as on clinical effectiveness, have been well researched and build on a scientific tradition of evaluation. But others, such as responsive governance and efficiency are less well represented in literature and tend to be based primarily on empirical evidence. Unless there is clear evidence to the contrary, it was considered acceptable to recommend measures that are based on usefulness rather than hard scientific evidence. Indicators included in the core set have been selected on the basis of *best available* evidence and relevance to the European hospitals context. An indicator that is often used by hospital to support performance improvement has a strong face validity no matter if there is no hard facts or strong scientific to support its use.

3.1. Criteria for selection

Criteria for indicators:

- Importance and relevance: the indicator must reflect aspects of functioning that matter to users and are relevant in current healthcare context. Their importance may be underlined by national or international policies (e.g. WHO Health For All framework). Clinical indicators should focus on events that have a high prevalence rate and high burden.
- Potential for use (and abuse) and responsiveness to assessment: Hospital must be able to act upon this indicator if it reveals a problem. Hence, they must have the responsibility, substantial control and ability to implement improvement strategies.

Criteria for measurement tools:

- Reliability: It supposes that the indicator has explicit and detailed specifications for the numerator and denominators. Uniform data collection procedures are understandable and easy to implement. Reliability is improved when the measure is minimally reliant on subjective judgment. It includes the concepts of internal consistency, test/retest stability and inter-rater reliability (agreement). Reliability is a necessary but not sufficient condition. To be valid, an instrument needs to be reliable.

- Face validity (also refers to acceptability): There a consensus among the users and experts that this measure is related to the dimension (or sub-dimension) it is supposed to assess.
- Content validity: Theoretical models support that the measure relates to the sub-dimension of performance it is supposed to assess and that it covers the whole domain and not only a very specific aspect.
- Construct validity: Empirical evidence demonstrates it is associated with other measures of performance.
- Burden of data collection: It includes availability, cost and timeliness of quality data and degree of easiness of data collection. Indicators (e.g. sentinel events) should not be excluded merely because they require data that are regularly missing or inaccurate; on the contrary they should be used as an opportunity to identify and respond to a need for education and improvement leading to more effective information systems. Similarly indicators based on data abstracted manually from records should not be excluded; the exercise is educational for staff and improves the quality of the clinical records.

Criteria for the set of indicators:

- Face validity: Is the indicator set acceptable as such by its potential users?
- Content validity: Are all the dimensions covered properly?
- Construct validity: How do the indicators relate with each other? Are indicators of different dimensions correlated (discrimination criteria)? Are indicators of a same dimension correlated (convergence criteria)?

3.2. List of indicators

During the elaboration workshops it was decided to propose a core set of indicators (Table 2), to be used by all participating hospitals, and a tailored set (Table 3) from which hospitals could select if they wish, indicators they consider appropriate to their particular situation.

Table 2
List of core set indicators and tracers by dimension and sub-dimension

Dimension – Sub-dimension	Core set indicators	Tracers
Clinical effectiveness and patient safety		
Appropriateness of care	C-section rate	
Conformity of processes of care	Prophylactic antibiotic use	Colorectal scheduled surgery CABG Hip replacement
Outcomes of care and safety processes	Mortality rates	AMI CAP CABG Hip fracture Stroke Total hip replacement

	Readmission rates	AMI CAP Asthma (24 hours) Asthma (24-72 hours) Diabetes (24 hours) Diabetes (24-72 hours) Hysterectomy Total hip replacement
	Admission after day surgery	Cataract surgery Cholecystectomy Knee arthroscopy Inguinal hernia Curettage of uterus Tonsillectomy/adenoidectomy Tube ligation Varicose veins
	Return to ICU for selected tracers	
	Sentinel events	
Efficiency		
Appropriateness of services	Ambulatory surgery	Cataract surgery Cholecystectomy Knee arthroscopy Inguinal hernia Curettage of uterus Tonsillectomy/adenoidectomy Tube ligation Varicose veins
Productivity	Length of stay	Uncomplicated delivery Hysterectomy
Max use of capacity	Inventory in stock, for pharmaceuticals	
	Intensity of surgical theatre use	Elective Emergency
Financial performance	No indicator in core set	

Staff orientation and staff safety		
Economic factors	No indicator in core set	
Practice environment	No indicator in core set	
Perspective and recognition of individual needs	Training expenditures	
Health promotion and safety initiatives	Expenditures on HP activities	
Staff experience	No indicator in core set	
Behavioural responses	Short-term absenteeism Long-term absenteeism	Nurses Nurse assistants Nurses Nurse assistants
Staff safety	Staff excessive weekly working time	
	Work-related injuries (PCE)	
Responsive governance and environmental safety		
System integration and continuity	Survey result	
Public Health Orientation: access	No indicator in core set	
Public Health Orientation: Health promotion	Breastfeeding at discharge	
Equity and ethics	No indicator in core set	
Environmental concerns	No indicator in core set	

Patient centeredness		
Overall perception/satisfaction	Survey result	
Interpersonal aspects	Survey result	
Client orientation: access	Last minute cancelled surgery Survey results	One day surgery Inpatient
Client orientation: amenities	No indicator in core set	
Client orientation: comprehensiveness	No indicator in core set	
Client orientation: information and empowerment	Survey result	
Client orientation: continuity	Survey result	

Table 3
List of tailored set indicators and tracers by dimensions and sub-dimension

Dimension / Sub-dimension	Tailored set of indicators
Clinical effectiveness and safety	
Conformity of processes of care	Door to needle time
	CT scan after stroke
	AMI patient discharged on aspirin
Outcomes of care and safety processes	Ditto CORE, with more advanced risk-adjustment procedures and follow-up of patients (e.g. different hospitals for readmission and fixed follow-up for mortality)
	Rate of pressure ulcers for stroke and fracture patients
	Rate of hospital-acquired infections
Efficiency	
Appropriateness of services	Score on Appropriateness Evaluation Protocol (AEP – European version)
Productivity	LOS case-mix adjusted
	# Dosage unit (or cost) antibiotics per patient day
	Cost of corporate services per patient day
Use of capacity	Operating Room utilization rate
Financial performance	Cash-Flow/Debt
Staff orientation and staff safety	
Economic factors	Percentage of wages paid on time or average delay for wages payments
Practice environment	Results of staff survey on job content
Health promotion and safety initiatives	Percent job descriptions with risk assessment
Staff experience	Results of staff survey on organizational climate
Behavioural responses	Staff turnover rate
Staff safety	Number of work-related injuries by type
	Number of assaults on staff
Responsive governance and environmental safety	
System integration and continuity	Results of audit of discharge preparation
	Percentage of discharge letters sent to General Practitioner within 2 weeks or given to the patient within 3 days after discharge
	Results of AEP for geriatric patients
Public Health Orientation: access	Perceived financial access through patient surveys
	Waiting time for selected tracers (median): CABG, breast cancer surgery, cataract, hip replacement
Public Health Orientation: Health promotion	Percent AMI and CHF patients with lifestyle counselling documented in record
Client orientation: access	Average score on access aspects items in patient surveys
Client orientation: amenities	Average score on amenities aspects items in patient surveys

3.3. Links between indicators and performance dimensions

Indicators of performance were selected through a process of operationalization which involves a logical chain of reasoning from a broad performance concept to performance dimensions to sub-dimensions to indicators. However, the reality of performance is more complex than this simple chain of operationalization would suggest. First, performance dimension and sub-dimensions are intrinsically interrelated. Second, any given indicator,

although selected to measure a given sub-dimension of performance, may in fact also be related to and measuring other sub-dimensions and/or dimensions of performance.

Table 4 indicates how each indicator in PATH's core set is associated with the various dimensions of performance. A distinction is made between «reflective» and «formative» associations. A reflective indicator is one whose variation is assumed to result from the underlying performance dimension. It is an effect of that dimension of performance. A formative indicator is one whose variation is assumed to lead to variation in the underlying performance dimension. It is a «cause» of variations in that performance dimension. Table 4 also indicates with which other dimensions of performance each indicator may be indirectly associated.

This mapping of the relationships between indicators and dimensions of performance is essential to the interpretation of performance results. It is through this map that users can make sense of performance data. It also highlights the necessity of considering simultaneously rather than in isolation the various aspects of performance.

Table 4
Link Between Indicators and Performance Dimensions

Dimension – Sub-dimension	Core	Reflective of	Formative of	Relates to
Clinical effectiveness and patient safety				
Appropriateness of care	C-section rate	CE/appropriateness of care CE/safety/process/risk avoidance CE/safety/process/aggressiveness of care	CE/safety/outcomes/complications	Neonatal mortality Complications: uterine rupture,…
Conformity of processes of care	Prophylactic antibiotic use	CE/safety/process/risk avoidance	CE/safety/outcomes Eff/productivity	Wound infections Cost of antibiotics/patient
Outcomes of care and safety processes	Mortality rates for selected tracers	CE/outcomes		
	Readmission rates for selected tracers	CE/outcomes RG/syst. integration/follow-up PC/client orient./information/education PC/client orient/comprehensiveness Eff/productivity/LOS	Eff/appropriateness services	Length of stay
	Admission after day surgery	CE/outcomes CE/safety/outcomes/complications Eff/appropriateness services	PC/subjective experience	Rate of day surgery Rate of cancelled procedures
	Return to ICU for selected tracers	CE/outcomes CE/safety/process/risk avoidance? CE/safety/process/aggressiveness of care? RG/PHO/access	PC/subjective experience Eff/productivity/cost	Return to operating theatre Occupation rate Length of stay in ICU
	Sentinel events	CE/safety/outcomes/complications	Eff/productivity/LOS	
Efficiency				
Appropriateness of services	Ambulatory surgery rate (extension: medical acute care)	Eff/appropriateness of services CE/process/innovativeness	Eff/productivity/cost PC/subjective experience	Cancellation of procedures Waiting time Admission after day surgery OR utilization rate

Productivity	Length of stay for selected tracers	PC&CE/internal coordination of care CE/outcomes/improved health CE/safety/outcomes/complications CE/process/clinical pathways RG/syst integration/discharge preparation PC/client orient/empowerment/	Eff/productivity PC/client orient/empowerment	Discharge preparation Waiting time Readmissions One-day surgery Descriptive: transfer rate
Max use of capacity	Days in inventory	Smooth production flow	Eff/max use capacity	
	Intensity of surgical theatre use	Smooth production flow	Eff/max use capacity	Cancellation of procedures Waiting time
Financial performance	No indicator in core set			
Staff orientation and staff safety				
Economic factors	No indicator in core set			
Practice environment	No indicator in core set			
Perspective and recognition of individual needs	Training days	Staff/org. factors/recognition of needs	Staff/outcome Staff/behavioural response CE/process/competence CE/process/innovativeness	
Health promotion and safety initiatives	Budget dedicated to staff HP activities	Staff/org. factors/health promotion	Staff/outcomes/objective health Staff/behavioural resp./absenteeism	
Staff experience	No indicator in core set			
Behavioural responses	Short-term absenteeism Long-term absenteeism	Staff/behavioural responses Staff/org. factors Staff/outcomes/satisfaction & morale	Eff/productivity/cost PC/continuity/safety	*Staff ratios* Length of stay Patient survey on interpersonal care Patient survey – global satisfaction
Safety processes	Staff excessive hours worked	Staff/behavioural response/attractiveness Staff/behavioural response/absenteeism	Staff/staff safety/outcomes/injuries CE/Patient safety/outcomes/errors	PCE injuries Short-term absenteeism
	Work-related injuries (PCE)	Staff/behavioural responses S/staff/outcomes	Staff/outcomes/objective health Staff/outcomes/experience Eff/productivity/cost	*Staff ratios*

Responsive governance and environmental safety				
System integration and continuity	Survey result	RG/syst. integration/continuity	PC/subjective experience CE/outcomes	Length of stay
PHO: access	No indicator in core set			
PHO: Health promotion	% women breastfeeding at discharge	RG/PHO/health promotion PC/interpersonal PC/client orientation/empowerment Eff/productivity/LOS	CE/outcomes	Length of stay
Equity and ethics	No indicator in core set			
Environmental concerns	No indicator in core set			
Patient centeredness				
Overall perception/satisfaction	Survey result			
Interpersonal aspects	Survey result	PC/interpersonal Staff/behavioural responses		*Staff ratios*
Client orientation: access	Cancelled procedures for admin. reasons		PC/access PC/subjective experience	Length of stay *Bed occupancy rate* OR utilization rate Rate of one day surgery Median waiting time
	Cancelled procedures for clinical reasons	RG/integration PC/CO/empowerment/education	PC/max use resources	
Client orientation: amenities	No indicator in core set			
Client orientation: comprehensiveness	No indicator in core set	PC/CO/comprehensiveness		
Client orientation: information and empowerment	Survey result	PC/CO/empowerment Eff/productivity/LOS	CE/outcomes/readmissions CE/safety/outcomes/complications Eff/productivity/LOS	
Client orientation: continuity	Survey result	PC/CO/continuity RG/integration/continuity	CE/safety/outcomes/complications	Length of stay

4. Reporting of performance

4.1. Construction of peer groups

All comparisons in the Dashboards will be based on comparisons of participating hospitals with its peer group. Peer groups are constructed based on a questionnaire on hospital quality management issues that is distributed to the PATH hospitals. Hospitals grouping together will be identified by cluster analysis. In the pilot implementation two separate analyses were carried out to assess robustness of the clustering and three clusters were identified. Variables included in the limited analysis were:

- Number of beds
- Type of hospital
- Catchment area
- Specialities
- Number of medical specialists (FTE)
- Number of physicians
- Patient admissions /year
- Teaching activities
- Research activities

A three group clustering solution was retained with the following groups:

1. Group 1 includes 9 hospitals (4 in France, 4 in Slovakia and 1 in Belgium) and represents smaller community mostly general hospitals, mostly in rural or mixed areas.

2. Group 2 includes some community but mostly large multi-specialty hospitals, all teaching. However, they are smaller than hospitals in group 3 in terms of number of beds, number of sites, total number of physicians, number of specialists and are less involved in research.

3. Group 3 is the largest, multisite teaching hospitals located in urban areas (13 hospitals: 7 in France, 1 in Canada, 1 in Slovakia, 4 in Belgium).

The construction of peer groups is based on a range of assumptions and comparisons with peers to some extend may be misleading if the rationale is not expressed clearly. For example, for evidence-based indicators the peer group should not be the guiding factor as the target as set by evidence-based medicine and not by the peer that may or may not practice EBM.

In the future hospitals should be able to identify themselves the peer group they would like the comparisons to be based on. Another possibility to display comparative performance would be the graphical representation of the distribution of all hospitals for a given indicator. Such comparison, while still keeping individual hospitals' results anonymous, could help to identify the variation in performance (identification of over and underperformers). A final issue to be considered in the future development of PATH is how match-making can be facilitated between hospitals while ensuring confidentiality of results.

4.2. Graphical and statistical presentation of results

The dashboards are the core output of the PATH projects. They facilitate hospital managers' efforts to compare the performance of their hospitals with the performance of a peer group of hospitals and also allow managers to identify where their hospitals over or underperforms.

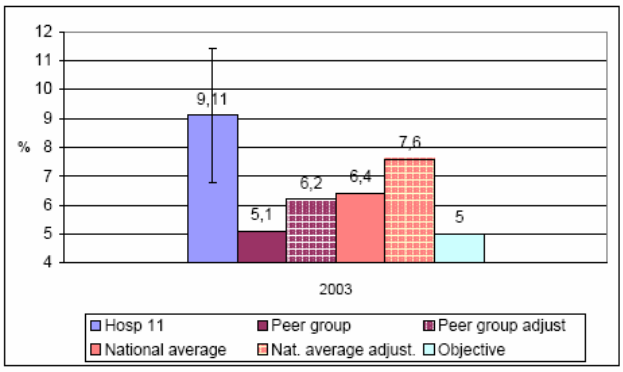
Three types of dashboards will be computed: 1. Dashboard for individual performance indicators; 2. Relative Performance Index and 3. Overall Performance Index. The indicator-specific dashboard are prepared for each hospital and each indicator and tracer and illustrates for any given indicator how the performance of a hospital compares to its peer group (Figure 1). It also includes data grouped by age and sex in order to allow for more in-depth comparisons. If available, the dashboard may include data on national averages or objectives, set at hospital, regional or national level.

Figure 1: Example of dashboard for individual performance indicator

CORE Indicator : Readmission within 30 days ; Risk-adjustment : age and sex
Stratification / tracer : Acute Myocardial Infarction (AMI)

Global rate : 9,11 %
CI : 2,32 %
N : 593

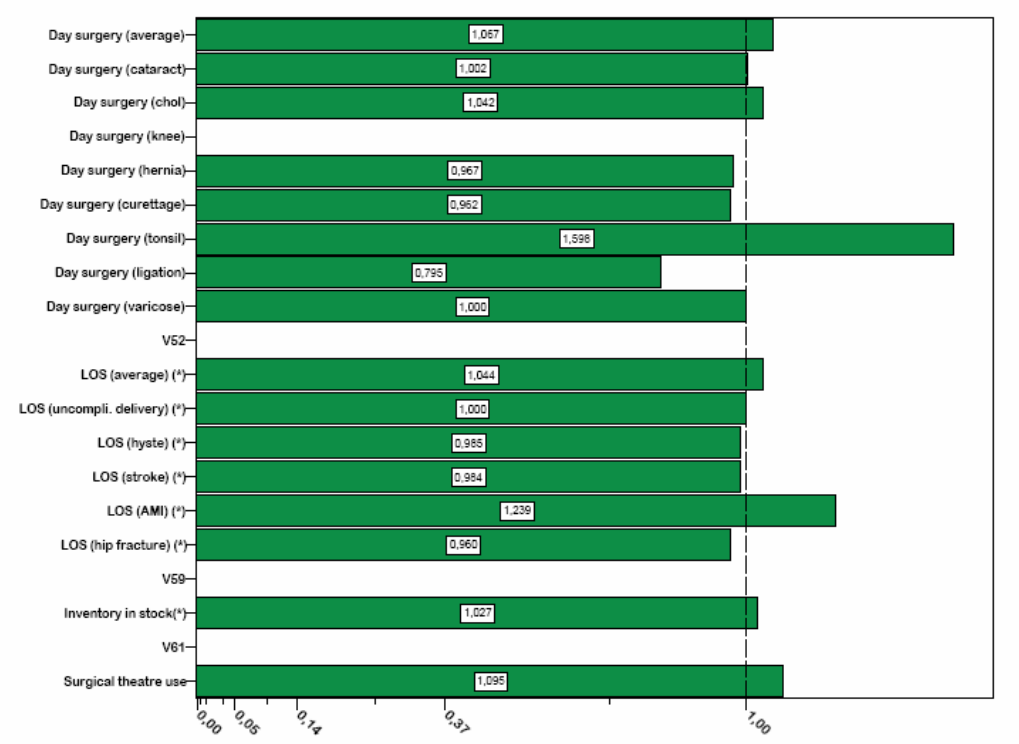
Stratify by sex and age		n	N	%
Male	age 0-14			
	age 15-24			
	age 25-44	2	41	4,88
	age 45-64	12	147	8,16
	age 65-79	16	126	12,70
	age 80-89	5	61	8,20
	age over 89	1	19	5,26
	total	36	394	9,14
Female	age 0-14			
	age 15-24			
	age 25-44	3	12	25,00
	age 45-64	4	18	22,22
	age 65-79	6	79	7,59
	age 80-89	4	56	7,14
	age over 89	1	34	2,94
	total	18	199	9,05



The relative performance index (RPI) aims to display the performance for each hospital by performance dimension in order to allow managers to obtain a quick overview on how their hospital is doing e.g. in terms of efficiency (Figure 2). The relative performance index is prepared for each hospital in each performance dimension and obtained by dividing the hospital's score by the peer groups' average[1]. Indicators can be positively or negatively associated with performance. An asterisk (*) indicates a negative association meaning that a higher score indicates lower performance.

[1] An index of 1 means that the hospital score is identical to the peer groups' average. A RPI of 1.5 indicates that the hospital score is 1.5 times (or 50 %) higher than the peer groups' average. A RPI of .5 indicates a hospital score 2 times lower (1/0.5) than the peer groups' average. Dashboards presented at the PATH workshop in November 2005 were based on comparing performance with national averages. Analysis was repeated in December 2005 based on comparisons with peer-groups.

Figure 2: Example of relative performance index



The overall performance index provides a one-page overview over the hospital's performance. It shows for each of the performance dimensions the number and the percentage of indicators that are below at the same level or above the peer group's performance (Figure 3). The dashboards are designed for the strategic management of the hospital.

Figure 3: Overall performance index

dimension	Low Performance (*1)	Average Performance	High Performance (*2)	TOTAL
Clinical effectiveness and safety	0	0	2	2
Efficiency	0	4	0	4
Staff orientation and safety	0	2	1	3
Responsive governance	0	1	0	1
Patient centredness	0	0	1	1
Safety	0	1	0	1
total	0	8	4	12

dimension	Low Performance (*1)	Average Performance	High Performance (*2)	TOTAL
Clinical effectiveness and safety	0%	0%	100%	100%
Efficiency	0%	100%	0%	100%
Staff orientation and safety	0%	67%	33%	100%
Responsive governance	0%	100%	0%	100%
Patient centredness	0%	0%	100%	100%
Safety	0%	100%	0%	100%
total	**0%**	**67%**	**33%**	**100%**

5. Descriptive sheets for PATH core indicators

A descriptive sheet was drawn for each proposed indicator. The descriptive sheets contain an operational definition, the rationale and justification for use (burden, importance/prevalence/potential for improvement), hospital impact, and validity and a guide for interpretation direction and potential target, stratification and alterative measures, related performance indicators, causative factors, and potential quality improvement strategies).

As descriptive sheets should be self-standing, each sheet contains its own bibliography.

Structure of descriptive sheets

Section 1. Operational definition

The objective of this section is to share a common language. Operational definitions are provided to support uniform data collection across hospitals and countries.

If indicators are to be used for comparisons, operational definitions (and the underlying data) need to be standardised rather than left for local determination within national contexts. Though standardisation between countries should be aimed at, it will be gradual. A commitment to start to schedule for convergence is preferred to the unrealistic aim to seek immediate conformity. International comparisons are a secondary objective, aimed for at a later stage of the project.

Section 2. Rationale and justification for use

The second section justifies why the indicator should be used. It is crucial to make clear what the indicator is supposed to measure, its strengths and limits. It is also extremely valuable that users understand why it is important to gather data on the indicator in order to motivate them to accept the indicator, go through the burden of data collection, and make sure of the data quality.

This part is organized around the criteria for indicator selection (see above). It is based on the evidence provided in the descriptive sheet that experts decided to include the indicator in the core set.

Section 3. Interpretation guide

The third section provides tracks on how to use the indicator results. The overarching objective of the project is to provide tools to support hospitals in assessing their performance, questioning their own results, and translating them into actions for improvement, with the support of other participating hospitals (benchmarks). For this reason, PATH puts a lot of emphasis on how indicators can be used in a formative process. Indicators results should not be simply accepted as a statement of good or bad performance. Nor should indicators be interpreted in isolation.

In this section, we provide potential paths on how to move from measurement to assessment to judgment and quality improvement actions. A series of measures are proposed to support interpretation of results. Measures that require further data collection are highlighted in purple. Uniform definition and data collection are preferred so that not only will indicators be compared between hospitals but also potential explanatory factors.

Degree of conclusiveness

Section 4. Data collection issues

In order to prepare and guide the first workshop on PATH pilot implementation, this section identifies the major challenge to implement the indicator. Those questions will need to be addressed during the workshop.

At the implementation stage of PATH, this section will include detailed description on what data to collect, where it is available, by whom it is collected, and what are the data quality control mechanisms and meta-indicators. It could need to be adapted to national/regional specificities.

Reliability, validity and causation are building blocks that combine with each other to ascertain a degree of conclusiveness. Reliable measures that lack validity and causality can still be used as "screening test". For instance, the Ontario Hospital Report warns "*measures of clinical performance should be thought as screening test. Screening test – such as pap smears– are often used in medicine*". They can produce both false positive and false negative. The Scotland Clinical Outcome Report calls them "flags" and insists that they should be viewed as tools to contribute to quality improvement ("*they can provide insights into quality of care and highlight variations in outcome worthy of further investigations*").

The descriptive sheets contain an assessment of the degree of conclusiveness for each indicator, based on available evidence. It provides very raw estimation and can vary greatly depending on the context, data quality and risk-adjustment procedures (if available). It is just a signal on when to be particularly careful.

Annex: Descriptive sheets

Descriptive sheets for PATH core set Clinical effectiveness and Patient safety indicators

A descriptive sheet was drawn for each proposed indicator. The descriptive sheets contain an operational definition, the rationale and justification for use (burden, importance/prevalence/potential for improvement, hospital impact, and validity and a guide for interpretation (direction and potential target, stratification and alternative measures, related performance indicators, causative factors, and potential quality improvement strategies).

The indicator on sentinel events follows a slightly different presentation.

As descriptive sheets should be self-standing, each sheet contains its own bibliography.

Sheet 1: Mortality, for selected tracer conditions or procedures
Sheet 2: Readmission, for selected tracer conditions or procedures
Sheet 3: Readmission to higher level of care within 48 hours
Sheet 4: Caesarean section
Sheet 5: Admission after day surgery, for selected tracer procedures
Sheet 6: Antibiotic prophylaxis use, for selected tracer procedures
Sheet 7: Sentinel events

Clinical effectiveness: Mortality, for selected tracer conditions and procedures

a. Definition

a. **Numerator**:
Core basket: Total number of patients admitted for a specific tracer condition or procedure who died *during their hospital stay*
Tailored basket**:** Total number of patients admitted for a specific tracer condition or procedure who died *during a fixed follow-up period*

b. **Denominator**: Total number of patients admitted for tracer condition or procedure

c. **Tracer conditions and procedures**: stroke (to be restricted to very specific ICD-9 and ICD-10 codes to increase homogeneity of case-mix), Acute Myocardial Infarction (AMI), hip fracture, community-acquired pneumonia (*note: depends on the level of severity, for simplicity of data collection, includes patient in intensive care units*), Coronary Artery Bypass Graft (CABG) (*note: not relevant in all hospitals*), Total hip replacement
Maternal and neonatal mortality are included in a tailored basket for use in South Africa
Tracer condition is identified using only the principal or primary diagnosis code

d. **Exclusion criteria**: patients transferred to / from other hospitals
Transfer rates and – ideally – destination should be reported simultaneously as a proxy for case-mix and for reputation
For acute myocardial infarction, it might be interesting to specifically study for patients transferred in (i.e. patients referred to tertiary care hospitals from lower level hospital) (in tailored set?)

e. **Risk-adjustment**: AGE, SEX

b. Rationale – Justification for use

Specific detailed justifications for use of mortality rates for coronary artery bypass, acute myocardial infarction, stroke, congestive heart failure, hip fracture and hip replacement, pneumonia and perinatal mortality is presented at annex 1. They are summarized at table 1.

a. **Burden**: Mortality is the "ultimate" outcome.

b. **Importance – Prevalence – Potential for improvement**:

Readmission rates vary greatly depending on disease and time frame. Low mortality rates are often a major concern for statistical reasons. In rare events, it is difficult to distinguish between random noise ("chance") and differences in quality or case-mix. To identify statistically significant differences in problem rates of the size likely to be due to quality often requires either more cases or bigger differences than are present. A simulation study –assuming perfect adjustment for case-mix– demonstrated there are perhaps only one or two surgical diagnoses (carotid endarterectomy and coronary artery bypass grafting) that have both the high volumes and substantial mortality necessary to be considered useful mortality rates[1].

c. **Hospital impact**:

- For instance, in a study before-after design with concurrent controls, quality improvement interventions lowered the risk of in-hospital deaths among patients with acute myocardial infarction[2].
- However, hospitals cannot impact on pre-admission care. Pre-admission care is crucial in conditions such as acute myocardial infarction and strongly impacts on severity on admission and final outcome.

d. **Validity**:

Reflects technical quality of care
Is affected by length of stay

Strong rationale: The use of effective treatment should save lives and treatments themselves should not cause untimely death. Mortality is the "ultimate" outcome; mortality as outcome is not difficult to explain to people.

High face validity: Despite the challenge of risk-adjustment and proper specification of the outcome, this indicator is probably the most widely used indicator of quality. Mortality rates were the first hospital-

specific outcome measure to be made publicly available by the Health care Financing Administration (HCFA) in 1986. It raised a general outcry and the HCFA ended their publication. Despite numerous study documenting the limitations of mortality rates for consumer use, mortality rate have recently been made publicly available in Scotland, England, France, and Ontario.

Mixed evidence supporting construct validity:

Association with other indicators of performance:

- Mortality rates: In one study[3], risk-adjusted mortality rates for 6 common conditions (acute myocardial infarction, congestive heart failure, pneumonia, stroke, obstructive lung disease, gastrointestinal hemorrahge) are very weakly associated. Random variations and low hospital volume accounted for *some* of the difference in standardized mortality ratios. This observation contradicts the assumption that if mortality rates represent hospital quality of care they should be similar for different diagnosis, particularly diagnoses that would be managed by similar doctors or nurses.
- Process of care: Hospitals identified as providing good process of care for AMI[4] and for pneumonia[5,6,7] tend to have lower mortality rates.
- Patient satisfaction: Patient satisfaction and mortality rates for 6 high volume medical diagnoses –at the hospital level– were found to be inversely associated[8]. In this study, association was the strongest for scores between mortality rate and patient's ratings of coordination, discharge instructions, overall quality, information provided and was almost nil between mortality rates and patients' ratings of physician care.
- Accreditation: In one study[9], hospitals not surveyed by JCAHO had on average higher mortality rates than hospitals accredited by JCAHO but there were considerable variations in mortality rates within hospitals accredited by the JCAHO.

Strength: strong rationale, death is the "ultimate" outcome, demonstrated relationship with process measures for some conditions Limits: rating is strongly affected by risk adjustment procedure, time frame and whether or not deaths after discharge are included; low reliability (concerns with quality of coding).

c. To add meaning – Guide for interpretation

Core indicator: very limited risk-adjustment
Potential value: stimulate discussion and encourage local investigation

Screening tool	X										**Conclusive assm^{nt}**

Tailored indicator: extensive risk adjustment and fixed follow-up period (extends beyond discharge)

Screening tool							X				**Conclusive assm^{nt}**

a. **Direction and targets**: Lower rate is preferred.

b. **Stratification – alternative measures**:

Stratification
- **Place of occurrence: operating theatre, intensive care/intermediary care unit, hospitalization unit**

Complementary measures:
- **Mortality rate after fixed follow-up**
- **Proportion of death occurring within hospital compared to deaths after discharge**

Mortality rates should always be presented simultaneously with transfer rates and destination.

Complementary measures for further scrutiny – to investigate outliers: **implicit or explicit review process of care** in medical records to assess the compliance with guidelines. Process indicators have been

extensively used to assess the quality of care to acute myocardial infarction, stroke and pneumonia patients.

c. **Related performance indicators**:

- Length of stay (efficiency)
  Expected relationship (for core):
  When lengths of stay are shortened and patients are prematurely discharged, a larger proportion of patients might die after discharge and hence will not be computed in the core indicator, artificially lowering mortality rate.
- Return to the ICU (Core –clinical effectiveness)
  Expected relationship: Return to the ICU is associated with an increased risk of mortality.
- Ventilatory-associated pneumonia (Tailored – safety)
  Expected relationship: Ventilatory associated pneumonia is a serious complication and reflects quality of care in the intensive care unit. As both indicators are supposed to reflect the same underlying concept, they should be positively associated.

d. **Causative factors**:

Mortality rates are affected by many factors other than quality of care. Differences may be attributed to the following factors:

1. Differences in coding practices
   - Some diagnosis have a low specificity/sensitivity (e.g. stroke)
   - Differences in ranking of procedure: chronologically or according to the degree of complexity
   - Under- or over-reporting of secondary comorbidities
   - Unable to distinguish between comorbidities present on admission from those developed during the hospital stay
2. Differences in risk-factors and selection bias
   - Variation in propensity to hospitalize (for community-acquired pneumonia)[10]
   - Variation in pre-admission care (for acute myocardial infarction and for stroke) and severity on admission
   - Concurrent illness, complexity of procedure, frailty and functional capacity (for hip fracture)
   - Socio-economic status[11]
3. Differences in transferring and discharging practices (for inpatient mortality)
4. Differences in post-discharge care (for mortality within a fixed followed-up time period)
5. "Chance" (stochastic factor)
6. Quality of care

Implication for performance assessment:

- Factor 1 (coding practices) is under hospital influence but not related to quality of care. Data quality mechanism should be established in order to evaluate the extent of differences in coding practices. A short description of who collects the data and by who and why it is used can give some insights into potential incentives and coding strategies. Meta-indicators on data quality (e.g. average number of secondary diagnoses) should be computed.
- Factor 2 (risk factors and selection bias) is an exogenous variable; it mostly out of hospital's control. Ideally, mortality rates should be adjusted for risk factors. Due to the high burden of data collection, adjustment for risk factor is not required in the core set. To limit impact of differences in risk factors, we advise to limit comparisons to peer groups of hospitals with similar case-mix (e.g. community hospital, tertiary hospitals). Potential proxies for risk factors: age, sex, admission origin (home, nursing home), average income in zip code of residence. More specific proxies are discussed for each tracer condition or procedure in the appendix.
- Factor 3 (transferring and discharging practices) is under hospital's control and affects patient case mix. It is not related to quality of care. We propose to exclude in the core set all patients admitted from another hospital or discharged to another acute care setting. In-hospital mortality rates should always be presented simultaneously with transfer rates, discharge destination, and length of stay.

- Factor 4 (post-discharge care) is only partly under hospital's influence. Hospitals' role, autonomy and integration within the community vary greatly among the national or regional contexts. Factor 4 is only relevant for mortality rate within a fixed follow-up period (in tailored basket). Impact of exogenous environmental factors is lessened with short follow-up period (e.g. 30 days).
- Factor 5 ("chance") will never be neutralized but it should be accounted for when comparing results. Test of statistical significance need to be computed.

Hospital factors (partly under hospital control depending on hospitals autonomy in the country):

- Equipment/technology available, e.g. revascularisation facilities for AMI patients.
- Staff ratios and staff qualifications:
  - A large-scale study (more than 200 000 general, orthopaedic and vascular surgery patients in 168 US hospitals) indicates that each additional patient per nurse is associated with a 7% increase risk in dying within 30 days of admission.
  - Specialty of admitting physician

Environmental factors:

- Cultural factor: Preference to discharge end-of-life patients home or to a palliative care facility will alter the in-hospital / out-of-hospital ratio of mortality.
-

e. **Quality improvement strategies**:

In this section, hospitals should describe how mortality is monitored and how key outcome and process indicators are used in a quality improvement process. Strategies include physician profiling, peer review committee, death analysis by internal committee, etc.

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1 Hofer TP, Hayward RA. Identifying poor quality hospitals: can hospital mortality rates detect quality problems for medical diagnoes? Medical Care 1996;34(8):737-753.

2 Scott I, Coory M, Harper C. The effects of quality improvement interventions on in-hospital mortality following acute myocardial infarction. Cochrane 2001;1:op045.

3 Rosenthal G, Shah A, Way L, Harper D. Variations in standardized hospital mortality rates for six common medical diagnoses: implications for profiling hospital quality. Medical care 1998;36(7):955-964.

4 AHRQ

5 Meehan TP, Fine MJ, Krumholz HM, Scinto JD, Galusha DH, Mockalis JT, et al. Quality of care, process, and outcomes in elderly patients with pneumonia. Journal of the American Medical association 1997;278(23):2080-2084.

6 Gleason PP, Meehan TP, Fine JM, Galusha DH, Fine MJ. Associations Between Initial Antimicrobial Therapy and Medical Outcomes for Hospitalized Elderly Patients With Pneumonia. Archives of Internal Medicine 1999;159:2562-2572.

7 Malone DC, Shaban HM. Adherence to ATS guidelines for hospitalised patients with community-acquired pneumonia. Annals of Pharmacotherapy 2001;35(10):1180-1185.

8 Jaipaul CK, Rosenthal CE. Do hospitals with lower mortality have higher patient satisfaction? A regional analysis of patients with medical diagnosis. American Journal of Medical Quality 2003;18(2):59-65.

9 Chen J, Rathore SS, Radford MJ, Krumholz HM. JCAHO accreditation and quality of care for acute myocardial infarction. Health Affairs 2003.22(2):243-254.

10 Miller GM, Miller LS, Fireman B, Black SB. Variation in practice for discretionary admissions. Impact on estimates of quality of hospital care. Journal of the American Medical Association 1994;271(19):1493-1498.

11 David A, Austin P, Nayler CD, Tu JV. Factoring socio-economic status into cardiac performance profiling for hospitals: does it matter? Medical Care 2002;40(1):60-67

Detailed presentation of potential tracer conditions for mortality rate indicators is mostly based on an extensive review of the literature by the AHRQ[1] and on work by the CRAG[2]. The full reports are available on

- http://www.qualityindicators.ahrq.gov/downloads/pub/inpatqi/iqi_guide_rev2.pdf
- http://www.show.scot.nhs.uk/crag/publications/coi7/contents.htm

Coronary artery bypass

Face validity and consensus on use:

- Rationale: Relatively common procedure that requires proficiency with the use of complex equipment and technical errors may lead to clinically significant complications
- One of the most widely used and publicized post-procedural mortality indicator. Prominent public initiatives to compare patient outcomes for doctors and hospitals often started with CABG surgery. Currently used by the ACHS, MarQIP, NHS-T. It has become the focus of State Public reporting initiatives (California, New Jersey, New York, and Pennsylvania).

Construct validity:

- Many technical processes of care as well as surgeon and hospital skill and experience have been shown to reduce mortality
- Evidence indicates some effect of volume and surgeon experience on CABG mortality.

Risk-adjustment:

- Well-documented risk factors (cardiac function, coronary disease severity, urgency of the surgery) and data on risk factors partially available in administrative database.
- Ranking relatively insensitive to which method is used to perform risk-adjustment (AHRQ).
- Measures derived from ICD-9-M codes and basic demographic information proved superior in identifying patients' risk of dying to clinical measures (e.g. physiology scores after the acute physiology score component of the Acute Physiology and Chronic Health Evaluation, third version)[3]

Limits:

- Distinguishing comorbidities present at admission from complications of care

Acute myocardial infarction

Prevalence:

- The concern of the World Health Organization for the current coronary heart disease epidemic is substantiated by its MONICA project (multinational MONItoring of trends and determinants in Cardiovascular disease).

Potential for improvement:

- Many acute treatments have been shown to reduce short-term and long-term AMI mortality and many are believed to be under-used, suggesting important opportunities for quality improvement
- Though, a European study[4] indicated average quality ratings (adherence to five key treatments) ranged from 89% in the U.K. and France to 96% in Germany. Those high ratings suggest little room for improvement.

Hospital impact:

- Interventions to improve adherence to published guidelines significantly decrease mortality rates[5]

Face validity:

- Currently used by CRAG, JCAHO
- A consensus has emerged about the definition of timely and effective treatments for AMI. We do not propose such indicators for use in the PATH project because of the burden of data collection on a

regular basis. However –for hospitals flagged as "outliers"– mortality indicators could be coupled with process indicators to try to understand or substantiate the results. This is an interesting feature of AMI mortality indicators

Construct validity:

- Hospitals identified as providing good process of care for AMI also tend to have lower mortality rates

Limits:

- Variation in AMI risk factors across hospitals. AHRQ suggests selection bias is less important for AMI –an urgent medical condition– than elective surgical conditions. However, according to the CRAG, hospitals are concentrating patients of different severity because of:

  1) Influence by the speed at which patients get to the hospital after a heart attack: sicker patients make it to the hospital in urban areas though, in rural areas, they would have died before getting to the hospital because of poor access; but an alternative analysis would suggest that the faster the patients get to the hospital the more chance he has to survive (so favoring urban areas)[6]

  2) Influence by the type of policy adopted to ensure early thrombolytic treatment (e.g. 'scoop and run' policy in urban areas to get the patients as quickly as possible to the hospital and pre-hospital thrombolysis in rural areas)

- Proxy for those "environmental" factors (urban/rural area, % deaths following AMI occurring out of hospital in the area, average survival rate in the area, etc.) should be considered during the pilot test.

- Many hospitals treat a relatively small number of AMI patients. Thresholds for inclusion (minimum number of case to be able to distinguish noise from signal) need to be defined.

Complementary indicators for further scrutiny – to investigate outliers:

Process indicators based on audit of medical records to evaluate compliance with guidelines:

- Percent of AMI patients without aspirin contraindications who received ***aspirin*** within 24 hours before or after hospital arrival
- Percent AMI patients without ***betablocker*** contraindications who received a beta blocker within 24 hours after hospitals arrival
- ***Thrombolytic treatment***:
  - *Definition JCAHO*: Median time from arrival to administration of a thrombolytic agent in patients with ST segment elevation or left bundle branch block on the electrocardiogram performed closest to hospital arrival time
  - *Definition ACHS*: Number of patients with AMI requiring thrombolysis who receive trombolytic treatment within one hour of presentation to the hospital / total number of patients with AMI requiring thrombolysis.

    Patients are supposed to require thrombolysis if (1) chest pain greater than 30 minutes, (2) new ST segment elevation or left bundle branch block
- Median time from hospital arrival to ***percutaneous transluminal coronary angioplasty*** (PTCA) in patients with ST segment elevation or left bundle branch block (LBBB) on the electrocardiogram (ECG) performed closest to hospital arrival time

Stroke

Prevalence and potential for improvement

- The AHRQ reports in-hospital mortality rates from 10% to 15% of cases.
- In one international study[7], proportion of patients who died at six months range from 12% to 33% and differences in mortality rates between countries remained very large after adjustment for casemix at baseline. Authors warn that residual differences are too large to be solely explained by differences in quality of care.

Rationale:

- Like for AMI, process indicators (appropriate and timely care) are widely available for stroke and could be used to examine flagged hospital in a benchmarking approach.

Limits: CRAG and AHRQ identify two major limits for stroke indicators related 1) to coding practices and variations in definition and 2) to patient selection bias and case-mix:

- As part of the preparatory work for the Five Hospital Study of Stroke Outcome (Dennis et al. 1999 in CRAG), three ICD-9 codes were excluded because they were insufficiently accurate markers of acute stroke. During the study itself, acute stroke in the discharge abstract was confirmed 78% of the time. This result was confirmed in Denmark with 79.3% of stroke recorded in discharge abstract confirmed after medical record review[8]. The AHRQ reports a positive predictive value of less than 80% for new strokes associated with the diagnosis codes included in the stroke DRG.
- Hospitals with different types of facilities may attract different types of patients with resulting different outcomes. For instance, the presence of a trauma center or accident and emergency facilities may involve the admission of a higher proportion of patents with more severe stroke; an interest in acute stroke therapies may attract patients with milder or resolving symptoms; the presence of a large elderly unit may attract patients of greater frailty with a worse prognoses; and finally, specialist centers may attract a higher proportion of the more complex and unusual cases but not those who are severely ill and unfit to transfer. At some hospitals, "best practice" involves treating mild patient on an outpatient basis and are consequently admitting a more severely ill subset of patients (AHRQ).
- Hospitals may not only differ in their admission but also in their transfer and discharge practices for patients suffering from uncomplicated strokes or transient ischemic attacks (AHRQ). This difference in transferring and discharging practices is thought to strongly influence in-hospital mortality rates because most deaths occur many days to weeks after the attack.
- Patient selection bias calls for adequate measurement of patient risk-factors. Acute stroke mortality is determined primarily by stroke severity. Patient factors –when measured with a comprehensive battery of case-mix variables– account for many of the differences in observed outcomes[9]. In the International Stroke Trial, outcomes were adjusted for sex, age over 70 years, systolic BP over 160 mm Hg, presence of atrial fibrillation, neurological deficits, entered within 24 hours of onset and visible infract on CT scan. On aggregated national data, adjustment for case mix had a serious impact on ranking of the countries. Unfortunately, few data are available on a routine basis and it would require ad-hoc review of medical records.

Congestive heart failure

Prevalence and potential for improvement:

- Common condition with relatively frequent inpatient mortality.
- Recent studies show a decline in case fatality rates –possibly related to recent innovations in the care of hospitalized patients.
- Hospitals vary widely in processes of care known to reduce CHF mortality.

Construct validity:

- Related to mortality for some other medical conditions. Hospital organization of care (stroke unit care versus stroke team care) is somewhat associated with mortality rates; stroke unit management being beneficial only to patients with large vessels infarcts[10].

Limits:

- Differences in coding practice of CHF is suspected because a primary diagnosis of CHF is not very sensitive in administrative data, though little evidence exist to support the importance of this problem.

Complementary indicators for further scrutiny – to investigate outliers:

Process indicator based on audit of medical records to evaluate compliance with guidelines:

- Percentage of heart failure patients with documentation in the hospital record that left ventricular function (LVF) was assessed before arrival, during hospitalization, or planned for after discharge

Hip fracture

Prevalence and potential for improvement:

- Hip fracture is a widely used tracer because of its high prevalence.

Limits:

- Very diverse case-mix of patients admitted for hip fracture. Hip fractures typically occur in frail patients at risk for deep venous thrombosis, pneumonia and myocardial ischemia.
- Many aspects of the case-mix which are strongly associated with the outcome cannot be measured on the basis of discharge abstracts, e.g. pre-existing levels of mobility or functional capacity, extremely frail patient with associated diagnoses such as dementia, etc.
- Low mortality rate and therefore low statistical significance (around 5%)
- Unclear time frame to relate death to previous hip fracture (1 month or 4 months?). Thirty-day mortality is considerably higher than in-hospital mortality.
- Construct validity at the provider level not established.
- Limited explicit evidence on practices that reduce short-term mortality.

Place of occurrence of the hip fracture (bedroom, elsewhere in the patient's residence or outside the home) could be a good proxy for general functional status prior to hip fracture and a powerful predictor of subsequent outcome (CRAG). Alternatively, patients admitted from institutional care are likely to be frailer and with a poorer diagnosis than patients admitted from their home (CRAG). According to the AHRQ, comorbidities and functional impairment are important predictors. Comorbidities can be obtained from discharge data; while functional impairment requires prospective data collection but little evidence exists on whether this patient factor significantly differs across hospitals.

Hip replacement

Prevalence and potential for improvement:

- Common procedure frequently performed on older patients with comorbid illnesses
- Many technical process of care may reduce potentially life-threatening complications
- With mortality rates usually lower than 1-2%,

Limits:

- Due to the low mortality rates, hospital level estimates may be imprecise for many hospitals. For instance, it would be necessary to include 4673 patients (corresponds to 20 years data for a hospital performing 230 interventions per year) to evidence a statistically significant difference in mortality between two hospitals whose rates are respectively 0.5 and 1%[11]. The lack of statistical power is a major limit for this tracer.

Complementary indicator for further scrutiny – to investigate outliers:

- See indicator on appropriateness of antibiotic prophylaxis

Community-acquired Pneumonia

Prevalence and potential for improvement:

- Hospitalizations for pneumonia are very common and in-hospital death is relatively common too.
- Average mortality rate for community-acquired pneumonia of 13.6% in hospitalized patients, with higher rates for elderly patients (17.6%), bacteremic patients (19.6%) and patients admitted to intensive care units (36.5%)[12]. For this condition, the most important concern is the heterogeneity of pneumonia patients.

Construct validity:

- Three processes of care (blood culture collection within 24 hours of arrival or administration of antibiotics within 8 hours of arrival, initial treatment with second or third generation cephalosporin)

are independently associated with reduced 30-day mortality[13],[14]. Malone and Shaban[15] demonstrated in 330 patients with community-acquired pneumonia that patients treated inconsistently with the American Thoracic Society Guidelines had a 4.43-fold increase risk of inpatient mortality and had significantly longer length of stay.

- Those results were not confirmed by a more recent study[16]. The diverging results might be explained by confounding effect of severity of illness. Blood culture collection within 24 hours of arrival and antibiotics administration within 8 hours were significantly associated with severity of pneumonia on admission.

Limits:

- Literature suggests that differences in comorbidity and coding might affect performance measures and that risk-adjustment for comorbities affects hospital ranking.
- The AHRQ indicates that substantial patient heterogeneity reduces precision of hospital estimates and that previous studies report a relatively high probability of errors in labeling hospitals as high-mortality outliers.
- Differences in admission practices (conditions for treating pneumonia patients an outpatient basis), could result in some hospitals admitting a more severely ill subset of patients.

Complementary indicators for further scrutiny – to investigate outliers:

Process indicators based on audit of medical records to evaluate compliance with guidelines:

- Median time from hospital arrival to administration of ***first antibiotic dose***: assess the timeliness of antibiotic administration for pneumonia inpatients
- Percent of patients whose initial ***blood culture*** specimen was collected prior to the first hospital dose of antibiotics.
- Percentage of pneumonia inpatients 65 years of age and older screened for and/or given pneumococcal ***vaccination*** when needed.
- Percent of patients who receive ***oxygenation assessment*** within 24 hours prior to or after arrival at the hospital

Perinatal mortality

Perinatal mortality rate is used as an indicator of the quality of antenatal and perinatal care. The infant mortality rate has been identified as a key indicator for monitoring "progress towards Health for All by year 2000" by the WHO. Though it is a relatively well-defined indicator of the social and economic development, perinatal mortality rate is preferred to measure quality of perinatal care. During the 2nd workshop, it has been identified by the panel of expert as "very important" indicator. Though, it is a very rare and extreme event. The very low frequency of this event seriously hampers statistical significance at the hospital level.

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Clinical effectiveness:
Readmission, for selected tracer conditions or procedures

1. Definition

a. **Numerator**: Total number of patients admitted through the emergency department after discharge – within a fixed follow-up period– from the same hospital and with a readmission diagnosis relevant to the initial care.

b. **Denominator**: Total number of patients admitted for selected tracer condition

c. **Tracer procedures and conditions**: acute myocardial infarction (30 days), community-acquired pneumonia (30 days), asthma (24 hours and 24 to 72 hours), diabetes (24 hours and 24 to 72 hours) , hysterectomy, total hip replacement.

In the tailored set, a global indicator on surgery patients could be included (of specific financial interest for Poland because the second admission is not reimbursed).

South Africa will also include a specific indicator for HIV patients.

Tracer condition is identified using only the principal or primary diagnosis code

d. **Inclusion/exclusion criteria**: Patients who died during the index hospitalization or who were discharged to another acute care hospital are excluded from the numerator.

To be considered as a readmission, four conditions must be met: 1) diagnoses or procedure that was considered relevant to the initial care, 2) subsequent emergent or urgent admission (non elective), 3) the time between the discharge after the initial episode and the admission for the subsequent hospitalization lies within a specified time period defined by an expert panel, 4) the initial episode did not end with the patient signing himself out against medical advice (or died).

We propose to drop condition 4 because of the burden of data collection and –to some extent– it is hospital's responsibility to encourage patients to stay as long as required. Second, a proxy for emergent or urgent readmission is to include only readmissions through the emergency department.

Other potential exclusion criteria: patients already receiving continuous care at a primary care clinic, chemotherapy or radiotherapy; residing in or planned to go to nursing home; admitted only to undergo a procedure. Those criteria are not used in the PATH core indicator but could provide interesting tracks for tailored indicators.

Risk-adjustment: It was decided by the working group not to adjust for difference sin age or sex because it may represent bad selection of patients for day surgery.

2. Rationale – Justification for use

a. Burden:

From a financial point of view, readmissions are often very costly as they involve the most expensive type of health services, inpatient acute care. From a patient perspective, they are distressing for the patient and relatives and often reflect major complications.

b. Importance – Prevalence – Potential for improvement:

Readmission rates vary greatly depending on disease and time frame. For instance, asthma readmission rate within 7 days vary from 1.1% in the Netherlands to 3.0% in California; diabetes readmission rate within 7 days vary from 1.1% in the Netherlands to 3.0% in Scotland, congestive heart failure readmission rate within 30 days vary from 4.3% in New York to 13.0% in California, and rates for hip replacement within 30 days vary from 0.3% in Netherlands to 1.6% in Scotland[1].

From 9% to 48% of all readmissions have been judged to be preventable because they are associated with indicators of substandard care during the index hospitalization and 12% to 75% of all readmissions could be prevented by patient education, predischarge assessment and domiciliary care[2].

c. Hospital impact:

The efficacy of pre-discharge reviews and improved follow-up after discharge to reduce readmissions has been demonstrated in seven studies out of 11 review of the literature in 1999[3]. In three cases, such strategies have simultaneously been associated with a decrease in mortality rates. The intervention had no effect in three studies and resulted in an increase in readmissions in one study. More recently, three prospective controlled trials[4,5,6] indicated that there were fewer readmissions in the intervention group

(nurse-led heart failure clinic and a multi-disciplinary home-based intervention). Around three quarter of the hospitals participating to the Australian National Demonstration Program for best practice in elective surgery decreased readmission rates and overall, unplanned unbooked readmissions within a month of discharge were reduced by 27%[7].
However, hospital influence is limited because readmissions after medical stay often indicate the progression of the disease rather than discrete outcomes of care.
A central question is how much influence do hospitals have on post-discharge care and to what degree are they accountable for post-discharge care? Answers to this question may vary greatly depending on national arrangements and organization of care.
By focussing on early readmissions and imposing more stringent time frame for readmission, impact of natural progression of the disease and post-discharge care is limited. For instance, for chronic disease such as asthma and diabetes, we advise to use readmission within 72 hours.

d. Validity:

Reflects technical quality of care (CE[i])
Reflect discharge preparation (RG[ii]), follow-up (RG) and patient education (RG & PC[iii])
Is affected and affects length of stay (Eff[iv])

Readmission may reflect on different aspects of care depending on the type of tracer condition (chronic disease, medical condition or surgical procedure) and the time frame. For instance, asthma readmission within 24 hours indicates premature discharge, between 24 and 72 hours indicates poor patient education and within 30 days indicates quality of ambulatory care.

Strong rationale:
Readmissions reflect the impact of hospital care on the condition of the patient after discharge[8]. The underlying assumption to use early readmission as a quality indicator is that something providers did or left undone during the prior stay or early post-discharge period led to the need for the patients' rehospitalization. It could be either due to sub-standard care during index hospitalization (poor resolution of the problem), either to poor discharge preparation or follow-up. This assumption is challenged by natural progression of the disease, if readmission is planned or if it is prompted by a disease not present at discharge and not related to the previous spell.
From an efficiency point of view, readmission is costly.

High face validity: There is a very large consensus for use of condition- or procedure- specific readmission rates. The NHS, ACHS, the Maryland Quality Indicator Project and the Ontario hospital Report currently use disease specific readmission rates. A consensus also emerged that global readmission rates are of little value[9].

Weak *evidence supporting construct validity:* A meta-analysis of 13 comparisons of readmission rates after sub-standard versus normative care and of 9 comparisons of readmission rates after normative versus exceptional care (from 1993 to 1996) reveals that early readmission is significantly associated with the process of inpatient care[10]. Evidence of an association with premature discharge and poor process of is stronger for community-acquired pneumonia. Evidence is mixed for congestive heart failure[11, 12,13,14].

In one study, risk of readmission is increased with increased satisfaction with access to emergency care assessed on the index hospitalization[15].

Strength: strong rationale (if limited to "unplanned" readmissions), very high consensus to use, ease of understanding by providers,

[i] Dimension: Clinical Effectiveness
[ii] Dimension: Responsive Governance
[iii] Dimension: Patient Centeredness
[iv] Dimension: Efficiency

Clinical effectiveness:
Readmission, for selected tracer conditions or procedures

Limits: difficult to distinguish preventable readmission from readmission due to the natural progress of the history or readmissions not liked with the previous spell or planned readmissions, weak construct validity, difficult to follow-up readmissions in different hospitals

3. To add meaning – Guide for interpretation

Screening tool					X						Conclusive assm[nt]

Even after adjustment for risk factors, difference sin outcome could be attributable to residual differences in case-mix, coding inconsistency, random error, etc.

Degree of conclusiveness varies greatly depending on tracer condition or procedure, time frame, risk-adjustment, identification of unplanned readmission.

a. Direction and targets: lower readmission rates are preferred.

b. Stratification – alternative measures:
To understand the indicator better, complement with

- Proportion of readmissions ***planned*** for further treatment or follow-up ***on total*** readmissions.

For tracer conditions for which process indicators are developed (see JCAHO and ACHS), verify **compliance with guidelines** relating to post-discharge care. For instance,

- Percentage of heart failure patients discharged home with written discharge instructions or educational material given to patient or caregiver at discharge or during the hospital stay addressing all of the following: activity level, diet, discharge medications, follow-up appointment, weight monitoring, and what to do if symptoms worsen. Each of the six discharge instruction elements can be assessed individually. However, completion of all six instruction categories is required for a patient to qualify as a numerator event for this measure
- Percent of patients without aspirin contraindications who are prescribed aspirin at hospital discharge

c. Related performance indicators:

- ***Length of stay*** (Core – efficiency)
  Expected relationship: If short length of stay reflects premature discharge, risk of readmission is increased. Moreover, shorter length of stay diminishes opportunities to educate the patient. On the country level, evidence indicates a there seems to be a country specific trade-off between length of stay and rate of readmission[16]. But the same international study indicates that patients with longer index hospitalization are at increased risk of readmission[17]. Length of stay may be a proxy for severity, frail status and complications.
- ***Patient satisfaction or experience with information and education*** (Core –Patient Centeredness)
  Expected relationship: As both early readmissions and patient survey scores on information and education are supposed to reflect –at least partly– the same underlying concept, they should be correlated negatively (higher readmission associated with lower satisfaction scores)
- ***Discharge preparation*** (Responsive Governance)
  Expected relationship: Effective screening and discharge planning has been shown to decrease the risk of readmission
- ***Patient satisfaction or experience continuity of care*** (Core –Patient Centeredness perspective on responsive governance)
  Expected relationship: Both indicators are influenced by the continuity and integration of care. As they shed different and complementary light on the same concept, they should be positively related.
- ***Discharge letter sent to GP within 2 weeks*** (Core –Responsive governance)

Expected relationship: We expect that some readmissions could be expected if the general practitioner support patient after return home.

d. Exogenous variables:

- Patient factors:
  - Severity of illness and comorbidities: current administrative database provide little information to evaluate the severity of illness, for instance left ventricular ejection fraction for congestive cardiac failure or forced expiratory volume for chronic obstructive airways disease[18].
  - Socio-demographic variables e.g. supplemental Medicaid coverage, socio-economic status[19]
  - Discharge destination (home or skilled care nursing facility or nursing home)
  - Selection bias:
    - If there is no linkage with the registry of death, only inpatients deaths are excluded. Patients who die after return home are still computed in the numerator but will obviously not be readmitted.
    - If a high proportion of patients is treated on an outpatient basis, hospitalized patients have an increased severity
- Environment factors
  - Managed care penetration, after care by general practitioners, home care. Effectiveness of home-based intervention strategies[20] and lower readmission rates for patients discharged to nursing homes or skilled care facilities indicate that post-discharge care has a strong impact on readmissions. Availability of alternative care resources may divert patients from readmission to hospital.

e. Quality improvement strategies:

In this section, hospitals should list strategies such as
- Guidelines on pre-discharge assessment, criteria for readiness for discharge
- Strategies to improve pre-discharge preparation, e.g. with nurse/social care worker team providing effective screening and discharge planning coordination of home care
- Increased cooperation with other care providers (e.g. general practitioners, home care services agencies)
- Scheduled follow-up appointments, diabetes or asthma clinics
- Patient brochures on how to care for the condition after return home, what are the symptoms to check for, whom to contact in case of concerns, etc.
- Day-hospital or hospital-at-home programs for specific conditions (e.g. congestive heart failure)

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Clinical effectiveness:
Readmission to higher level of care within 48 hours

1. Definition

a. Numerator: Total number of patients in the denominator who are *unexpectedly* (once or several times) transferred to a higher level of care (intensive care or intermediary care) within 48 hours (or 72 hours to account for week-end effect) of their discharge from a high level of care to an acute care ward

b. Denominator: Total number of patients in the acute care ward who were previously in an intensive care unit or an intermediary care unit and underwent an elective surgery

c. Exclusion criteria: Readmissions for further planned operations should be eliminated from the numerator (but difficult to identify with current information systems)

d. Risk adjustment: AGE, SEX

e. Comment: Several levels of intensive care are coexisting. It is therefore suggested to replace the term "intensive care" to "higher level of care" and to use acute care ward as reference points. The definition of "higher level of care" is left for local determination. The focus is not on patients entering the intensive care but the patients exiting the acute care ward to return to intermediary or intensive care.

2. Rationale – Justification for use

a. Burden:

Patients readmitted to the ICU have 2 to 10 times higher risk of death and longer length of stay and odds of [1]. Increased risk of death remains after risk-adjusting or controlling for severity[2,3].

b. Importance – Prevalence – Potential for improvement:

- The average readmission rate of 7% (range, 4 to 14%) has remained relatively unchanged in Both North America and Europe[4]. Readmission within 48 hours account for 22 to 30% of all readmissions to ICU.
- In a single site study[5] (US, university hospital, 5 years period) only 97 patients (0.9%) discharged from the ICU were readmitted within 48 hours.
- In Australia, the average readmission rate within 48 hours is 1.5% (decile 2=0.75%, decile 8=1.9%) within hospitals using ACHS quality indicator
- We found no data on readmission rates in East European country. Prevalence rate above may not be generalized to those contexts because of wide variations in equipment available in ICU and use of ICU on the patient care pathway.

c. Hospital impact:

- We found no study relating experience of hospital intervention aiming at reducing readmission to ICU.
- If readmission reflects premature discharge, we expect hospitals to be able to impact on readmission by supporting discharge decisions. Hospital impact is limited by the availability of ICU beds.

d. Validity:

Readmission to the ICU reflects technical quality of care in the ICU and more specifically of appropriate timing of discharge (CE[i]).

To a lesser extent –as we limit indicator to readmissions within 48 hours time frame– it reflects technical quality of care in hospitalization unit (CE[ii])

It may also reflect, access to care (RG[iii]) and optimal use of capacity (negative relationship) (Eff[iv])

Readmission to the ICU impacts on productivity (prolonged length of stay) (Eff[v]) and outcomes of care (higher mortality rate) (CE[vi])

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i Dimension: clinical effectiveness
ii Dimension: clinical effectiveness
iii Dimension: responsive governance
iv Dimension: efficiency
v Dimension: efficiency

Clinical effectiveness:
Readmission to higher level of care within 48 hours

Mixed rationale: Readmission occurring soon after ICU discharge is considered to reflect premature discharge and premature discharge was shown to be responsible for 22% to 42% of ICU readmissions. Concern for premature discharge has been raised because of steadily decrease in ICU length of stay and ICU bed rationing. The underlying assumption is that shorter length of stay is detrimental and increases risk for readmission. But, on the other hand, such practice also places patients at lower risk for iatrogenic complications. And, interestingly, patients readmitted to the ICU are those with longer initial length of stay even after adjustment for risk factors[6,7] and "we do not know whether continual ICU care would have avoided the clinical deterioration that prompted readmission[8]". To reduce impact of evolution of the disease and quality of care in the hospitalis ation unit and to focus on premature discharge, the indicator includes only return to ICU within 48 hours of discharge from ICU.

Strong face validity: It is a generally accepted and widely used indicator of quality in ICU. ICU readmission within 48 hours ranked by the Society of Critical Care Medicine's Quality Indicator Committee (1995) as the top indicator for judging ICU quality. The ACHS and the Maryland Quality Indicator Project currently use this indicator.

Low construct validity:

- Evidence readmissions to the ICU within 48 hours reflect premature discharge is limited:
  - Readmission within 48 hours occurs in significant proportion of patient (22 to 30% of readmitted patients in three published studies[9]).
  - In a single site study[10], only 32% of the readmissions within 4 days after ICU-discharge with any new or old pathology under insufficient control or insufficiently diagnosed were deemed preventable. This represent only 31 patients on a 4 years period in a 10 beds ICU. The other readmissions were due to unforeseeable complications of the underlying disease. The largest proportion of readmission deemed preventable was in the group with respiratory problems.
  - In a multi-site study in Austria, patients who oresented residual organ dysfuctions and were in greater need of organ support at ICU discharge had an increased risk of being readmitted[11].
- Evidence readmissions to the ICU within 48 hours reflect quality of technical care within ICU is mixed:
  - In a meta-analysis of studies published before 1997, there is no evidence that hospital readmissions are correlated with the overall quality of the hospital[12,13].
- Good evidence readmission to the ICU is associated with worse outcomes and more specifically with higher mortality rate, after adjustment or controlling for severity (see section "burden" above).

Conclusion

Strengths: widely accepted and used measure with strong face validity, limited burden of data collection

Limits: low validity because of mixed rationale and mixed evidence of its relationship with other outcome measures and process, difficult to distinguish between planned re-operations and or natural evolution of the disease and readmissions due to complications or premature discharge, difficult to adjust for clinical factors (e.g. severity of illness), difficult comparisons between hospitals or countries because of varying levels of availability of ICU beds and intermediate care beds, difficult to interpret because of bi-directionality of the indicator, low prevalence and hence difficult to identify statistically significant differences

3. To add meaning – Guide for interpretation

Screening tool		X									**Conclusive assm[nt]**

a. Direction and targets:

Usually, lower rates are better. However, an extremely low rate may indicate systematic failure to discharge patients in a timely fashion resulting in prolonged ICU stays or failure to readmit patients with deteriorating health status. Prolonged length of stay should be avoided also from a financial point of view and from an access point of view in a context of limited ICU beds capacity. Hence, patients should be discharged when their need for further ICU care is low and not nil and hence with

[vi] Dimension: clinical effectiveness

a small, but real, chance of returning[14]. Both low and high rates need to be scrutinized. No target rate has been established.

b. Stratification – alternative measures:

Complementary measures:

- Readmission rate at 72 hours
- Readmission rate during hospital stay, notwithstanding any limit on time
- Proportion of deaths occurring within ICU
  - Expected relationship: higher proportion of death in hospitalization units indicates that patients are not transferred rapidly when their health status deteriorates. It may explain low readmission rates.

Measures for further scrutiny – to investigate outliers:

- Audit a sample of medical records stratify for reasons for readmission to ICU based: diagnosis or problem similar or identical to the reason for initial admission, pulmonary problems, including inadequate pulmonary toilet and nosocomial pneumonia, cardiac conditions, bleeding, medication toxicities
- Identify multiple readmissions

c. Related performance indicators:

- ***Complications*** (Core – Safety)
  - Expected relationship: complications may be one of the factors explaining high readmission rates. For example, nosocomial pneumonia that developed subsequent to discharge from ICU is a frequently reported reason for readmission to ICU. On the other hand, if readmission rates are extremely low –indicating late discharge from ICU– patients are exposed to an increased risk of acquiring ICU-related complications such as resistant nosocomial infections.

Readmission rates make sense only when analyzed simultaneously with the following indicators built on the same patient population:

- ***Length of stay in ICU*** (median, 1st and 9th decile)
  - Expected relationship: lower length of stay is associated with higher readmission rates if it reflects premature discharge but it is associated with lower readmission rates if it reflects faster recovery and less complications because of high quality of care
- ***Mortality rate within ICU***/intermediate care unit/hospitalization unit
  - Expected relationship: higher mortality is associated with lower readmissions because of selection bias)

d. Exogenous variables:

Patient factors

- Selection bias: policies, practice style regarding admission to intensive care unit and beds availability
- Predictors of readmission not well studied nor reproducible
- Other predictors: age, severity of illness during the initial ICU admission, admission for upper gastrointestinal hemorrhage or neurological diagnoses, specific laboratory abnormalities, complications such as hospital-acquired pneumonia
- Medical patients are more likely than surgical patients to be readmitted. This factor should not influence the indicator because it is computed for specific tracer conditions. But it needs to be taken into account when aggregating results on various tracer condition (see hereunder questions to be addressed during 4th workshop)
- Measurement of risk factors require ad-hoc data collection

Hospital factors (partly under hospital control depending on hospitals autonomy in the country):

- Availability of ICU beds
  - Measure: average occupancy rate of ICU beds
- Availability of intermediate care beds
  - Measures: # intermediate care beds per ICU beds; occupancy rate of intermediate care beds

- Type of equipment/machinery available within ICU and within hospitalization units (e.g. monitoring and perfusion pumps)

e. Quality improvement strategies:

In this section, hospital should list strategies such as

- Improvements on very specific process of care such as careful neurologic assessment, meticulous attention to respiratory care transfer orders, prompt respiratory therapy on floor care
- Systematic readmission audits as part of a quality improvement program
- Guidelines for discharge decisions
- Improved collaboration between physicians and nurses in making transfer decision[15]
- Improved coordination of care between ICU and hospitalization units
- Specific follow-up for patients discharged from ICU (e.g. dedicated teams of respiratory therapists)

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Clinical effectiveness: Caesarean section

1. Definition

a. Definitions

Three definitions were originally proposed to the working group:

Version A: Primary Caesarean section delivery rate

Numerator: cases within the denominator with first time Caesarean section

Denominator: includes first time deliveries; excludes day-surgery patients & general exclusion criteria

Version B: Vaginal delivery after Caesarean section

Numerator: Number of vaginal birth in women with a diagnosis of previous Caesarean section

Denominator: All deliveries with a previous Caesarean section diagnosis in any diagnosis field

Version C: Total Caesarean section delivery rate

Numerator: Number of Caesarean sections

Denominator: All deliveries

b. Comments:

Though version A is theoretically preferred be indicator because efforts to reduce C-section delivery should focus on reducing the number of primary C-section delivery, it was decided to include only version C in the core set of indicators, to simplify data collection. Version A is highly recommended in the tailored set of indicators.

A strong selection bias is expected. For instance, in France, three levels of maternity are defined and the proportion of C-section is expected to vary widely between those levels. It will be crucial to identify such structural differences to compare only maternity treating patients with similar complexity.

2. Rationale – Justification for use

a. Burden:

- Negative impact: C-section is associated with higher rates of mortality and morbidity: deep vein thrombosis, pulmonary embolism, post-thrombotic syndrome, endometrisis and wound infections.
- Positive impact: Lower perinatal mortality, neonatal mortality, and serious neonatal morbidity for the planned Caesarean section group with specific conditions (foetus breech presentation); For subsequent delivery following C-section, reduce risk for maternal uterine rupture and neonatal trauma

For a financial point of view, C-section is more costly

b. Importance – Prevalence – Potential for improvement:

- C-section is the most common operative surgery in United States
- WHO targets a rate of 10-15%. In Nordic countries, the rate remains stable around this target while it steadily increased in United States, Canada, and United Kingdom
- Wide variations in C-section rates were observed and were not associated in with differences in perinatal and maternal mortality rates
- France: 16.3% in 1999 to 17.6% in 2001 (AUDIOPOG network) [1]
- England: 21.3% total, 17% primary C-sections and 67% repeat C-section, in 2000[2]
- Scotland: from 24% in 1998 to 20% in 2001[3]
- Austria: from 13% in 1996 to 15% in 1998 (17% in primigravidae)[4]
- Denmark: between 13.2% and 15.2% in five labour wards[5]
- Data above in Western European and North American contexts cannot be generalized to Eastern European countries without further evidence

c. Hospital impact:

- Experience of physician profiling and feedback proved useful to decrease C-section rates[6,7,8,9]
- BUT hospital is limited as, to some degree, patients' preferences can intervene in the use of C-section

d. Validity:

Reflects appropriateness of care, propensity to use invasive techniques, physician risk-aversion (Dim: CE – PS[i])
Extremely low rates (typically, under 5%) may reflect a lack of access to health care (Dim: RG[ii]).
Influences complications (PS[iii])
Impacts on costs (Dim: Eff[iv].)

High face validity: Very high consensus on use (mainly on primary C-section). C-section is one of the indicator most often used.
Indicators on C-section are included in the following performance assessment systems: Ontario, CRAG, ACHS, MarQIP, AHRQ, JCAHO. However, target rates are still somewhat controversial and hamper interpretation of the indicator. Debate is mostly centred on vaginal delivery following C-section.

Low construct validity:
- We found no evidence of association between Csection rates and other clinical effectiveness indicators, except for complications directly related to delivery (see section "burden")
- Limited evidence of lower Csection rates at sites where there is consensual meeting with the clinician staff, either after each duty-call or weekly

Conclusion:
- Strengths: most common operative procedure (in US); evidence of over-use and large potential for quality improvement in a number of settings; evidence of large variations in use of C-section; huge consensus on use of the indicator (face validity); WHO target to reduce C-section rate from 22% to 10-15%.

- Limits: difficult interpretation (bi-directional); selection bias expected; need to identify high-risk patients for which C-section is indicated (not identifiable from administrative database); non-clinical (cultural, socio-demographic) factors and patient preferences difficult to account for.

3. To add meaning – Guide for interpretation

Version A – not adjusted for risk factors

Screening tool			**X**							**Conclusive assm[nt]**

Version A with limited adjustment for risk factors

Screening tool							**X**			**Conclusive assm[nt]**

a. Direction and targets: bi-directional indicator, both low and high rates should be scrutinized. There is no agreement on what level the C-section rate should be.

In countries such as United States and United Kingdom, C-section has been identified as an over-used procedure and as such a lower rate is better. However, this may not be the case in all countries and in all hospitals. Great caution is especially required when interpreting the rate of vaginal delivery following C-section has no agreement because of the risk of performing. WHO targets to reduce C-section from 22% to 10-15%. In the US, Healthy People 2010 targets 15% of women giving birth for the first time and 63% of women with priori with C-section birth. Those rates are proposed at the national level and hospital specific targets may vary according to case-mix. They should serve only as reference points and not as norms that every hospital should attain.

b. Stratification – alternative measures:

[i] Dimension: clinical effectiveness and patient safety
[ii] Dimension: responsive governance
[iii] Dimension: safety
[iv] Dimension: Efficiency

Stratify C-section rates for deliveries at risk depending on complication type, dystocia, breech presentation, previous C-section, multiple pregnancy.

Background measures to better understand practice type:
- Proportion of elective (before labour) versus emergency C-section deliveries
- Proportion of failed vaginal delivery after C-section
- Epidural use
- Labor induction[10]

Complementary measures for further scrutiny – to investigate outliers:

- Proportion by category of urgency (immediate threat to the life of the mother or fetus, maternal or fetal compromise that is not immediately life threatening, mother need early delivery but no maternal or fetal compromise, delivery timed to suit the mother and the staff) (classification according to the National Confidential Enquiry into Perioperative Deaths NCEPOD)

Background measure to evaluate potential impact of C-sections: maternal and neonatal complications

c. Related performance indicators:

- Maternal and perinatal mortality rate (not included as indicator in the core neither in the tailored set of because of very low occurrence and hence lack of statistical significance but should be recorded as background information)
- Appropriateness of antibioprophylaxis following C-section (tailored–clinical effectiveness–antibioprophylaxis)
- Length of stay following delivery (stratified for vaginal or C-section birth) (core–efficiency–length of stay)

While C-section rates reflect appropriateness of the procedure (Should it be performed?), antibioprophylaxis reflects on technical quality of treatment (How was it performed?) and indicators supplement each other by giving a more complete picture of delivery management within the hospital.

d. Exogenous variables:

Hospital specific factors:
- Major determinants of overall C-section rates: dystocia, fetal distress, breech, repeat C-section
- Potential factors affecting risk for C-sections: maternal age, weight, height or body mass index, parity and previous C-section, gestation and birth weight
- Selection bias expected for clinical factors, e.g. as complicated pregnancies are transferred to tertiary centers, and for socio-demographic factors on public/private or not-for-profit/for profit status.
  - Clinical factors may not all be identified from administrative data and supplement risk factors based on birth records or patient record may need to be collected.
  - Limited correlation between rankings on unadjusted or adjusted rates and between rankings based on different risk adjustment techniques[11,12]. Reliable risk-adjustment techniques are available only for primary C-section[13].
  - Risk adjustment for nulliparity, birth weight, gestational age, (from birth record) and ICD-9 codes (from discharge abstract)[14].
- Physician age, sex, medical school, group practice, recent medico-legal claims
- Level of pediatric services and architecture of maternities[15].
- Method of financing (e.g. in Italy, public, semi-private with arrangements with the national health service, completely private[16])
- Availability of resources to monitor vital signs and realize C-section in emergency (may be a concern in very low resources settings and may trigger more C-section)

Area specific factors:
- Selection bias for socio-demographic factors on grounds of geographic localization.
- Socio-demographic factors related to C-section rate: age, insurance status, and, less notably, race and ethnicity[17]. Selection bias due to patient preferences may occur.
- Potential proxy: average income in the area and other census data such as average number of children per women

Country-specific factors:
- Cultural factors: to some degree, patient's preference[18] and litigation practices may intervene
- Financial incentives (not) to perform C-section, from physicians' point of view
- Extremely low rates of C-section may represent a lack of access to health care

- Potential proxies: average C-section rate in the country

e. Quality improvement strategies:

1. How is C-section monitored within hospital? With whom is the information shared?
2. Is there any written policy or guidelines on C-section?

A patient centered perspective on C-section addresses the role of informed consent, importance of patient choice and patient autonomy, physician responsibility in providing balanced information and honoring patient choice for elective repeat C-section[19].

A safety perspective on C-section addresses complications from C-section (and from vaginal delivery or failed vaginal delivery after C-section) and appropriateness of antibioprophylaxis following C-section.

4. Data collection issue

Questions to discuss during 1st workshop on PATH implementation:

- Potential sources of data: birth register, theatre register, delivery suite register, maternity case notes, patient records, administrative database (e.g. invoice data), discharge abstract, national specific register
- For detailed analysis of results, see methodology –and especially data collection tools– used for the National Sentinel Caesarean Section Audit

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Clinical effectiveness:
Admission after day surgery, for selected tracer procedures

1. Definition

a. **Numerator**: Number of patients undergoing a tracer procedure who have a discharge intention of one day

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

c. **Tracer procedures:** cataract surgery, knee arthoscopy, inguinal hernia, curettage of the uterus, tonsillectomy and/or adenoidectomy, cholecystectomy, tube ligitation, varicose veins – stripping and ligation

Those tracer procedures cover most of the specialties with a high volume and represent different level of innovativeness

The same tracer procedures are used for the indicator "rate of one-day surgery"

d. **Definitions:**
Identification of day-surgery patient is left for local determination. In some countries, day-surgery patients are attributed a specific code on admission and hence can easily be identified from database. In other countries, a special register will need to be set up.

Early readmission: patients not discharged. They are transferred directly from the day procedure facility to an overnight facility or indirectly through an observation facility first. They are not discharged between the end of surgery and admission to hospitalization unit.

Late readmission: Patients who were discharged following surgery and are-admitted within 72 hours after discharge.

e. **Exclusion criteria**: Because of data collection issues, and because it is more meaningful from a clinical point of view, only early readmission are included in this indicator. The patient is not discharged home before admission to inpatient acute care facility. Unplanned admission within 72 hours of discharge is proposed as a tailored indicator.

Only admission to the hospital where the day-surgery took place are included.

2. Rationale – Justification for use

a. **Burden**:
- Admission following day surgery is distressing for the patient
- Some admissions are caused by major complications such as perforated uterus or bowel or haemorrhage while others are caused by minor complications such as postoperative pain or delayed recovery.

b. **Importance – Prevalence – Potential for improvement**:
The prevalence rate is relatively low. A meta-analysis of 6 studies from 1990 to 1997 indicates a rate of 2.42%[1]. In more recent literature we identified rates ranging from 1.5%[2] to 3.4%[3]. Low prevalence rate is balanced by a high potential for improvement. Around 75% of admissions are justified by postoperative pain, nausea or social problems and thought to be preventable[4 5]

c. **Hospital impact**:
In response to indicator monitoring as part of the accreditation process of the ACHS, diverse actions were reported by 64% of organizations as a result of indicator monitoring[6]. Those actions include increased patient education, production of information leaflets, establishment of pre-anaesthetics clinics, alteration of surgical techniques, introduction of drug trials and a number of policy changes.

d. Validity:

Early admission reflects technical quality of surgery (CE[i]), e.g. appropriateness of patient selection for one day, clinical team ability, pain management, and adverse events (PS[ii]), etc.
Late admission (after being discharged) reflects patient education (PC[iii]) and continuity of care (RG[iv])
Admission following day-surgery negatively impacts on patient experience (PC[v])

Rationale: Most admissions following one-day surgery could have been avoided by proper patient education and patient selection. Many complications leading to admission are directly related to process of care (e.g. complications during surgery) and professional competencies.

We did not find any evidence of an association between admission following ambulatory surgery and process of care or outcomes of care.

Strengths: most admissions are though to be preventable, good face validity (rationale)
Limits: low prevalence rate, no evidence to support validity, only makes sense when related to rate of ambulatory surgery (as a proxy for patient case-mix)

3. To add meaning – Guide for interpretation

When combined to rate of one day surgery:

Screening tool					X						Conclusive assm[nt]

a. Direction and targets: Lower readmission rates are better.
Target by the (UK) Royal College of Surgeon for urology: < 3%
Targets by the (UK) Royal College of Anaesthetists[7]:

- < 2% admission for surgical reasons
- < 1% admission for anaesthetic/medical reasons (ASA 1 & 2)
- < 5% admission for anesthetic/medical reasons (ASA 3)
- < 1% re-admission after discharge

b. Stratification – alternative measures:

- Also report rate of readmission (patients re-admitted within 72 hours after discharge)
- Stratify by main causes for readmission[8] (surgical, anesthetist, social) or more specifically for most common causes of readmission such as pain, nausea and vomiting, no carer at home, minor complication, major complication during surgery, etc.

c. Related performance indicators:

- Rate of one day surgery (Core – efficiency)
  - Expected relationship: both indicators provide indirect measures of patient selection for day surgery. Day surgery rate provides information on the ***quantity*** of patients selected for day case procedure and admission following day surgery following provides information on ***quality*** of patient selection. If rate of one day surgery is higher, we expect more complex interventions or interventions on more frail patients to be realized it may explain why admission rate are higher. The objective is to achieve an optimal balance between high day surgery rate and low rate of admission after day surgery.

[i] Dimension: Clinical effectiveness
[ii] Dimension: Patient safety
[iii] Dimension: Patient centeredness
[iv] Dimension: Responsive governance
[v] Dimension: Patient centeredness

- Cancelled one-day surgery on day of operation for clinical reasons (Core – patient centeredness)
  - Expected relationship: Quality of pre-assessment impacts on both indicators. Timely identification of potential –clinical or social– problems should positively impact both indicators. Hence, we expect them to be positively related.

Rate of one-day surgery, cancelled one-day surgeries and admission following day surgery compose a cluster on quality of care in ambulatory surgery.

If specific surveys are organized for one-day surgery patients, scores on information and education, continuity of care, and pain management and global satisfaction should also be related to. Those surveys were not included in the set of indicators because of the burden of tool development of data collection but nevertheless they are extremely useful and their results should be incorporated into the general framework of performance measurement.

d. Exogenous variables:

- Patient factors may be decomposed into three categories: pre-surgery (e.g. age), during surgery (e.g. duration of surgery) and post-surgery (e.g. nausea). Patient factors are not properly understood nor do studies provide consistent results. Patient factors should not entirely be considered as exogenous variables. Adjustment for those patient factors would not only mask variations in case-mix. They would also mask variations in quality. Indeed, pre-surgery factors reflect appropriateness of patient selection for ambulatory care and during- and post- surgery factors are strongly affected by process of care.
- Hospital factors[vi]:
  - Equipment available, availability of drugs (for pain management and anaesthesia)
  - Freestanding vs. attached facilities[9]
- Contextual factors
  - Social support: carer at home
  - Proportion of interventions in hospital-affiliated, freestanding ambulatory centers and physician office in the area, serves as a proxy for patient case-mix
    - Expected relationship: with more office-based interventions supposed to drive more minor interventions out of the hospital and increase complexity of intervention within hospital or in hospital affiliated ambulatory centers). Hence, selection of tracer procedures need to take into account this factor and try to minimize the possibility of "concurrent" facilities and to focus on those interventions that require the use of fully equipped operating theatre.

e. Quality improvement strategies:

Open question: List strategies oriented towards:
- Patient selection and pre-operative assessment
- Patient waiting time
- Patient education
- Pre-operative anaesthesia
- Discharge criteria
- Implementation of clinical pathways to deal aggressively with problems such as pain, nausea, and vomiting
- Follow-up with nursing care
- Postoperative analgesia
- Earlier operating time for certain procedures

Those area of care evaluated using audit questions on structure and process such as developed by the [UK] Audit Commission[10] (appendix 2)

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Sheet 6: Antibiotic prophylaxis use, for selected tracer procedures

1. Definition

Core indicator: Antibiotics prophylaxis administration in accordance with guidelines (timing, dosage, choice of agent) for selected tracer operative procedures

An ideal "global" rate of (prophylactic) antibiotic consumption cannot be established. So the adequateness of prescribing and timing of administration need to be examined on a case-by-case basis, relying on widely accepted guidelines. A random sample of cases is selected to lower the burden of data collection.

Numerator:

- Version 1: Total number of audited medical records with evidence of over-use of antibiotics (too early and/or too long, too high dose, too broad spectrum)
- Version 2: Total number of audited records with evidence of under-use of antibiotics (too late, too early termination, too low doses, narrow spectrum where broad spectrum would have been required)

Denominator:

- Total number of medical record audited for a specific tracer operative procedure

Exclusion/inclusion criteria: 1) excluded if evidence of pre-operative infection; 2) more criteria to be determined

Tracer procedures: knee arthroplasty, cesarean section
Other potential tracer procedures: appendectomy, hysterectomy, total hip replacement, coronary artery bypass graft

For content validity of the set, both clean and contaminated procedures should be included in the core list of tracers. Preference is given to procedure with high prevalence rate.

This indicator is limited to a number of operative tracer procedures for which international guidelines on **antibiotic prophylaxis** are available. The tracer procedures will be defined in a further step of the project. For each selected procedure, medical records are sampled and audited by trained professional.

Ideally, for the core set, participants to pilot implementation of PATH should agree on international guidelines. In the tailored set, assessment against international guidelines can be completed by assessment against national or local guidelines.

Hospitals are advised to add some more tracer conditions (e.g. community-acquired pneumonia) in the tailored set. In the core set is limited to antibiotic prophylaxis before surgery. But a recent study[1] revealed over-consumption of antibiotics prophylaxis before surgery and under-treatment with antibiotics in internal medicine department. So that conclusion of the core indicators cannot be generalized to the whole sphere of antibiotics. Moreover, one study[2] suggests that the impact of active antimicrobial drug use programs is limited to the specific departments where they are implemented (no "halo effect"). Hence results could vary depending on tracer procedures and condition selected.

2. Rationale – Justification for use

a. Burden:

When administered in compliance with guidelines, antibiotic prophylaxis significantly reduces risk for ***postoperative infections***. Postoperative infections are associated with a high ***morbidity*** and ***mortality*** and are often very ***costly***.

Antimicrobial use is the major determinant in the development of resistance[3]. There is little doubt that careful antibiotics prescribing can curtail the emergence and reduce the prevalence of ***resistance***[4].

The increasing use of antibiotics is resulting in huge hospital expenditures. Antibiotics consumption is a major ***cost driver***. Average cost per patient day for antimicrobial agents is estimated to 10 USD- 40 USD in tertiary care medical school affiliated hospitals[5].

b. Importance – Prevalence – Potential for improvement:

- High variations in antibiotic use suggest potential for improvement. Inappropriate usage of antibiotics has been observed in a substantial proportion of inpatients[6]. For instance, recent studies in Turkey and Germany indicated that only respectively only 26% and 28 percent of surgeons were using appropriate prophylaxis in all ways (timing, dosage)[7,8]. Timing seems to be the major challenge.
- In hospitals, antibiotics are prescribed by almost all physicians so that programs to improve quality of prescribing need to be agreed on throughout the hospital

c. Hospital impact:

- Antibiotics use programs have proved useful in different settings[9,10,11]

d. Validity:

Reflects Antibiotics utilization may represent quality of care, risk avoidance, access to services and equity. It is also a determinant of cost efficiency.

Reflects technical quality, organization of care (especially for timing), safety procedures (CE– PS[i])
Strongly impacts on complications (PS[ii]) and costs (Eff[iii])

Strong face validity: Monitoring antibiotics administration is a widely accepted practice to control antimicrobial resistance. It is used in a large number of settings and included in accreditation standards.

Previous use: JCAHO(planned implementation)[iv] and CMS[v]: prophylactic antibiotic received within 1 hour priori to surgical incision, prophylactic antibiotic selection for surgical patients, prophylactic antibiotics discontinued within 24 hours after surgery end time)

Construct validity: We did not find any study relating an indicator of appropriateness of antibiotic administration with indicators of process or outcomes of care. However, at the patient level, perioperative antibiotic prophylaxis has been demonstrated to significantly decrease the risk of wound infection.

Conclusion:

- Strengths: appropriate antibiotics prescription is a crucial public health issue and should be covered by at least one indicator for content validity of the set of indicators as a whole, strong face validity
- Limits: burden of tool development and data collection, covers only a limited area of antibiotic use

3. To add meaning – Guide for interpretation

Screening tool								X			Conclusive assm[nt]

a. Direction and targets: Higher rate of appropriateness is preferred.

b. Stratification – alternative measures:

Complementary indicators,
by patient type and specialty (intensive care unit / surgical / obstetrics / medical)

- Number of *guidelines* on antibiotics updated during the previous year (or 5 years)
& Number of procedures for which antibiotics guidelines disseminated within the hospital

[i] Dimension: clinical effectiveness and patient safety
[ii] Dimension: Patient safety
[iii] Dimension: Efficiency
[iv] Joint Commission on Accreditation of Healthcare Organizations
[v] Centers for Medicare and Medicaid Services

Rationale: Diffusion of updated guidelines is a crucial strategy to control antibiotics consumption and resistance.

- Antibiotics use ***density (penetration index[12])***:
  - Defined Daily Doses / 1000 patient days
  - Cost / 1000 patient days

  Rationale: This measure provides an overall picture of antibiotics consumption in the hospital. However, it is very difficult to interpret because of variations in case-mix.

- Antibiotics use ***evolution***: % variation in use density compared to year before and 2 years before
  Rationale: Measures on antibiotics use density are difficult to interpret in absence of adjustment for case-mix. By restricting comparisons to hospital's past performance, patient factors are limited. Increased use of antibiotics may be explained by variations in case-mix, increased resistance incidence or change in practice.

- Antibiotics ***specificity***:
  Defined daily dose of vancomycin and/or third generation cephalosporins divided by total defined daily dose of antimicrobials
  Rationale: Evidence suggests that control of broad-spectrum antibiotics decreases incidence of antibiotic-resistant bacteria[13]. Intensive vancomycin use may flag high incidence of resistance

c. Related performance indicators:

- ***Nosocomial infections*** by type (Tailored – Safety)
  - Nosocomial pneumonia
  - Urinary tract infection
  - Primary bloodstream infection

- **Percentage patient with length of stay above a predefined** (for identical tracer procedures)
  (Alternative definition for length of stay – Core – Efficiency)
  Expected relationship: If antibiotics prophylaxis prevents complications, it will ultimately average reduce length of stay.

d. Exogenous variables:

- ***Patient-specific factors***
  - Because we rely on audit of medical record, patient specific factors are explicitly taken into account when computing appropriateness indicators.
  - Case-mix strongly influences alternative indicators –such as Defined Daily Doses per 1000 patient days– and strongly challenges interpretation. For this reason, we suggest to stratify alternative indicators by specialty / department and to focus on time trends (relative increase or decrease in consumption).
- ***Hospital specific factors:***
  - Local bacterial ecology – resistance
  - Degree of Hospital autonomy to order drugs
- ***Country-specific factors:***
  - Financial incentives associated with drug administration in hospitals (retrospective or prospective reimbursement of drugs)

e. Quality improvement strategies:

Open question: List strategies to improve antibiotics administration such as:

- Diffusion of ***updated*** guidelines, local prescribing consensus with all prescribers, pocket size prescribing guide regularly updated
- Restricted prescription policies for most expensive antibiotics (with or without control; e.g. oral validation by an expert or the institution's infectious diseases specialist)

- Limited susceptibility testing
- Physician profiling and feedback, assessment of prescribing by regular audits
- Antimicrobial agents team, infectious disease consultation service

List also all strategies oriented towards

- Improve awareness on cost of antibiotics
- Physician training
- Pharmacist involvement

4. Data collection issue

Steps for data collection:

1. Selection of guidelines
2. Training of data abstracters (to increase knowledge of guidelines)
3. Random sampling of medical records (e.g. for each tracer procedure)
4. Data abstraction from medical records and judgment on appropriateness of antibiotics use

Operationalization of definition:

- Select operative procedures for which guidelines are widely accepted
- Define population: inclusion / exclusion criteria
- Specify sampling procedure and number of medical record audited
- Assess cost (burden of data collection)

To compute indicators:

- How to aggregate indicators for different tracers
- How to aggregate different level of appropriateness (under-use / over-use / inappropriate molecule)?

Other questions:

- Which complementary indicators are currently measured / could be measured / should be measured?

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[1] Gyssens IC, Kullberg BJ, van der Meer JW. Clinical results and costs due to improved antibiotics policies (article in Dutch). Ned Tijdsrchrift Geneeskunder 1999;143(47):2361-2364.

[2] Kern WV, Rose AD, Hay B, Muche R, Frank U. Antimicrobial expenditures and usage at four university hospitals. Baden-Wurttemberg Interuniversity Study Group. Infection 2001;29(3):127-137.

[3] Gyssens IC. Quality measures of antimicrobial drug use. International Journal of Antimicrobial Agents 2001;17(1):9-19.

[4] Gould IM. A review of the role of antibiotic policies in the control of antibiotics resistance. Journal of Antimicrobial Chemotherapy 1999;43:459-465.

[5] Kern WV, Rose AD, Muche HR, Frank U. Antimicrobial expenditures and usage at four university hospitals.

[6] Kern WV, Rose AD, Muche HR, Frank U. Antimicrobial expenditures and usage at four university hospitals.

[7] Hosoglu S, Sunbul M, Erol S, Altindis M, Caylan R, Demirdag K, et al. A national survey of surgical antibiotic control in Turkey. Infection Control and Hospital Epidemiology 2003;24(10):758-761.

[8] Van Kasteren ME, Kullberg BJ, de Boer AS, Mintjes-de Groot J, Gyssen IC. Adherence to local guidelines for surgical antimicrobial prophylaxis: a multicentre audit of Dutch hospitals. Journal of Antimicrobial Chemotherapy 2003;51(6):1389-1396.

[9] Gould IM. A review of the role of antibiotic policies in the control of antibiotics resistance. Journal of Antimicrobial Chemotherapy 1999;43:459-465.

[10] Saizy-Callaert S, Causse R, Furhman C, Le Paih MF, Thébault A, Chouaïd C. Impact of a multidisciplinary approach to the control of antibiotic prescription in a general hospital

[11] Hospital antibiotic control measures in the UK. Working party of the British Society for Antimicrobial Chemotherapy

[12] Marchiset-Ferlay N, Pernot C, Guenfoudi MP, Albuisson, Garnier N, Lazzarotti A, Durnet-Archeray MJ, Chavanet P. Implementation of a monitoring system for the consumption of antibiotics in the Dijon university hospital (in French). Médecine et Maladies Infectieuses 2003;33:84-92.

[13] Murty R. Implementation of strategies to control antimicrobial resistance. Chest 2001;119(2 suppl.):405S-411S.

Sheet 7: Sentinel events

Definition by the JCAHO (www.jcaho.org):

- *"A sentinel event is an unexpected occurrence involving death or serious physical or psychological injury, or the risk thereof. Serious injury specifically includes loss of limb or function. The phrase, "or the risk thereof" includes any process variation for which a recurrence would carry a significant chance of a serious adverse outcome.*
- *Such events are called "sentinel" because they signal the need for immediate investigation and response."*

Categories identified by the JCAHO:

- Patient suicide
- Op/post-op complication
- Wrong-site surgery
- Medication error
- Delay in treatment
- Patient death/injury in restraints
- Patient fall
- Assault/rape/homicide
- Transfusion error
- Perinatal death/loss of function
- Patient elopement
- Fire
- Ventilator death/injury
- Infection-related event
- Anesthesia-related event
- Medical equipment-related
- Maternal death
- Infant abduction
- Utility systems-related event
- …

***Very high importance*:** Sentinel events are very important because they have extremely strong negative impact on patients even though prevalence is very low.

Extremely low reliability and hence validity: The main concern with this indicator is the extremely low reliability. Because of this issue, directionality of the indicator is unclear. Less sentinel events are, of course preferred. The target should be that no sentinel events occur. However, practically, it is unclear how to interpret no or extremely few sentinel events ***reported***. It may mean either that no sentinel events occurred either that the sentinel events that occurred were simply not reported, because there is no formal procedure to report sentinel or that workers are not educated/motivated/confident to report them or that they are simply not identified. This issue is also addressed for the indicator on staff percutaneous injuries.

Clearly, this indicator must only be used as a screening. It is not conclusive at all. This means that

1. Number of adverse events should not be used for comparisons between hospitals. The only "norm" it can be compared to is a target of zero occurrence. It only makes sense if reporting procedures are clearly indicated.
2. It could be completed with an indicator on the proportion of sentinel events for which there is written evidence that measures were taken in order to understand the causes of the sentinel event and to corrective measure or an action plan implemented to avoid further occurrence of such event.

This indicator was included in the core list, regardless of low reliability because it sends a strong signal that such events need to be closely monitored and trigger corrective preventive measures.

Descriptive sheets for PATH core set Efficiency indicators

A descriptive sheet was designed for most indicators proposed in the core set. It contains operational definition, rationale and justification for use, and a guide for interpretation. The descriptive sheets aims at supporting a final selection of evidence-based indicators and at supporting hospitals in building indicators and using their data to identify potential quality improvement initiatives.

Sheet 1: Day surgery rate, for selected tracer procedures
Sheet 2: Length of stay, for selected tracer conditions or procedures
Sheet 3: Inventory in stock
Sheet 4: Intensity of use of surgical theatre

Efficiency: Day surgery rate, for selected tracer procedures

1. Definition

a. **Numerator**: Number of patients undergoing a tracer procedure who have a discharge intention of one day

b. **Denominator**: Total number of patients undergoing a tracer procedure

c. **Tracer procedures**: cataract surgery, knee arthoscopy, inguinal hernia, curettage of the uterus, tonsillectomy and/or adenoidectomy, cholecystectomy, tube ligitation, varicose veins – stripping and ligation

Those tracer procedures cover most of the specialties with a high volume and represent different level of innovativeness

The same tracer procedures are used for the indicator "admission after one-day surgery"

d. **Definitions**: There is a clear need for defining "day surgery" to increase comparability of day surgery statistics.

- "Day surgery is the admission of selected patients to a hospital for a planned surgical procedure, returning home on the same day. True day surgery patients are day case patients who require full operating theatre facilities and/or general anaesthetic, and any day cases not included as outpatient or endoscopy (…) Minor day cases are day case patients who generally do not require full operating theatre facilities or general anaesthetic for example, patients having endoscopies or coloscopies and many, but not all, pain relief procedures and minor surgery[i]. "

- Alternative definition: "Day surgery is defined as planned surgical procedures carried out in a hospital, where the patient does not stay for more than twelve hours". Cut-off may be extended to 23 hours in special extended care facilities.

Difficulties regarding uniform definitions are partly overcome by proper selection of tracer procedures: focusing on "true day surgery" and avoiding too broad surgical categories. Moreover a glossary of terms should be developed to define outpatient – ambulatory – one-day surgery. All indicators based on one-day surgery (admission following day surgery, rate of day surgery and cancellation of day surgery) must rely on the same definitions, tracer procedures and inclusion/exclusion criteria.

It was decided that determination of day-surgery patient is left for local determination. In some countries, day-surgery patients are attributed a specific code on admission and hence can easily be identified from database. In other countries, a special register will need to be set up.

e. **Inclusion/exclusion criteria**: Limit to elective procedures, exclude emergency procedures and patients who died.

2. Rationale – Justification for use

a. **Burden**:

- The main justification for day surgery is to save health care resources but also to reduce the time that patients are sick, and to facilitate their recovery[1].

b. **Importance – Prevalence – Potential for improvement**:

- Day surgery has been a priority area for hospital reforms in the recent years.
- Rate of one-day surgery for Western European and North American countries are described in appendix.
- In the countries studied, some procedures have little potential for improvement because of the already very high rate of one-day surgery. However, this observation cannot be generalized to Eastern European countries in the absence of statistics and could be relevant.

[i] NHS Department of Health. Day surgery: operational guide. 2002available at www.doh.gov.uk/daysurgery

- In other cases (e.g. dilatation and curettage of the uterus or knee arthroscopy), the variation between countries is remarkably high and indicates large potentials and/or differences in reporting.
- In our survey in participating countries on importance and relevance of indicators and data availability, Slovakia noted that most hospitals are just starting with one day surgery, because previously hospitals were reimbursed according to occupied beds and days. Lithuania noted that day surgeries are currently under development and in introduction process. Few surgical cases (ophthalmology) are treated as day surgery; others will be in use in a few years.

c. Hospital impact:

- Poor day surgery rates may be explained by (1) insufficient day surgery capacity, (2) physician's practices, (3) poor use of management of its day surgery unit.

d. Validity:

(1) Reflects cost-efficiency and appropriateness (Dim: Eff[ii])
(2) Reflects innovativeness and diffusion of technologies (Dim: CE[iii])
(3) Impacts on outcomes (Dim: CE) and patient satisfaction (Dim: PC[iv])
(4) Requires smooth organization of care around patient and impacts on patient flow (Dim: PC)

Strong rationale:

(1) Dimension efficiency – Cost-efficiency and optimal use of capacity:
- In a context of limited bed availability, increased one-day surgery will release inpatient beds for major cases and hence improve access and reduce waiting times
- Inpatient days are highly resource intensive.
- Cost-effectiveness of one-day surgery was demonstrated for a number of surgical procedures and different context

(2) Dimension clinical effectiveness – Innovativeness and diffusion of technologies:
- It has been the recent improvement in anaesthetic drugs and procedures and in surgical techniques that allowed more operations to be completed as day surgery cases. A prerequisite for increased use of day surgery is the development of less invasive surgery, such as laparoscopy and endoscopy. Pain management and anesthesia techniques are pivotal to successful day surgery.
- The degree to which this indicator reflects innovativeness depends on choice of tracer procedure. For instance, "physicians that provide laparoscopic cholecystectomy in a day surgery setting can be classified as innovators. The executers of cataract surgery in day surgery can be classified as early adopters. The surgeons who did not execute curettage and dilatations of the uterus in 1999 may be characterized as laggards".

(3) Patient centeredness perspective on clinical effectiveness – Outcomes and patient satisfaction: (faster recovery, focus on pain management)
- Risk of hospital acquired infection is reduced
- Patient surveys indicate that the great majority of patients prefer to recover home rather than staying overnight in hospital: less impact on daily life, less
- Day surgery is indicated for children as overnight admission is often the most distressful part of visiting hospital for them[2].

(4) Patient centeredness – Organization of care:
- The necessity to adapt and to transform the traditional hospital is a major challenge for the development of ambulatory surgery[3]. In ambulatory surgery the priorities are reversed as the organisational priorities are reversed and the patient is truly the focus of the organisation. In a traditional hospital, the patient is certainly central to diagnostic and therapeutic preoccupations but not the organisation. Organisation is centred on resources: physicians, nurses and equipment.
- Cancellation of surgery due to emergency pressures in a dedicated day surgery unit is unlikely.

[ii] Dimension: Efficiency
[iii] Dimension: Clinical effectiveness
[iv] Dimension: Patient centeredness

Efficiency: Day surgery rate, for selected tracer procedures

Great consensus on use: In our survey of 11 countries on indicators perceived importance and relevance and data availability, it is used in all 11 respondents' hospitals and by central authorities in 7 out of 10 countries. Not used in Slovakia, Denmark and Albania.

Strengths: very strong rationale

Limits: no standard definition or measurement of day surgery across countries, difficult to interpret because it is multi-faceted and reflects and impacts on several dimension of performance, hospital influence is limited by availability of technology

3. To add meaning – Guide for interpretation

When combined to rate of admission after day surgery:

Screening tool								**X**			**Conclusive assm^{nt}**

a. Direction and targets: Higher rate is better as long as safety is not compromised.

High rates of day surgery are indicative of higher efficiency. But many patients are not suitable for management as day case. Exceeding some point could put patients at risk or require very intensive use of resources that would not be cost efficient any more.

NHS Executive target for day surgery: 60% of all elective surgery.

b. Stratification – alternative measures:

- Background measures to assess optimal use of day case facility and identify bottlenecks:
  - Occupation rate of the day case unit operating theatres
  - Bed occupancy rate: (weighted) throughput per beds per month (bed means patient recovery space and includes trolley and reclining chairs). In the UK, cases are weighted so as to reflect different workload: true day case and inpatients: 1.0; minor day cases: 0.5; pre-operative assessments: 0.1[4].
  - Staffing ratio: (weighted) throughput per full-time equivalent member of staff per month
  - True day surgery patients treated in day surgery units as a percentage of all day-case patients (including both true day cases and minor cases)

c. Related performance indicators:

- Median length of stay
  - Expected relationship: both indicators question and reflect on the optimal use of (bed) capacity. They are both influenced by similar factors (financing of hospital days, bed occupancy rate, availability of alternative ressources).
- Admission following day surgery
  - Expected relationship: both indicators provide indirect measures of patient selection for day surgery. If rate of one day surgery is higher, we expect more complex interventions or interventions on more frail patients to be realized and may explain higher why admission. The objective is to achieve an optimal balance between high day surgery rate and low rate of admission after day surgery. Day surgery rate provides information on the ***quantity*** of patients selected for day case procedure and admission following day surgery following provides information on ***quality*** of patient selection.

If hospital is performing patient surveys for this specific patient category, results on patient satisfaction or patient experience could be included in the framework.

d. Exogenous variables:

- Patient factors
  - Anaesthesic risk (can be measured with ASA risk index)
  - Most common risk factors: elderly, comorbid chronic conditions such as insulin-dependent diabetic patients, patients on treatment with oral anticoagulants
  - Patient preferences and financial incentives (mainly for international comparisons)
  - Distance from hospital
  - Support at home: family and/or social support, availability of home care
- Hospital factors (degree of hospital influence depends on the context):
  - Availability of inpatient beds
    - Measure: Bed occupancy rate
  - Availability of technology
  - Accommodation and facilities dedicated to (extended-) day surgery
    - Measure: binary variable (Yes/No)
  - Operating theatres dedicated to day surgery (alternative: operating list made up entirely of day cases)
    - Measure: binary variable (Yes/dedicated lists/No)
- Country or regional factors
  - Financial support available to develop day surgery
  - Financial incentives from the point of view of hospital, physicians and patients

e. Quality improvement strategies:

- Investments in equipment and dedicated facility and operating theatre –or operating list– for day surgery
- Guidelines on patient selection for day surgery
- Patient education leaflet to increase acceptance of day surgery
- Training of physician and nurses
- Increased coordination with home care agencies
- Hospital – hotel facility for patients living far away from hospital or patients with no scoail backup

Appendix: prevalence and evolution of day surgery in European countries

Table 1: Ratios of ambulatory surgery for selected procedures (in Lathouwer and Poulier 1998)

	Belgium	Denmark	Finland	Germany	Ireland	Netherlands	Portugal	UK	US	Canada
Year	1995	1995	1995	1994	1995	1995	1995	1995	1994	1995-6
Knee arthrscopy	30.6	44.9	6.1	45.5	50.7	77.6	2.5	59.8	93.5	91.3
Extraction of teeth	60.5	78.3			65.1	61.8	78.3	42.5	67.4	41.4
Cataract surgery	28.3	72.7	33.3	24.4	11.1	29.3	0.3	37.1	96.9	94.5
Inguinal and femoral hernia	7.1	20.3	15.9	5.2	2.6	22.8	5.9	25.3	84.4	44.3
Dilatation and curettage of uterus	42.7	45.3	51.6	28.0	39.9	45.8	33.7	57.6	92.5	90.3
Tonsillectomy	32.4	2.3	3.0	N/A	0.4	85.0	2.0	2.4	89.3	50.4
Excision of breast lump	15.3	37.7	12.6	11.4	60.9	42.2	14.4	47.6	93.9	88.2
Total for 18 most common procedures	39.2	41.3	32.2	N/A	37.6	57.8	10.4	46.3	93.2	79.2

Table 2: Reported statistics on twelve day surgery procedures in the Nordic countries in 2001 (in NOMESCO)

Procedure group	Denmark	Finland	Iceland	Norway	Sweden
Decompression of median nerve	76	83	67	90	95
Cataract surgery	91	85	81	87	95
Tonsillectomy and/or adentoidectomy	18	55	36	41	48
Repair of hernia	48	38	26	55	67
Laparoscopic cholecystectomy	9	3	6	14	10
Currettage and excision of endometrium	66	62	82	62	76
Termination of pregnancy	75	84	98	96	87
Female sterilization	69	73	86	82	83
Removal of implanted devices from bone	47	50	46	34	61
Knee arthoscopy	70	63	37	73	91
Arthroscopy on the knee meniscus	68	71	82	83	93
Ligature and resection of veins of leg	44	48	27	75	90

Table 3: Day surgery growth in the UK: Day case surgeries as a percentage of all elective surgical admissions in the UK (Jarrett PEM 1997 in Mitchell 1999)

Date	**Day cases (%)**
1989/90	34
1990/91	37
1991/92	41
1992/93	45.5
1993/94	48
1994/95	52

[1] Minatti WR, Perriello J, DiCaprio M, Pierini L, Mendiburo A. Postoperative outcomes in ambulatory surgery. Are they the same, worse, or better? Journal of Ambulatory Surgery 2002;10:17-19.

[2] NHS Department of Health. Day surgery: operational guide. 2002 available at www.doh.gov.uk/daysurgery. P 5.

[3] De Lathouwer C. Ambulatory surgery: an organisational and cultural revolution, a social and political challenge. Ambulatory Surgery 1999;7:183-186.

[4] Audit Commission. Day surgery. Acute Hospital Portofolio – Review of National Findings 2001;4:17 p. Available on www.audit-commission.gov.uk

Efficiency:
Length of stay, for selected tracer conditions or procedures

1. Definition

a. **Definition**: Median number of days of hospitalization (admission and discharge date count for one day) for selected tracer conditions and procedures

b. **Tracer conditions**: This indicator is limited to a number of tracer procedures. A specific indicator is computed for each tracer procedure. All indicators are then aggregated in a global indicator.

Preference is given to elective, schedules procedures

Core tracers: uncomplicated delivery, hysterectomy

Tailored tracers: stroke (limited to one specific code to limit to a more homogenous group of patients), acute myocardial infarction, hip fracture

In the tailored, a global indicator on elective surgery may be incorporated as a tailored indicator.

Tracer condition is identified using only the principal or primary diagnosis code

c. **Exclusion criteria**: patients transferred to / from other hospitals

Transfer rates and – ideally – destination should be reported simultaneously as a proxy for case-mix.

d. **Comments**: In hospitals with long-term care units such as geriatric care, only days in high level of care (intensive, intermediary or acute care) should be included in the calculation of the indicator.

e. **Complementary measure**: Length of stay before the first procedure, for elective surgery

2. Rationale – Justification for use

a. Burden:

Negative impact of **long stays**:

- For the society: financial burden (hospital settings are resource-intensive settings), if limited availability, hinder access to hospital care (beds occupied by patients who could be taken care of in other context while patients who would require hospital care have no access)
- For the hospital: financial burden (if global budget or fee per admission)
- For patients: financial burden (if significant patient intervention in hospitalisation cost), increased exposure to hazards (risk of nosocomial infections)
- More specifically, for diabetes patients, The National Service Framework for Diabetes (UK)[1] established a standard for "care of people with diabetes during admission to hospital". It is motivated by the fact that people with diabetes "*frequently describe poor experience of inpatient care, particularly in relation to (…) delays in discharge resulting from their diabetes, especially when diabetes was not the original reason for their admission*". [1]

Negative impact of **short stays**:

- For the society: transfer of cost to the community
- For the hospital: financial burden (decreased income in a fee per day system), increased case-load (only more severe patients in acute phase remain in hospital)
- For patients and relatives: less time for discharge preparation (fee has to "hurry up"), burden on relatives when back home (e.g. time off required for carer), in some systems transfer of costs to patients ("insurance" does not cover ambulatory care as well as hospital care)
- Premature discharge could be prejudicial to patient (and eventually induce readmissions)

b. Importance – Prevalence – Potential for improvement:

In many countries, policy makers are debating surrounding the over- or under- bedding. In EU countries, we observe a definite trend towards shorter stays but have not attained US levels. Numerous studies on appropriateness of hospital days indicate a great frequency of inappropriate days (see here-under).

[1] http://www.doh.gov.uk/nsf/diabetes/

A special focus on diabetes patients is proposed in the Tailored set because diabetes is a growing public health concern, diabetes patients are likely to stay twice as long in hospital as patients without diabetes, and increased length of stay can be curbed by proper glucose control during hospitalization[2].

c. Hospital influence:

The literature reports several successful experiences for reducing length of stay, such as diffusion of length of stay guidelines[3] or development of clinical pathways[4] and re-engineering of the organization of care, without any negative impact on patient outcomes. Hospitals participating to the Australian National Demonstration Program on best practice in elective surgery reduced length of stay on the average by 6% overall[5]. More specifically, for diabetes patients, strategies to reduce length of stay include diabetes specialist nursing services[6], diabetes nurse advisor[7], and consultation by diabetes team[8].

Hospital influence is limited by availability of alternative resources in the community.

d. Validity:

(1) Direct measure of efficiency and reflects appropriateness (Dim: Eff)

(2) Reflects integration and coordination of care with the community, discharge preparation (Dim: RG)

(3) Reflects smooth internal process (coordination of care within organization) (Dim: PC)

(4) To a lesser extent, reflects complications, pace of recovery (Dim: CE)

(5) In a context of under-supply of inpatient beds, reflects access (Dim: RG)

(6) Impacts on patient experience

Very strong rationale:

(1) Efficiency: to maximize use of limited resources, adequate level of care and resources use to patient needs (same rationale as for indicator on day surgery rate). Effect of prospective payment on decline in length of stay is a good illustration of the rationale behind attention to length of stay and the high cost associated with each inpatient days.

(2) Integration and coordination of care: patients requiring alternative services should have access to them (e.g. nursing home, home care, etc.) otherwise hospitals will have to compensate.

(3) Smooth internal process:

(4) Clinical effectiveness:
- Patient are less exposed to hospital hazards (nosocomial infection): compare benefits and risks of hospitalisation
- Shorter stay could indicate more effectiveness in treating patients.
- Longer stays could indicate complications
- Premature stay could be prejudicial to patient (and induce readmission)
- *More specifically, for diabetes patients*: They are at increased risk of complications. A growing body of the literature strongly recommends the concept that optimising glycemic control in the hospital setting would result in improved outcomes, particularly among patients hospitalised for cardiac disease, stroke, infections and surgical procedures[9] and glycemic control translates into shorter lengths of stay.

(5) Access: In context of under-supply of beds, the less time patients spend in hospital, the more patient can have access to in-hospital care

(6) Patient satisfaction:
- Most patients prefer to recover home.

Extremely high consensus on use (result of the survey in participating countries):

- Used in all hospitals and by most central authorities and by central authorities in 7 out of 10 countries. Not used in Slovakia, Denmark and Albania
- Case-mix adjustment for age and sex in the Albanian hospital and with APR-DRGs in Belgium
- It is considered appropriate for longitudinal in hospital comparisons, national comparisons and international comparisons by all respondents.

Mixed evidence of construct validity – demonstrated relationship with other performance indicators:

- Clinical outcomes
  - Readmission: mixed evidence, slightly in favour of greater risk for readmission with lower length of stay. It probably depends on how short are short stays –see illustration for newborns– and discharge preparation. Length of stay can be shortened with no higher risk for readmission if patients are discharged safely with good education, follow-up care, and in a stable condition. But several studies still indicate a higher readmission rate for patients with longer length of stay. This contra-intuitive finding may be due to the fact that patient factors are not properly accounted for and longer length of stay can be perceived as a proxy for severity during the index hospitalisation[10].
- Process of care
  - Hospital pathways and guidelines appear successful in decreasing length of stay with comparable clinical outcomes[11],[12]. However, in some instances[13], lower lengths of stay resulted in increased readmissions.
  - More specific elements of process of care have also been linked with length of stay. For instance, rapid antibiotic delivery and appropriate antibiotic selection reduce length of hospital stay of patients with community-acquired pneumonia[14].
  - In an analysis of 11 operations, the factors generating the highest risks for a prolonged length of stay were the intra-operative process of care (intra-operative blood transfusion, operative time, return to the operating room) and adverse events[15].
- Patient satisfaction
  - We found one study[16] linking length of stay following delivery with patient satisfaction. Patients with shorter stays were more likely to perceive their stay as "too short". Moreover, the six measures of satisfaction were lower in the patients who perceived their stay as too short. However, difference in satisfaction according to the length of stay was very small. The authors interpret this result as suggesting that patient's satisfaction with care may depend more on whether patients perceived length of stay as adequate than on the absolute length of stay.

Conclusion:

Strengths: very strong rationale, low burden of data collection

Limits: difficult to interpret because it may reflects and impact on many different sub-dimensions of performance, difficulties to adjust for differences in case-mix

3. To add meaning – Guide for interpretation

When combined with transfer rates and readmission rates and for specific tracer conditions and procedures only

Screening tool			X							**Conclusive assm^{nt}**

a. Direction and targets

- From a point of view of indicator of efficiency, shorter is better.
- From a point of view of clinical effectiveness, shorter is better if it indicates rapid recovery but no premature discharge or in unstable condition. Shorter length of stay should not jeopardize safety.
- Both low and high length of stay should be scrutinized

b. Stratification – alternative & complementary measures:

Stratification

- BY Destination: home, nursing home or rehabilitation care
  - Rationale: delayed discharge may occur because of lack of available beds in nursing homes or rehabilitation facility.

Alternative indicators:

- Outliers: percent patients with length of stay higher than a predetermined threshold (e.g. national average + variance)
  - Rationale: outliers are more specific indicators for clinical indicators than median length of stay as they indicate complications or sentinel events
  - Other potential causative factors are patient severity and lack of long-term beds in the area
- Percent of elective surgery on day of admission
  - Rationale: Day of surgery admission is a critical performance indicator in measuring the efficiency and effectiveness of a pre-admission service[17]. Hospitals have definite impact on this indicator. In the Australian National Demonstration Hospital Program on best practice in managing elective surgery participating hospitals significantly increased rate of admission on day of surgery. Quality pre-admission services positively impact on both rate of day surgery and rate of admission on day of surgery. Both strategies have proved cost-effective.

In the tailored set:

- Tracer-specific length of stay adjusted for differences in case mix
- Hospital-wide average length of stay adjusted for case-mix (compare the global average length of stay to expected length of stay according to the DRG structure of the hospital and)

Complementary measures:

- **Transfer rate**:
  - Rationale: transferred patients are excluded from the base indicator. This measure indicates if the median length of stay is computed on a representative sub-set of patients. It is also a proxy for case-mix. We can expect hospitals admitting a large proportion of patients from other acute care settings to attract more severe/complex patients.

c. Related performance indicators

- Readmission rate (Core – Clinical effectiveness)
  - ➢ Rationale: 1) Assess if early discharge has negative impact on patient outcomes. 2) Identify strategies to "cut-up" hospital stay for administrative reasons (artificial reduction of length of stay)
- Return to the intensive care unit
  - ➢ Rationale: Patients who return to the intensive care unit have been shown to have significantly longer length of stay.
- Result of audit of discharge preparation (Core – Responsive governance)
  - ➢ Rationale: unnecessary hospitalization days can be avoided by a timely and informative screening for likeliness to require services after discharge, by the timely commencement of the preparation of a discharge plan and by timely notification of community providers.
- Patient satisfaction with discharge preparation (Core – Patient centeredness)
- Rate of day surgery (Core – Efficiency)
  - ➢ Rationale: For tracer procedures that can be performed as day surgery, a higher rate of day surgery may serve as a proxy of the severity of patients has only patients in frail status or with complications will be operated on an inpatient basis.
- For delivery: Breastfeeding at discharge (Core – Responsive governance)

d. Exogenous variables

- Patient factors
  - Severity and comorbidities – stable/unstable condition.
    Comment: In the tailored set, we propose to adjust length of stay according to risk factors. Risk adjustment models will need to be developed during the pilot phase of the PATH project. For several tracer conditions or procedures, the variable emergency / elective admission may be used as a proxy, to stratify patients with potentially very different outcomes in terms of length of stay.
  - Social support when returning home. This factor should be assessed early to insure proper discharge preparation. It may complicate somewhat return home.
  - FOR DIABETES PATIENTS: better glycemic control in Caucasians, older diabetic patients, patients with higher outpatient utilization; poorer glycemic control in minorities, patients with greater disease severity, longer duration of disease, more extensive comorbidity[18].
- Organizational factors:
  - A high bed occupancy rate is a strong incentive to reduce lengths of stay.
- Local factors:
  - Occupancy rate of nursing home & rehabilitation beds in the area
  - Family and social support
  - Alternative resources such as home nurses
- National / regional factor:
  - Financial incentives for hospital (e.g. per diem, per admission, global budget), physicians, and patients

e. Potential quality improvement strategies

In this section, hospitals should describe strategies for

- Smooth patient process of care:
  - Clinical pathways
  - Coordination of care within organization to assure timely laboratory and diagnostic test and information transfer (and avoid redundancy)
  - Integration of care with the community (discharge preparation, including education)
- Clinical effectiveness
- Availability of less invasive techniques
- Pre-assessment clinics, early discharge preparation: identify patient at risk of requiring support at discharge, cooperation with other health care providers
- Diffusion of length of stay guidelines, clinical pathways, planning of operating room and technical departments to avoid "bottlenecks", etc.
- Use of less invasive techniques (e.g laparoscopic vs open surgery) and pain management techniques
- Transfer policies

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Efficiency: Inventory in stock

1. Definition

Full description: Average number of days inventoried supplies are held in inventory, for tracer categories

a. Numerator: Total value of inventory at the end of the year for pharmaceuticals

b. Denominator: Total expenditures for pharmaceuticals during the year / 365

c. Collection period: latest administrative year available

d. Comments:

- Data on blood wastage is readily available. Hence, remove blood products from the definition of the indicator on inventory in stock and build a specific indicator for blood wastage. It is computed using 2003 data (latest administrative year available)
- Surgical disposable equipment is removed from the original definition of this indicator
- Include chemo-therapy drugs

Pharmaceuticals are purchased regionally.

2. Rationale – Justification for use

a. Burden:

Burden of high inventory in stock:

- Holding costs are directly proportional to inventory in stock. They are made up of interest, insurance, lost opportunity cost, depreciation, deterioration, obsolescence and handling cost.
- Pharmaceuticals, blood products and surgical disposable account for a substantial part of cost of supplies and they are directly related to hospital core activities. Depreciation, obsolescence and deterioration are a crucial concern for those products.

Burden of low inventory in stock:

- Cost of emergency overnight delivery because of shortage of supplies
- The burden of stock rupture is difficult to assess. It varies greatly depending on how essential is the product for patient care.

b. Importance – Prevalence – Potential for improvement:

- Cost of material management amounts approximately to 30 to 40 percent of operating dollars in a hospital. It has been estimated that around 50% of all the cost in the operating room are consumable supplies[1].
- Anecdotal evidence suggests potential for reducing inventory levels. In the United States, it was estimated that nationally, hospitals are incurring millions of dollars of unnecessary inventory holding cost in the range of 10% to 15% annually, because their storeroom and departmental inventories are being managed poorly or not managed at all. According to some, American hospital's biggest problems lies in the storeroom, as hospitals have been slower than other industries to adopt money saving techniques logistic practices[2].
- We have no hard data to support this affirmation and it cannot be generalized to Western and Eastern European countries as holding costs and opportunities to reduce inventories are probably very contextual with wide variations between countries and regions.
- In Ontario[3], the average number of days in stock greatly varies with a mean of 21.29 days and a variance of 19.46. Small hospitals have on average twice as much number of days in stock as community and teaching hospitals.

c. Hospital impact:

- Inventory management techniques have a strong impact on number of days in stock.

d. Validity:

(1) Formative indicator of optimal use of capacity (Dim: Eff[i])
(2) To a lesser extent, reflective indicator of capacity to meet demand (if very low ratio) (Dim: RF[ii])

Strong rationale: One purpose of inventory management is to ensure the availability of the items that the user needs in the quantity in which they need them. The other purpose is cost containment. Both purposes are (in)-directly addressed with the indicator. Holding cost is decreased by lowering inventory in stock but low inventory in stock may result in being out of stock and not being able to supply the users with items they require to perform proper care and it can ultimately negatively affect patient outcomes.

Inventory in stock provides a good indication of the quality of material management, as it is the outcome of many different processes encompassing forecasting demand, communication between departments (users and purchasers), ordering, monitoring levels of inventory, and organization of delivery. This indicator estimates the number of days worth of stock.

Low stock indicates either good inventory management either hospital has not the capacity to acquire the required material.

Strong face validity and consensus on use:

Current use: Included in Ontario Hospital Report.
This is a very common managerial tool used both in the private and public sectors, taught in many general management manuals. It has strong face validity for managers. Formal definitions vary slightly (average number turnover, number of days worth of stock) but the basic idea remains the same.

In the survey on indicators importance and relevance and data availability, Lithuania and Georgia indicated that they are currently using this indicator in their hospital. It is not used in respondent's hospitals for Slovakia, Albania, Estonia, Finland, Ireland, Denmark, and France.

Low construct validity: We did not find any scientific literature in Medline database relating inventory in stock with other performance indicators. During our research, we came to the conclusion that many efficiency indicators are less well represented in literature and tend to be based primarily on empirical evidence and common managerial practices.

One study in Taiwan hospitals indicated a statistically significant relationship between processes (material management systems) and the outcome (stock turnover rates)[4].

Strengths: very strong face validity and rationale for use
Limits: no standard definition of pharmaceuticals, blood products, and surgical disposable equipment,; difficult to interpret because there is no clear target and indicator may be explained by many factors

3. To add meaning – Guide for interpretation

When combined with total value in stock per patient day,

Screening tool								X			Conclusive assm[nt]

a. Direction and targets: In a reasonable range and from a cost efficiency point of view, lower inventory in stock is better. However, in hospitals with low inventory, implementing just-in-time inventory systems may not be the most cost-effective strategy and they could probably achieve better costs reduction by negotiating less expensive purchase prices. Moreover, if average inventory in stock is too low, hospital is at risk of not being able to answer the demand.

Targets vary depending on the type of supply, how crucial it is for patient care, minimum number of references in stock, random variation in demand, delivery delays from the suppliers, number of geographically dispersed sites.

[i] Dimension: Efficiency
[ii] Dimension: Responsive Governance

b. Stratification – alternative measures:

Proposed stratification:
- Stratify for pharmaceuticals, blood products, and surgical disposable equipment
- Compute specific indicator for the operating room because operating room supplies are both expensive and numerous and operating room storage space is the most costly space in the hospital[5]
- Identify supplies with greater cost through ABC technique and specifically focus on monitoring of those supplies

Potential complementary measures:
- Average delivery delay, for the same supplies categories as above
- Total value in stock per patient day, for the same supplies categories as above
- Increase or reduction of average value of stock per patient days compared to previous year

And also, for further scrutiny of outliers:
- Out-of-stock frequency
- Total waste due to depreciation, deterioration, and obsolescence per patient day
- Number of references/items hold in stock, for the same supplies categories as above

c. Related performance indicators:
- Hospital-initiated cancelled procedures on day of surgery (Tailored – Patient centeredness perspective on efficiency)
  - Rationale: Rupture of stock for blood products or other essential supplies may force hospitals to cancel procedures. This indicator is more closely linked to inventory in stock specifically computed for the operating theatre (see proposed stratification above).

d. Exogenous variables:
- Hospital factors (degree of hospital influence depends on the context)
  - Size, due to economies of scale (proxy: number of bed)
  - Random variations in demand (proxies: proportion admissions through emergency care, proportion elective procedures)
  - Hospital mission probably influences the range and cost of supplies with, for instance, teaching hospitals requiring more rare high cost drugs than community hospitals
  - Enough resources to acquire supplies, availability of blood products (proxy: cost of supplies per patient day)
  - Degree of autonomy to purchase supplies and inventory management information systems
  - Delivery delays from the suppliers (to reduce the need for decentralized stocks)
  - Hospital dispersed on several site, with each site requiring its own inventory; delivery systems to users within the organization (proxy: number of geographically dispersed sites)
  - *Proxy*: *Limit comparisons to peer group of hospitals with similar mission*, e.g. teaching, community, small
- Country or regional factors
  - For pharmaceuticals: in some countries, pharmacies are not within hospital and patients have to buy their own medication

e. Potential quality improvement strategies:
In this section, hospitals should describe strategies to
- Reduction of cycle time, for instance negotiate short delivery delays with suppliers
- More efficient utilization of supplies in order to reduce the need to buy more:
  - Limitation to number of drugs/references through standardization committees or essential drug formulary,
  - Inventory control technologies such as bar-coding, scanning technology, organise central inventory
  - Consolidate constellation of inventory locations and control "unofficial" or secondary inventories maintained in users areas
  - Improved supply forecasting (predict supply usage)

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Efficiency: Intensity of use of surgical theatre

1. Definition

a. **Numerator**: Number of patient hours under anesthesia

b. **Denominator**: Number of theatres * 24 hours

c. **Comments**:
- Unit of measurement of the proposed indicator (surgical theatre unused session) is unclear and varies (hours/time, theatre use, and salaries) and hence the definition has been changed by the working group

d. **Data collection**:
- Data is not readily available
- Data will be collected prospectively over 1 week during April-May 2004
- Report on both elective and emergency surgery
- Delivery room is left for local determination for each country to report on or not (separately, if possible)

Recovery room are not counted as surgical theatres

2. Rationale – Justification for use

a. Burden:

- The operating room is a high cost department within hospitals. Considerable resources are wasted if operating room is not used effectively.
- Effective management of operating room is paramount when operating room is a "bottleneck". By increasing use of operating room, patient flow improves and waiting list can be reduced.

b. Importance – Prevalence – Potential for improvement:

- No data available on trends and potential for improvement

c. Hospital impact:

- Indicators are very sensitive to planning (scheduling and forecasting) and coordination of care (pre-operative preparation)
- Unused sessions are related to cancellation of booked procedures
- Illustration: During the National Demonstration Hospital Program, operating room utilisation improved by 3.2% overall with more than half achieving more than 90% utilisation; lead hospitals improved by 5% to an average 95% utilisation

d. Validity:

Direct measure of optimal use of capacity (Dim: Eff[i])
In some contexts, impacts on access (Dim: RG[ii])
To a lesser extent and in some contexts, reflects reputation, market share, volume (Dim: RG)

Very strong rationale: Analysing the operating room utilisation trends allows rescheduling of elective operating sessions so that all units achieve optimal utilization. This is only possible if the data is closely monitored and if reasons for low utilisation rates and/or high rate of unused sessions are investigated[1].

Little consensus on use: This indicator was used in the Australian National Demonstration Program for best practice in elective surgery. The performance assessment systems studied do not use this indicator. Neither did we find evidence on the potential use of this indicator.

[i] Dimension Efficiency
[ii] Dimension: Responsive governance

Efficiency: Intensity of use of surgical theatre

CCL:

Strengths: strong rationale for use, potential relationship with other indicators of performance to increase content validity of the set as a whole, forces hospitals to monitor operating room utilization Limits: no evidence of validity of the indicator, great concerns regarding reliability across countries and burden of data collection

3. To add meaning – Guide for interpretation

When combined to rate of admission after day surgery:

Screening tool		X								**Conclusive assm^{nt}**

a. Direction and targets: Higher rate is better. Though, an extremely high rate may trigger concerns regarding access for emergency patients.

The Australian National Demonstration Program targeted an operating room utilization rate of 80-85% and exceeded this target.

b. Stratification – alternative measures:

Alternative indicators in Tailored set:

1) Occupancy rate: anaesthesia start to time left operating room / operating session time allocated
2) Surgical utilization rate: surgery start to surgery finish / operating session time allocated

Definitions:

- Anaesthesia start: is measured from when the anaesthetists actually commences doing something relevant to the case, e.g. drawing up of drugs, checking machine
- Surgery start: is measured from when skin preparation begins or when specialised positioning of the patient begins, whichever occurs first
- Surgery finish: surgery is considered ended when the dressings are applied

Stratification:

Distinguish operating rooms dedicated to one-day case surgery as they face different constraints and are usually exclusively used for elective procedures.

Background measures:

- Total number of sessions planned per day
- Total number of hours operating room staffed for elective interventions

c. Related performance indicators:

- Hospital-initiated cancellations of procedures on the day of surgery (Tailored – Patient centeredness perspective on efficiency)
  - Expected relationship: Both indicators are outcomes of the management of patient flows in the operating theatre. We expect them to be positively correlated. Disorganized operating room and poor scheduling of patients results in cancellation of procedures and unused sessions. On the other side, very tight patient scheduling does not leave room for unexpected events during surgery and we can expect more cancellations as a result.
- Day surgery rate (Core – Efficiency)
  - Rationale: Operating rooms dedicated to day surgery have a different organization and face different constraints. Usually, they are exclusively reserved for elective cases and only very rarely accept emergencies.

d. Exogenous variables:

- Hospital factors (degree of hospital influence depends on the context):
  - Proportion emergency surgical interventions, type of procedure
    ⇒ Stratify by specialties, limit comparisons to urban/rural context *(=proxy for emergencies?)*
  - Surgeons degree of autonomy in hospital, involvement in management, financial incentives for better utilization of operating room
  - Median waiting time[i] operating room and bed capacity are the two potential bottlenecks in the patient flows. Increased patient flow and shorter waiting lists may be obtained by optimizing patient flows and capacity utilization. Hence, high median waiting time is a very strong incentive to increase utilization of operating room to answer population's needs.
- Country or regional factors
  - *The utilization rate* is affected by national legislation on hygiene (and hence preparation time of operating room between surgeries)

e. Quality improvement strategies:

- System to track and investigate reasons for cancellations of interventions
- Implementation of an operating theatre management system to monitor operating room utilization

4. Data collection issue

Questions to discuss during 1st workshop on pilot implementation of PATH:

- Compare current data to monitor operating room utilization and information systems in the operating theatre
- Alternatives:
  1) Continuous data collection (information system automatically records required information)
  2) Retrospective/prospective audit over a limited period
- Compare methods to schedule operating sessions
- Compare estimates of occupancy rates

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1 Commonwealth Department of Health and Family Services. Towards Best Practice in Elective Surgery: A Guide. The National Demonstration Hospitals Program. September 1997. Canberra, Australia. Available at http://www.archi.net.au/document/index.phtml/id/517/topic_id/207

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i Complementary measure to the indicator "variance in time on waiting list for selected tracer procedure" (Core – Responsive Governance – Equity)

Descriptive sheets for PATH core set Staff orientation indicators

Descriptive sheets are provided for indicators proposed for inclusion in the core set. First, operational definition is presented. Then, evidence to support the use of the indicator is gathered. Descriptive sheets provide information on hospital potential impact and responsiveness to measurement, prevalence, validity, an reliability. They also support potential users in interpreting the results, when the indicator is implemented.

Sheet 1: Budget for health promotion activities aimed at staff
Sheet 2: Absenteeism
Sheet 3: Work-related injuries (occupational percutaneous exposure (PCE) and mucocutaneous exposures (MCE) to blood or potentially infective biological fluids
Sheet 4: Excessive hours worked
Sheet 5: Training expenditure

Staff orientation: Budget for health promotion activities aimed at staff

1. Definition

a. Numerator: direct cost for all activities dedicated to staff health promotion (as per list) set up in 2003.

b. Denominator: total salary expenditures

c. Definitions:

- According to the WHO Ottawa Charter, *"Health promotion is the process of enabling people to increase control over, and to improve, their health"*
- Areas of health promotion activities: 1) health screening, 2) promoting healthy behaviour, 3) organizational interventions, 4) safety/physical environment, 5) social and welfare. Illustrations: worksite smoking cessation programs, stress –related programs, musculoskeletal disorders, alcohol cessation activities, nutrition and physical exercise.

d. Inclusion criteria:

For the purpose of this indicator, we only include area 2. Areas 3 and 4 (in)directly deal with staff safety indicators such as % job descriptions with risk assessment of job and work-related injuries (percutaneous injuries or mucocutaneous exposure). Health screening is also excluded.

2. Rationale – Justification for use

a. Hospital influence:

Depends on the degree of freedom to allocate funds within hospitals greatly vary between countries and public/private status and the available total budget. It also depends on National policies and legislation on health promotion within the Workplace

Potential adverse effect: If hospitals are evaluated merely on the budget for health promotion activities and not on the volume and quality of health promotion activities that are set up, they might as well just define a budget without being convinced of its usefulness nor without really ever using it, but just to show off.

b. Prevalence and potential for improvement: Little data is available on the extent of health promotion activities within hospitals. A survey in a sample of more than 1400 companies in seven European countries indicate that "activities which might be regarded as coming from the health promotion arena (e.g. eating, alcohol or smoking policies) tend to take place rarely"[1]

c. Validity:

Reflects concern for staff health (Dim: SO/RG[i])
Impacts on staff health (Dim: SO[ii])

Good face validity:

- Public policies supporting health Promotion in working setting:
  - Luxembourg Declaration on Workplace Health Promotion
  - World Health Organization "Healthy Workplace" initiatives
  - Cardiff Memoradum on Workplace Health Promotion in Small and Medium Sized Enterprises

Unknown construct validity: no evidence to support the impact of defining a health promoting budget on extent and quality of health activities. And extremely little evidence is available on the impact of health promotion activities on staff health, except for anecdotal "success stories" in general settings (not hospital-specific).

[i] Dimension: Staff orientation on responsive governance

[ii] Dimension: Staff orientation

Staff orientation: Budget for health promotion activities aimed at staff

However, even if the activities do not produce the expected results, their implementation can be viewed as a concern for staff health and hence a staff orientation. Moreover, it is crucial to include some measure of health promotion for the content validity of the indicator set as a whole.

Strengths: strong policy support and from international experts, improves content validity of the set as a whole

Limits: very little evidence to indicate the definition of a specific budget for health promotion and no evidence support its impact on staff health

1. To add meaning – Guide for interpretation

Screening tool	X										Conclusive assm[nt]

a. Direction and targets: larger budget is preferred but having defined a distinct budget for health promotion activities is already indicative of a concern for health promotion, even if extremely low.

b. Stratification – alternative measures:

Alternative: Direct cost for health promotion activities

Stratification:
- According to area of health promotion (see definitions above)

c. Related performance indicators:
- Short and long-term absenteeism
- Percutaneous injuries (and extension to other occupational injuries)

d. Quality improvement strategies:
- List process to define health promoting budget and stakeholders interventions in the process
- List process to select health promotion activities to be undertaken
- List health promotion activities undertaken
- Specify target audience
- Specify number of persons who attended/benefited from health promotion activities as defined above

2. Data collection issue

The main concerns that no specific budget is defined in a vast majority of hospitals.
Definition of the best denominator is unclear.

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[1] European Foundation for the Improvement of Living and Working Condition (EFILWC) *Workplace Health Promotion in Europe – Programme summary.* 1997 Editor: Office for Official Publications of the European Communities; Luxembourg. 40 pp.

Staff orientation: Absenteeism

1. Definition

a. Numerator: Number of days of medically or non-medically justified absence for less seven days or less in a raw (short-term absenteeism) or 30 days or more (long-term absenteeism), excluding holidays, among nurses and nurse assistants

b. Denominator: Total equivalent full time nurses and nurses assistants * number contractual days per year for a full-time staff (e.g. 250)

c. Definitions:
Absenteeism is referred herein as failure of employees to report for work when they are scheduled to work. Employees who are away from work on recognized holidays, vacations, approved leaves of absence, or leaves of absence allowed for under the collective agreement provisions would not be included[1].
- Short-term absenteeism: from 1 to 7 days (version 1) and from 2 to 7 days (version 2)
- Long-term absenteeism: more than 30 days to 1 year

d. Stratification
- Collect data by age, sex and qualification (nurse or assistant)
- Age categories: under 40, 40-55, over 55 years

e. Exclusion criteria:
- This indicator is measured only for nurses and nurse assistants. Administrative and support staff and physicians are not considered.
- For long-term absenteeism, maternity leaves, including preventive leaves, are excluded because of different legislations and it is out of hospital's influence (though in some instance, staff is relocated to activities compatible with pregnancy and preventive leave and hence long-term absenteeism is avoided).
- However, sick leave during pregnancy is included.

Data collection: retrospective longitudinal administrative data for calendar 2003

2. Rationale – Justification for use

a. Burden:

Negative impact of absenteeism:
- Cost to compensate for lost of working hours, increased workload for the remaining staff, lost productivity, lower quality if highly skilled personal providing essential services cannot be replaced
- Short-term absence is most disturbing because of its unpredictable nature and it allows less time to adjust schedule, take steps to replace absent worker, etc.

Positive impact of absenteeism:
- Short-term absenteeism can be an effective coping strategy in the presence of stressful conditions
- "Working through" illness: Incidence of employees attending work despite being ill is increasing in CIS countries, mainly because of fear of dismissal or financial motivations (loss of earnings)[2]

b. Importance – Prevalence – Potential for improvement:

- In Europe, the absenteeism rate (including temporary and permanent work incapacity) ranges from 3.5% in Denmark to 8% in Portugal[3].
- In Canada, average absenteeism rate is equal to 8.1% for nurses. It is 80% higher than the average rate for 47 other occupation groups at 4.5%[4]. According to CIHI[5], other health care workers are only half as likely to be absent from work as are nurses. Nurses are a high-risk group for emotional exhaustion and musculoskeletal injuries.
- On the other hand, incidence of employees attending work despite being ill is increasing in CIS countries, mainly because of fear of dismissal or financial motivations (loss of earnings)[6].
- Comment: Rates described above give a rough estimate as definitions and inclusion criteria greatly vary between studies

c. Hospital impact:

- In a meta-analysis of 99 studies on 12 type of absence interventions, a number of interventions proved useful in reducing absenteeism[7]: employee assistance programs, training and goal setting programs, policy changes to increase employees' accountability for their absence, scheduling changes such as flexible time, and games or token economies.
- Situational predictors of absenteeism such as organisational permissiveness, role problems, pay, and job characteristics[8] are partly under hospital's sphere of influence

d. Validity:

More specifically for short-term absence:
(1) Impacts on cost-efficiency (Dim: Eff.[9])
(2) Reflects organizational commitment, job involvement, morale, and job satisfaction (Dim: SO[10])
(3) Impacts on quality of care (Dim: CE[11] and PC/SO[12])
More specifically for long-term absence:
(4) Reflects staff ill-health (Dim: Saf. /SO[13])
Also
(5) Is influenced by health promotion activities (Dim: SO)

Face validity:

(1) Efficiency:
- Absenteeism is very costly in terms of compensation paid for lost hours at work and greater reliance on temporary or agency staff and overtime hours.
- It is an indirect indicator for staff productivity as both staff productivity and absenteeism are influenced by the same factors.

(2) Staff orientation:
- ***Theoretical models*** strongly support a relation between absenteeism and job satisfaction and work constraints (see appendix)[14].
- ***Demonstrated relationships*** with other indicators of performance: job characteristics and work stress (control over work, work overload and pressure, participation in decision-making), teamwork and social support, overtime, poor management style – Antecedent to turnover – Mixed evidence on relationship with job satisfaction.

(3) Quality of care
- Conventional wisdom assumes that "happy staff makes happy patients". In the services sector, satisfaction of staff is closely related with satisfaction of clients because of the interaction between staff and clients. Burnout strongly impacts on absenteeism. It is signaled by high level of depersonalization[15] and hence deteriorates staff attitudes towards the patient.
- When a nursing unit receives a last minute sick call for the upcoming shift, it is often very difficult to timely replace the absent workers and impacts on quality and continuity of care .

(4) Staff safety (ill-health)
- ***Strong consensus on use:*** Absenteeism is often used to measure of the impact of preventive and rehabilitation programs or interventions aimed at improving ergonomics and working environment[16]. In many studies it is also used as an indicator of importance of health-related variable under study[17].
- Musculoskeletal injury (low back pain) and mental health disease are very frequent justifications for long-term absenteeism. They are closely related to working conditions. Muskuloskeletal injury and more specifically occupational low back pain are the predominant causes of disability due to work-related conditions[18],[19] We suppose that other chronic conditions or acute diseases not related to working environment should be uniformly distributed among hospitals and should

not affect ranking, if controlled for age and sex of staff. In other words, there is no evidence of a selection bias resulting in more frail staff concentrated in a few hospitals.

- *However*, it is important to distinguish between ill health and absenteeism[20] because
  - Not all activities aimed at reducing workplace absenteeism have an effect on health employee
  - There are employees with health problems who are not absent at all.

(5) Health promotion activities

- Health promotion activities are aimed at improving staff health and hence should ultimately result in improved health and lower absenteeism. For instance, influenza immunization is a widespread cost-effective health promotion activity that has direct impact on absenteeism.

Construct validity:

Very good evidence on the relationship between absenteeism and other performance indicators such as working conditions, job content, staff satisfaction, health promotion activities (see appendix).

Strengths: high burden, extremely relevant to health sector, strong theoretical support and demonstrated relationship with practice environment, job satisfaction, morale, job involvement

Limits: variability of definitions and low reliability of data in some countries, more relevant to countries where job security is guaranteed

3. To add meaning – Guide for interpretation

Screening tool								X			**Conclusive assm^{nt}**

a. Direction and targets: Lower absenteeism is usually better. However, extremely low absenteeism rates may indicate fear of dismissal or other reprisals or raise concerns regarding data quality

b. Stratification – alternative measures:

Alternative units of measurement:

- Proportion working days (working days lost due to absence/total working days)
- Absence frequency rate
- Median duration of absence
- Proportion of short-term absence (total days of short-term absence/total days of absence)

Other related measure:

- Temporary or agency work

Stratification:

Within short-term absence

- Medically justified or not

Within long-term and short-term absence

- Professional category (distinguish nurses)

Alternative (complementary) indicators:

- Short-term absence frequency rate
- Median duration of absence
- Proportion of short-time absence over total absence
- Proportion of short-term absence medically justified

For further scrutiny and for internal use, we recommend hospitals to monitor

- Monthly
- At the department level
- For reasons (if indicated)

c. Related performance indicators:

- Work-related injuries (Core – Staff safety)
- Overtime or excessive hours (Tailored – Staff safety)
- Length of stay (Efficiency – core basket)
- Patient satisfaction/experience with nursing care and Global patient satisfaction (Core – Patient Centeredness)
- Budget for health promotion activities aimed at the staff (Core – Staff orientation and responsive governance)

d. Exogenous variables:

- Staff factors
  - Demographics: **age, sex, marital status, children**
  - Proportion of **full-time staff**
  - Tenure
  - Professional category
  - Attitudinal predictors, personality traits, e.g. absence culture or "absence-proneness" [21]
  - Chronic health conditions and habits: smoking, substance abuse, depression, lack of exercise
  - Acute health (colds and flu, family illness, pain). However, mediating factors are 1) somewhat related to stress, 2) believed to be somewhat controlled for with adequate interventions, and 3) varying thresholds for taking sick leave
  - Negative or positive life events (e.g. death of relative, wedding, etc.)
- Hospital factors (degree of hospital influence depends on the context):
  - **Staff ratios**
    Expected relationship: Staff ratios are supposed to have a very strong impact on absenteeism because they are one of the major determinants of job environment, job content and objective workload. Job strain negatively impacts on more ill health, staff satisfaction and involvement. On the other hand, staffing levels may be so tight that employees feel they have to show up even sick because cannot let their colleagues down.
- Country or regional factors
  - Absence culture at society level: values and beliefs of the larger society and its subcultures
    - Proxy: **Average absence rate**
  - Loss of income in case of temporary leave. For instance, in EU countries and Norway, benefit levels range from 50% to 100%. In CIS countries, loss of income aggravated by reliance on informal, out-of-packet gratitude payments
  - Medical certificate needed (13 out of 16 EU countries)
  - Downsizing in the health sector and fear of losing job
    - Proxy: Vacancy rate unemployment rate in the area for the professional category
  - Social support for family (e.g. sick parents or children)
    - Proxy: Socio-demographic variables in the area

e. Quality improvement strategies:

Open questions (use EFILWC framework):

- List strategies tackling health problems of employee (or family):
  1. Promoting the health and well-being of employees,
  2. Improving work environment and safety,
  3. "Family-friendly" practices (e.g. childcare for sick children)
- List strategies improving motivation at work and implication:
  1. Change in "absence culture" (what is believed to be "acceptable"),
  2. Training and goal setting programs,
  3. Absenteeism feedback on employee absence behaviours,
  4. Flexible working time
- List repressive strategies:
  1. Control of absenteeism,
  2. Checks on absent workers
- List strategies to facilitate return to work after long term-absenteeism, employee assistance program
  1. Adapt schedule
  2. Adapt working environment
  3. Adapt job content

APPENDIX

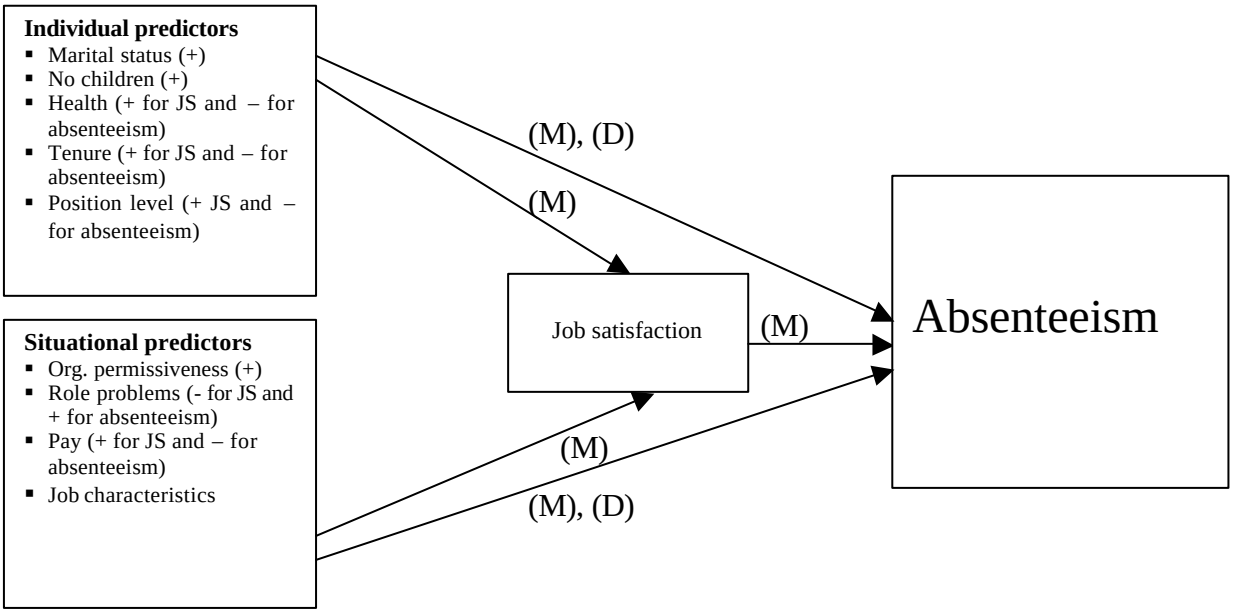
A. Theoretical models

Two streams of theoretical models are found in the literature[22] (Johns 1997). They support mediated or direct effect of staff satisfaction on absenteeism[23] (Goldberg and Waldman 2000):

a) Absenteeism is a behavioral response to job dissatisfaction,
b) Absenteeism is related to demographics and work (including job characteristics) and non-work constraints and not a direct response to job dissatisfaction

A missing link to examine job satisfaction and absenteeism could be trust and mutual respect within employment relationship and cultural salience. According to Nicholson and Johns[24] (1985, in Gellatly and Luchak 1998) *"under high cultural salience, attendance behavior should be under normative control, whereas, individual factors (e.g. job dissatisfaction) should play a greater role in determining absence when cultural salience is low"*. In their theoretical model, Blau and Boal (1987)[25] skip job satisfaction to replace it with organizational commitment and job involvement. A middle-approach consists in including the three concepts with job satisfaction having an indirect effect through organizational commitment and job involvement (Brook 1986).

Mediated (M) and direct effect (D)only models of absenteeism (in Goldberg and Waldman 2000)



B. Demonstrated relationships with other indicators of performance

- Job characteristics and work stress:
  - Results of job content questionnaire (measures psychological demands, job decision latitude and social support at work) are associated with both medically certified and non-certified sickness absences among nurses in Bourbonnais and Mondor (2001)[26].
  - A large proportion of sick leaves are motivated by a diagnosis "potentially related to the psychosocial environment" and a subsequent proportion of absences in this categories occur for mental health problems.

- Teamwork: teamwork is the work-related factor with greatest impact on absenteesim in Kivimäki et al. (2001)[27]. Physicians working in poorly functioning team were at increased risk (OR: 1.8) of taking long spells of absence than physicians working in well functioning teams. In this study, the other work-related factors significantly associated with physician absence were overload, heavy on call responsibility, and poor job control.

- Overtime: In Ontario, the probability of a hospital having a high RN lost-time claim rate was found to be increased with registered nurses working more than one hour of overtime per week[28] (Shamian et al. 2003).

- Health promotion activities:

Table 1: Other job work factors (adapted from a review of the literature by Michie and William 2003)[29]:

Study	Design	Participants	Response rate	Work factors	Outcome	Results
Rees and Cooper 1992	Cross sectional	1176 health care workers, UK	67%	Control over work	Sickness absence	No association
Brooke and Price, 1989	Cross sectional	425 hospital workers, USA	74%	Routinisation, centralization, pay, reward policy, role ambiguity, conflict, overload, organizational tolerance of absenteeism	Absenteeism	High role ambiguity and tolerance of absenteeism, low pay and low centralization predicted absenteeism (structural coeeficients: 0.21, p<0.001, 0.27 p<0.01, -0.11 p<0.05, -0.19, p<0.02)
Gray-Toft & Anderson, 1985	Experimental	159 nurses, USA	Not reported	Open, supportive supervisory style	Absenteeism	Open supportive supervisory style associated with lower absenteeism
Landerweerd & Baumans, 1994	Cross-sectional	561 nurses, NL	96%	Work pressure, job complexity, feedback, autonomy, promotion/training	Absence frequency	Work pressure associated with absence frequency (B=0.12) and promotion/training negatively associated (B=-0.12)
Smulders and Nijuis 1994	Cross sectional and prospective	1755 male public sector workers, NL	70%	Job control and job demand	Absence rate and frequency	Cross sectionally, job control associated with low absence frequency(beta=0.10, p<0.01) and demand associated with low absence rate (beta=-0.08, p<0.05)

Table 2: Demonstrated relationship between job satisfaction and absenteeism[30] (Gauci Borda and Norman 1997)

Study	Design	Participant	Variable	Results
Price & Mueller 1986	Retrospective (absence) and longitudinal (satisfaction)	948 hospital employees, including nurses	Job satisfaction and turnover	No relationship found between job satisfaction and absence
Ng 1991	Retrospective (absence) and cross-sectional (satisfaction)	182 nurses	Job satisfaction	No difference in job satisfaction on staff on wards with high and low absence
Matrunola 1996	Retrospective (absence) and corss-sectional (satisfaction)	50 nurses	Job satisfaction & demographic variables	No relationship found between job satisfaction and absence. No significant relationship for demographic variables eg. age and grade and absence neither.

Michie and William (2003)[31] provide an extensive review of the literature on mental health outcomes and work factors. They concluded that "

- *Key work factors associated with psychological ill health and sickness absence are long hours worked, work overload and pressure, and the effect of these on personal lives; lack of control over work; lack of participation in decision-making; poor social support; and unclear management and work role*

- *There is some evidence that sickness absence is associated with poor management style*"

We reported in the table above only studies where ill health was measured through absenteeism or sickness absence (review of the literature by Gauci Borda and Norman 1997[32]).

- Job satisfaction: unclear relationship.
- Antecedent to turnover
- Kinship responsibility identified as antecedent of absence and intent to stay

[2] Arford CW. Failing health systems: Failing health workers in Eastern Europe. Report on the Basic Security Survey for the International Labour Office and Public Services International Affiliate in the Health Sector in Central and Eastern Europe. International Labour Office, Geneva, Switzerland. 2001. Available on www.ilo.org/ses

[3] European Foundation for the Improvement of Living and Working Conditions – European Foundation for the Improvement of Living and Working Conditions 1997

[4] CNCA report 2001 in Shamian et al. 2003 (see ref. 14 below)

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[6] Arford CW. Failing health systems: Failing health workers in Eastern Europe. Report on the Basic Security Survey for the International Labour Office and Public Services International Affiliate in the Health Sector in Central and Eastern Europe. International Labour Office, Geneva, Switzerland. 2001. Available on www.ilo.org/ses

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[9] Dimension: Efficiency

[10] Dimension: Staff orientation

[11] Dimension: Clinical effectiveness

[12] Dimension: Patient centered perspective on staff orientation

[13] Dimension: Safety perspective on staff orientation

[14] Johns 1997

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[19][19] Shamian J, O'Brien-Pallas L, Kerr M, Koehoorn M. Effects of job strain, hospital organizational factors and individual characteristics on work-related disability among nurses. Final report: executive summary. October 2001.

[20] European Foundation for the Improvement of Living and Working Conditions 1997

[21] Gellatly and Luchak 1998, according to Harrison and Martocchio 1998, limited evidence in general population

[22] (Johns 1997).

[23] Goldberg, C., & Waldman, D. A. Modeling employee absenteeism: Testing alternative measures and mediated effects based on job satisfaction. Journal of Organizational Behavior 2000;21: 665-676.

[24] Nicholson and Johns 1985, in Gellatly IR, Luchak AA. Personal and organizational determinants of perceived absence norms. Human Relations 1998;51:1085-1102.

[25] Blau, G. & Boal, K. Conceptualizing How Job Involvement and Organizational Commitment Affect Turnover and Absenteeism. Academy of Management Review 1987;12, 288-300.

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[27] Kivimäki M, Sutinen R, Elovainio M, Vahtera J, Räsänen K, Töyry S et al. Sickness in hospital physicians: 2 year follow up study on determinants. Occupational and Environmental Medicine 2001;58:361-366.

[28] Shamian J, O'Brien-Pallas L, Kerr M, Koehoorn M. Effects of job strain, hospital organizational factors and individual characteristics on work-related disability among nurses. Final report: executive summary. October 2001.

[29] Michie S, William S. Reducing work related psychological ill health and sickness absence: a systematic literature review. Occupational and Environmental Medicine 2003;60:3-9.

[30] Gauci Borda R, Norman IJ. Factors influencing turnover and absence of nurses: a research review. International Journal of Nursing Studies 1997;34(6):385-394

[31] Michie S, William S. Reducing work related psychological ill health and sickness absence: a systematic literature review. Occupational and Environmental Medicine 2003;60:3-9.

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Staff orientation: Work-related injuries
Occupational percutaneous exposure (PCE) and mucocutaneous exposures (MCE) to blood or potentially infective biological fluids

1. Definition

a. **Numerator**: Number of case of percutaneous injuries reported in the official database or occupational medicine register in one year (includes needlestick injuries and sharp devices injuries)

b. **Denominator**: Average number of full-time equivalent staff and non-salaried physicians

c. **Exclusion criteria**: None

d. **Data source**: Routinely collected data in 2003 in 1 of the 2 databanks mentioned abov3

e. **Comment**: Encourage one-point survey for data quality control

2. Rationale – Justification for use

a. **Burden**:

- Exposure to serious and fatal infections from blood borne pathogens such as for instance HIV hepatitis B and C has severe impact on exposed staff health, even if the disease is not contracted.
- Probability of contracting hepatitis B, hepatitis C and HIV, from an infected patient, per needlestick, is estimated to respectively 30.00%, 1.80% and 0.30%[1].
- Exposure to blood borne pathogens results in a very high worker anxiety and distress[2]. Emotional distress can be severe and long lasting even if injury does not result in transmission of a severe disease. It can also extend to colleagues and family members.
- Post-exposure treatments for HIV and hepatitis B have unpleasant side effects.
- Direct cost of medical follow-up for at-risk exposure as been estimated in a range from 265 $ to 1,232 $ in two large hospitals in the US[3]. The cost includes 1) lab charges for blood tests; 2) charges for treatments such as hepatitis B immunoglobulin, hepatitis B vaccine, chemoprophylactic drugs for HIV, and tetanus vaccine, 3) service charges for emergency department or employee health department visits or other services; and 4) other costs such as surgery. Other cost includes lost time for the exposed worker.

b. **Importance – Prevalence – Potential for improvement**:

- The Centers for Disease Control and Prevention estimate to approximately 384,000 percutaneous injuries occurring in US hospitals, with about 236,000 resulting from needlesticks involving hollow-bore needles. Those estimates are adjusted for under-reporting.
- In Switzerland (7 hospitals)[4], the following self-reported incidence rates of percutaneous injury with material contaminated with blood or biological fluids were reported in a 1995 survey:

	Last workday	Last work month
Nurses	0.49 %	2.23 %
Surgeons	4.28 %	11.05 %
Anesthesists	2.11 %	3.14 %
Domestic personnel	0.11 %	0.17 %

- Among Danish hospital employed physicians[5] the risk per person per year (incidence rate) was estimated from 6.2-8.5 for PCE and 7.3-8.8 for MCE in highest risk specialties to 0.8-1.3 for PCE and 1.3-2.9 for MCE in lowest risk specialties. Only 35% physicians adhered to universal precautions and non-compliance with universal precautions was and non-compliance was associated with a considerably increased risk of both MCE and PCE, especially in non-surgical specialties.
- Note: it is difficult to compare rates because of varying definitions and methods

c. **Hospital impact**:

- The US General Accounting Office (GAO)[6] estimated that 75% needlestick injuries were preventable
  - by eliminating unnecessary use (25%)
  - by using needles with safety features (29%)
  - by using safer work practices (21%)

d. Validity:

(1) Reflects safe working conditions
(2) Impacts on staff health (Dim: Saf/Staff[i])
and more specifically on mental health and morale (Dim: Staff[ii])
(3) Impacts on costs (Dim: Eff[iii])
(4) Reflects responsibility towards staff (Dim: RG/staff[iv])

Strong rationale:

Rationale for use lies mainly on the fact that most injuries can be prevented by using safety devices and by organizational arrangements. Hence, it is believed that incidence rates are indicative of management's support to safety initiatives.

Great consensus on use:

In one study[7] on 40 units in 20 hospitals indicated that nurses from units with low staffing and poor organizational climates are generally twice as likely as nurses on well-staffed and better-organized units to report risk factors, needlestick injuries or near misses

Some construct validity:

Process: In Aiken et al. (1997)[8], working in hospitals characterized by professional nurse practice models and taking precautions to avoid blood contact was significantly associated with fewer injuries among nurses. Needlestick injury has been demonstrated to be significantly associated with work environment characteristics (e.g. time pressure of work).

Low reliability: Reliability is a prerequisite for validity. In occupational disease and injuries, low reliability of reporting is a major concern. Data can be obtained either from institutional declaration reports either from retrospective (e.g. question: "report in detail on percutaneous injuries that occurred or almost occurred the last workday and the last working month") or prospective (e.g. documentation for every-shift during a 15 or 30 days period) surveys. For instance, in a Swiss study, declaration rates of percutaneous injuries within seven Swiss hospitals were under-reported in comparison with retrospective survey (1 day and 1 year): 39.7% for nurses, 3.4% for physicians, 87.9% for domestic personnel[9].

Reporting is hindered by lack of knowledge of appropriate procedures to follow after injury has occurred; fear of punitive employer response; time constraints; and perception that a low risk of transmission is associated with certain type of injuries, or patients, or both.

In a survey in 11 countries on data availability and quality, respondents evaluated data on workplace injuries of medium to excellent quality:

- Excellent quality (10/10): Lithuania, Estonia, Slovakia, Finland
- Quite good quality (8/10): Ireland
- Medium quality (5/10): Denmark

Strengths: high burden, strong hospital impact, sends a crucial message to monitor the issue

Limits: low incidence, very low reliability

[i] Dimension: Safety perspective on staff orientation
[ii] Dimension: Staff orientation
[iii] Dimension: Efficiency
[iv] Dimension: Responsive Governance perspective on staff orientation

3. To add meaning – Guide for interpretation

Screening tool	X										Conclusive assm[nt]

Extremely high caution is recommended when interpreting the results because of the low reliability of injury reporting.

a. Direction and targets: Theoretically Lower rate is better. But due to low reliability, a low rate might be indicative of low reporting and not of low occurrence. It might indicate that there is no formal procedure to report incidents or that workers are not educated/motivated/confident to report incidents. Hence, a higher rate may indicate more concern for percutaneous injuries and a closer monitoring of the issue. The incidence rate may not be interpreted in isolation. It needs to be complemented with a description of reporting procedures (see open questions below).

b. Stratification – alternative measures:

Alternative measures related to exposure to blood or potentially infective biological fluids:
- Numerator:
  - Alternative 1: Number of percutaneous injuries ***or near misses***
  - Alternative 2: Number of percutaneous and ***mucocutaneous exposures*** to blood or potentially infective biological fluids (includes contamination of intact skin)
- Denominator:
  - Alternative 1, BY TYPE of OCCUPIED BED: Average number of occupied beds
  - Alternative 2:, BY TYPE of DEVICE : # of device purchased during the period

Complementary measures with a wider scope to include more occupational injuries:
- Sickness absence days resulting from a ***work-related incident*** (e.g. assault on staff or fall). Limit to include only absence days resulting from work-related incident and do not include occupational injuries/disease (low back pain, depression, etc.) because of very low reliability.
- Sickness absence resulting ***in insurance claims***
  Number days lost per EFT or incidence rate or cost per EFT) (only for national comparisons because of varying rules and conditions to claim for occupational injuries and conditions among countries)

For better understanding, stratify by
- Professional category
- Area of care: ICU, operating theatre, emergency, surgical, medical department), time (or weekdays Vs. weekends, daytime Vs. night)
- Years of work experience (by broad categories to be defined, e.g novice, experimented)
- Type of device

Compare results from anonymous retrospective survey and from organization's formal reporting scheme.

For further scrutiny: Staff survey to evaluate whether exposed staff is aware of the steps to take when injured by a needlestick and to evaluate knowledge and practices of prevention strategies

Background information: Estimation of prevalence among patients of HIV, hepatitis B and hepatitis C.

c. Related performance indicators:

- Related indicator in staff safety dimension (customized basket): Risk assessment of jobs
  - Expected relationship: both positive and negative – Risk assessment of jobs are supposed to lead to awareness and prevention strategies and hence lower ***incidence*** of percutaneous injuries. But, on the other side, increased awareness is supposed to result in higher ***reporting*** rates.

d. Exogenous variables:

- Specialties or department and type of intervention
- Experience (e.g. for physicians, employment as a senior or junior)

e. Quality improvement strategies:

- Open questions:
  - Written protocols for prompt reporting, evaluation, counselling, treatment, and follow-up.
  - Procedures implemented to improve ***reporting*** of work-related injuries
  - Risk assessment programs
  - Monitoring and analysing situations when injuries occurred
  - Education and training on safe handling and disposal of sharp devices
  - Needlestick injury ***prevention programs*** (for instance, see http://hsc.virginia.edu/medcntr/centers/epinet/chcklst2.pdf), including description of ***Safety devices*** used (for instance, disposable syringes)
  - For instance, a 1991 US law "The Needlestick Safety and Prevention Act" requires employers to 1) review exposure control plans each year to keep up to date on new technology to prevent injuries; 2) involve non managerial workers in evaluating and selecting safety engineering devices; 3) maintain an injury log noting the type and brand of devices involved and the location and description of the incident. Compliance with those structural indicators is evaluated by the JCAHO since 2002.

4. Data collection issue

For comparisons in PATH project, we support retrospective or prospective surveys. If similar surveys are used throughout PATH participants, we expect much less variability than in institutional reports of declaration.

For internal monitoring and for supporting a safe practice environment, it is crucial to ensure within each hospital that staff reports all incidents and near-misses and that all reports are acted upon.

Hence, PATH advocates both approaches to be used simultaneously. High declaration rate by comparisons to survey rate is also an indicator of quality. It can be interpreted as a sign that staff is aware of declaration procedures and supported in this. If no data on percutaneous injury or near miss is readily available, this indicator sends the message that it is crucial to monitor it. Main issues is not around burden of data collection –because data should theoretically be collected anyway– but around the reliability of data, especially for international comparisons –because of the very different approach and incentives for reporting work-related injuries.

Questions to discuss during 1st workshop on PATH implementation

1. Discuss strengths and limits of potential data sources:
   - Prospective or retrospective self-reported injury and conditions surveys
   - Institutional reports
   - Insurance claims

2. Compare institutional reports between participating hospitals and also with the Exposure Prevention Information Network (EPInet[v]). This system was developed to provide standardized methods for recording and tracking percutaneous injuries and blood and body fluids contacts. It is currently used in more than 1500 hospitals in the US and in Canada, Italy, Spain, Japan and the UK. Participants to the workshop should assess the potential for more standardization of reporting methods.

3. Define staff categories or criteria to be included in denominator as "exposed staff". For hospital staff who are not considered employee (e.g. contract workers to provide services such as phlebotomy), for temporary agency workers, medical residents, private hospital physicians), it may be difficult to calculate the number of full-time equivalent. Using number of occupied beds in denominator instead of number of exposed staff would bypass the challenge of identifying exposed staff. Hospitals beds can be divided into intensive care/surgical/medical/obstetric-gynecologic beds to acknowledge for different degree of exposure to risk of percutaneous injury.

[v] available for download on http://www.med.virginia.edu/medcntr/centers/epinet/epinet3.html).

1 GAO Projection of CDC data in United Stated General Accounting Office.

Occupational Safety: Selected Cost and Benefit Indications of Needlestick Prevention Devices for Hospitals. Report Number GAO-01-60R, 17 Nov 2000, inclosure 1.

Available on http://www.cdc.gov/niosh/topics/bbp/goa-01-60r.pdf.pdf

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3 Jagger J, Bentley M, Juillet E. Direct cost of follow-up for percutaneous and mucocutaneous exposures to at-risk body fluids: data from two hospitals. Advances in Exposures Prevention 1998;3(3):1-3.

4 Luthi JC. Duboisarber F. Iten A. Maziero A. Colombo C. Jost J. Francioli P. The occurrence of percutaneous injuries to health care workers – a cross sectional survey in Swiss hospitals. Schweizerische Medizinische Wochenschrift. 1998;128(14):536-543.

5 Nelsing S, Nielsen TL, BronnumHansen H, Nielsen JO. Incidence and risk factors of occupational blood exposure: A nation-wide survey among Danish doctors. European Journal of Epidemiology 1997;13(1):1-8.

6 GAO projection of CDC NaSH data

US General Accounting Office – Occupational Safety: Selected Cost and Benefit Indications of Needlestick Prevention Devices for Hospitals. Report Number GAO-01-60R, 17 Nov 2000.

Available on http://www.cdc.gov/niosh/topics/bbp/goa-01-60r.pdf.pdf

7 Clarke SP, Sloane DM, Aiken LH. Effects of hospital staffing and organizational climate on needlestick injuries to nurses American Journal of Public Health 2002;92(7):115-119.

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Staff orientation: Excessive hours worked

1. Definition

Excessive weekly working time:
Version A1: proportion of week worked over 48 hours
Version A2: proportion of week worked over 60 hours
Version A3: proportion of week worked over 150% regular working time according to national legislation

a. **Numerator**: for each week, number of full-time staff (nurses and nurse assistant) who worked more than 48 (or 60 or 150% of regulation), summed up on all the weeks in the period under study

b. **Denominator**: total number of weeks during observation * number of full-time employees

c. **Inclusion criteria**: Limit to nurses and nurse assistants/aids. Include only hospital employee (exclude working hours contracted through temporary work agency)

d. **Data collection**: Undertake a retrospective study of the percent of weeks worked more than 48 hours during the period from January to March 2004. If hospitals have to collect the information manually, they might choose a shorter time period for collection.

2. Rationale – Justification for use

a. Burden:

Negative impact:
- Long hours cause fatigue[1], reduces productivity and increase the risk that nurses will make mistakes that harm patients[2].

Positive impact:
- Long shifts improve continuity of care and hence can have a positive impact on safety
- Overtime is sometimes required to meet demand and assure accessibility of care in context of serious nursing shortage; the alternative being the closure of some beds
- Long working hours are sometimes welcomed from the employees as a important source of additional revenue (especially in Eastern European countries)

b. Importance – Prevalence – Potential for improvement:

Long working hours are highly prevalent in CIS countries. For instance, in Latvia and Ukraine, doctors and nurses work on average 60 hours a week[3]. In Western countries, mandatory overtime is a highly controversial subject. It is exacerbated by current nursing shortage.

c. Hospital impact:

- Limited by alternatives to overtime available to compensate lack of staff (e.g. and the degree of autonomy and flexibility in hiring new staff, constrained by centralization of power and nursing shortage

d. Validity:

(1) Impacts on staff health and staff satisfaction (dim: SO[i])
(2) Reflects overload and job strain (dim: Saf/SO[ii])
(3) Impacts on patient safety (more controversial) (Saf/CE[iii])
(4) In a context of nursing shortage, reflects acquisition of resources (Dim:RG[iv])
(5) Reflects Human resources planning (dim: SO[v])

[i] Dimension: Staff orientation
[ii] Dimension: Safety perspective on staff orientation
[iii] Dimension: Patient safety, safety perspective on clinical effectiveness
[iv] Dimension: Responsive governance
[v] Dimension: Staff orientation

Face validity:

(1) Conceptually, extensive working hours significantly reduces time for sleep and social activities that result in fatigue and limited social life, both negatively impacting on health and especially on psychological well-being[4]. Fatigue results in slowed reaction time, lapses of attention to crictical details, errors of omission, compromised problem solving, reduced motivation[5]. Impact of extensive working hours is moderated by various facors such as extent of night work, time between shift, workload, stress, employee's social and community life, family repsonsibilities, sleep propensity

(2) In most circumstances, overtime is a response to inadequate staffing. However, in the Commonwealth of Independant States (CIS) countries, it is suggested that overtime is a a structural part of professional arrangement supported by culture or justified by an economic incentives to increase salary (e.g. physician overtime hours "watching in the hospital")[6].

(3) A panel of 18 experts from The Institute of Medicine called for a ban on extended hours because they put the staff and patient safety at risk[7].

(5) Reflects human resource planning only in contexts where nursing staff is insufficient and there are alternatives to overtime to compensate for missing staff.

No consensus on use: This indicator is currently not used in the performance assessment systems under study

Construct validity:

(1) Staff health and staff satisfaction

Staff health: the main results of a recent and extensive review of the literature in the general population (not specific to health care workers) is that evidence suggests long hours are related to fatigue; equivocal relationship between long hours and stress or mental ill-health (mediating effect of control over job); strong evidence that people perceive that working long hours leads to poor work-life balance[8]. Another review of the literature[9] supports that long working hours is associated with psychological ill health and sickness absence.

More specifically, for nurses, in one study[10], working more than 12 hours a day or more than 40 hours a week and off hours (weekends and other than day shift) was associated with a 50-170% increase in the age-adjusted odds ratio for muskuloskeletal disorders of the three body sites under study (neck, shoulders and back). For physicians (UK consultants medical microbiologists), working more than 48 hours was significantly associated with increased psychological morbidity.

Staff satisfaction: For Australian anaesthetists[11] poor recognition and long hours were the major dissatisfying aspects of the job. We did not find any study on nurses. We did not find any specific study for nursing staff.

(3) ***Patient and staff safety***:

The United Kingdom government attempted to oppose the European Directive on Working Time[12], arguing that there is no convincing evidence that hours of work should be limited on health and safety grounds.

Strengths: strong face validity and some construct validity

Limits: difficult to identify cut-off between what can be considered excessive and acceptable working hours, not applicable to all staff categories, only partly under hospital influence, limited validity as indicator for staff and patient safety (still controversial)

3. To add meaning – Guide for interpretation

Screening tool				X							**Conclusive assm[nt]**

a. Direction and targets: lower rate is preferred

b. Stratification – alternative measures:

Stratification:

- Professional category
- Department (intensive care / emergency / operating room / obstetrics / internal medicine / surgery)

Alternative (complementary) indicators:

- Results of a survey on perceived workload and satisfaction with working hours and working conditions[vi]

For further scrutiny and for internal use, we recommend hospitals to monitor monthly and, for the indicator on extended hours, compute average by day of the week or night / day shift.

Background measure: staffing ratios. It is extremely important as low staffing ratio may partly justify overtime but also indicate higher workload and job strain and hence larger impact of excessive working hours of staff fatigue and health.

c. Related performance indicators:

- Result of a survey on satisfaction at work, morale and perceived workload and job content (Tailored – Staff orientation)
  - *Expected relationship*:
- Vacancy rate (Tailored – Staff orientation)
  - *Expected relationship*: a high vacancy rate increases the need for overtime
- Percutaneous injuries (Core – Safety perspective on Staff orientation) and other occupational injuries (see complementary indicators)
  - *Expected relationship*: Fatigue increases the risk of injuries
- Absenteeism (Core – Staff orientation)
  - *Expected relationship*: Short-term absenteeism is very disrupting for organization of care and allows little time to adjust schedules and take steps to replace absent worker present staff may need to compensate for absent staff. Long-term absenteeism could also be related to excessive hours because it was shown to be associated with stress, fatigue and lower mental health.

d. Exogenous variables:

- Staff factors
  - The impact of long working hours on staff fatigue depends on factors such as age, sex, coping strategy, general health status and external factors such as distance from work or number of dependants.
- Hospital factors (degree of hospital influence depends on the context):
  - Staffing levels (depends on budget, vacancy rates, national or local norms)
- Country or regional factors
  - National legislation regarding regular working hours, maximum working hours and payment of overtime
  - Supply of medical and nursing staff in comparison to demand: nursing shortage
  - Availability and price of alternative resources such as temporary/agency work

[vi] For illustration, items from a survey in Eastern Europe countries by the International Labour Office:

I am very concerned by the amount of overtime I work, I am happy with my current hours, I wish I could work more flexibly, By the standards of my country, my working conditions are excellent

"Health care in Central and Eastern Europe: Reform, Privatization and Employment in Four countries". International Labor Office , Geneva, Switzerland, 2001. 51 p. Available from http://www.ilo.org/ses

- Degree of flexibility for hospitals to recruit staff and adapt to variations in demand for care (e.g. seasonal, epidemics)
- Professional and cultural expectations

e. Quality improvement strategies:

Open question to identify strategies that mediate the impact of long hours on satisfaction, health and safety:

- Promote healthful work-rest patterns
- Increase choice and control over work hour and rest breaks.

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11 Kluger MT, Townend K, Laidlaw T. Job satisfaction, stress and burnout in Australian specialist anaesthesists. Anaesthesia 2003;58(4):339-345.

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Descriptive sheets for PATH core set Responsive governance indicators

We provide only one descriptive sheet for this dimension.

Sheet 1: Breastfeeding at discharge

Responsive governance: Breastfeeding at discharge

1. Definition

a. **Numerator**: Total number of mother included in the denominator breastfeeding at discharge

b. **Denominator**: Total number of delivery fulfilling criteria for inclusion

c. **Inclusion criteria**: Singleton, born at greater or equal to 37 weeks gestation, weight greater than or equal to 2500 grams at birth, 5-minute Apgar score greater than or equal to 5, neither mother nor infant has a medical condition for which breastfeeding is contraindicated (e.g. HIV).

d. **Definitions:** To be determined: exclusive breastfeeding only or include partial breastfeeding?

e. **Data collection**: Breastfeeding may be extracted from the kitchen information system because breastfeeding women receive a different diet. If routine data is not available, hospitals could have a survey on all women discharged during a week or a month, preferably in April-May 2004.

f. **Comment**: Average length of stay strongly differs and it could impact the results. For extremely short length of stay, breastfeeding should have been initiated.

2. Rationale – Justification for use

a. Positive impact:

- Breastfeeding is correlated with numerous advantages for babies and mothers including: an improved immune system in infants, reduced asthma, respiratory infections, ear infections, and diarrhea, improved cognitive function, particularly in low birth weight babies, and improved mother-infant attachment.
- Mothers who breastfeed have a reduced risk of premenopausal breast cancer, ovarian cancer and osteoporosis.

b. Importance – Prevalence – Potential for improvement:

- Breastfeeding is a priority public health area at both national and international levels. For instance, a WHO recommendation[1] indicates that **"** Breastfeeding is an unequalled way of providing ideal food for the healthy growth and development of infants; it is also part of the reproductive process with important implications for the health of mothers. As a global public health recommendation, infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health".
- Prevalence rates vary widely across countries.

c. Hospital influence:

- Hospitals have a real influence on women breastfeeding behaviour:
  - The critical period when mothers, especially those with their first babies, need the most help spans the few days in hospital and the subsequent week[2]
  - Strong evidence supports that hospital processes are related to breastfeeding outcome. For instance, the application of the Ten Steps to Successful Breastfeeding of the Baby-Friendly Hospital Initiative (BFHI)[i] has shown itself to be an effective method of improving breastfeeding practices worldwide. It has shown itself to be an effective method of improving breastfeeding practices world-wide[3,4,5,6]

[i] International program of The World Health Organization (WHO) and The United Nations Children's Fund (UNICEF). Based on the WHO/UNICEF Ten Steps to Successful Breastfeeding, the Initiative recognizes hospitals and birth centres that have taken steps to provide an optimal environment for the promotion, protection and support of breastfeeding.
BFHI homepage: http://www.unicef.org/programme/breastfeeding/baby.htm

- Some factors limit hospital's influence:
  - The cultural component in the decision to start (and continue) breastfeeding limits international comparisons.
  - Feeding decisions seem to be made prior or irrespective of contact with health professionals (study in United Kingdom)[7].

d. Validity:

Reflects health promotion for a specific patient category

Strong rationale: There is a wide agreement

No demonstrated relationship with other health promotion indicator, quality

Breastfeeding at discharge is the only indicator in the PATH core basket of indicator that assesses health promotion. It covers only partially health promotion activities within the hospital and is limited to at a very specific category of patients.

No demonstrated relationship with other performance indicators: We did not find evidence support that results on this specific indicator for this specific patient category could be generalized for a global assessment of health promotion at the hospital. We did not find any evidence neither on the relationship with other performance indicators.

Limited consensus on use: Breastfeeding is reported at the health system (national or regional) level but it was not included in the hospital performance assessment systems we studied.

Strengths: very strong rationale, major public health impact

Limits: limited hospital influence, covers only partially the area of health promotion in the hospital

3. To add meaning – Guide for interpretation

Screening tool								X			Conclusive assm[nt]

a. Direction and targets: Higher rate is better

- Healthy people 2000 objective[8]: increase to at least 75% the proportion of mothers who breastfeed their babies in the early post-partum period (objective 2.11 and 14.9)

b. Stratification – alternative measures:

- Alternative definitions to have a more thorough view on breastfeeding:
  - % breastfeeding within **1 hour** of birth
    - More directly under hospital's influence but very restrictive, does not account for all efforts made during mother's hospital stay to promote breastfeeding)
  - % breastfeeding at **24 hours** of birth
  - % breastfeeding at **one week**
    - Requires telephone interview if mother already discharged
    - Removes the bias due to different lengths of stay
  - % exclusive breastfeeding at babies **first immunization** (2 months)
    - Requires telephone interview
    - Less under hospital's control

c. Related performance indicators:

- Length of stay for uncomplicated vaginal delivery (Core – efficiency)
  - Expected relationship: Differences in length of stay imply differences in follow-up period for this indicator (but not for alternative indicators above). Hospitals with longer lengths of stay may have lower breastfeeding rate if women stop breastfeeding during the very first days after delivery but still during their hospital stay. On the other hand, the first days after delivery are crucial for successful breastfeeding and mothers longer at hospital may be able to receive more support.
- Result of patient surveys, limited to maternity patient (Core – Patient centeredness)
  - Expected relationship: A supportive environment for mothers and their babies should have a positive impact on both breastfeeding rate and patient experience/satisfaction.
- Caesarean section rate (Core – Clinical effectiveness)
  - Rationale: C-section interferes with the establishment of breastfeeding. A lower breastfeeding rate is observed among women after C-section delivery reflects a higher incidence of underlying maternal morbidity in this group.

d. Exogenous variables:

- Maternal factors: working mother, low maternal education level, low income, ethnicity (in some countries)
- Country or regional factors:
  - Governmental support, e.g. maternity leave, financial support to poor women who choose to bottle-feed, promotion through media, adoption of WHO code of breastmilk substitutes.
  - Cultural and social environment (e.g. father involvement, re-establish identity as “non mothers”, mother to mother networks).

e. Quality improvement strategies:

For a better understanding of differences in process that could explain difference in breastfeeding outcome, assess degree of compliance with BFHI ten steps to successful breastfeeding

- Binary variable: Baby friendly certification (233 facilities in CEE/CIS countries, for detailed number of facilities for each country, visit http://www.unicef.org/programme/breastfeeding/assets/statusbfhi.pdf)
- Self evaluation of the degree of verification of the BFHI ten steps to successful breastfeeding (breastfeeding promotion index) (see for instance postal questionnaire in Dulon et al. 2003):
  1. Have a written breastfeeding policy that is routinely communicated to all health care staff.
  2. Train all health care staff in skills necessary to implement this policy.
  3. Inform all pregnant women about the benefits and management of breastfeeding.
  4. Help mothers initiate breastfeeding within an hour of birth.
  5. Show mothers how to breastfeed and how to maintain lactation, even if they should be separated from their infants.
  6. Give newborn infants no food or drink other than breast-milk, unless medically indicated.
  7. Practice "rooming in" by allowing mothers and infants to remain together 24 hours a day.
  8. Encourage breastfeeding on demand.
  9. Give no artificial teats, pacifiers, dummies, or soothers to breastfeeding infants.
  10. Foster the establishment of breastfeeding support groups and refer mothers to them on

[1] World Health Organization, Fifty-fifth World Health Assembly, Global Strategy for Infant and Young Children Feeding, April 16 2002, A55/15

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[8] Healthy People 2000[8] World Health Organization, Fifty-fifth World Health Assembly, Global Strategy for Infant and Young Children Feeding, April 16 2002, A55/15

[8] Healthy People 2000

Descriptive sheets for PATH core set Patient centeredness indicators

Except for “last-minute cancelled surgery” all proposed indicators on patient centeredness rely on patient surveys. In this section, a single descriptive sheet is built for all indicators based on patient surveys. Its format is slightly different. Contrary to other descriptive sheets, no operational definition is provided, as we do not support a specific instrument. We present the surveys we found most often in the literature and decompose them according to the proposed components of patient centeredness. The second descriptive sheet provides definition and evidence to support the indicator “last minute cancelled surgery”.

Sheet 1: Last minute cancelled surgery
Sheet 2: Indicators based on patient surveys

Patient centeredness: Last minute cancelled surgery

1. Definition

Sub-indicator 1: cancelled one day surgery on day of surgery

Sub-indicator 2: last minute cancelled surgery for inpatient admission

a. **Numerator**: Total number of patients who had their surgery cancelled or postponed during the period under study and who meet inclusion criteria

b. **Denominator**: Total number of patient admitted for surgery during the period under study and who meet inclusion criteria

c. **Inclusion criteria**:

For inpatient, include all elective surgery (use of operating theatre), include both cancellations for clinical and non-clinical reasons, postponed to more than 24 hours. Specifically cover tracer procedures used for other performance indicators (e.g. readmission, mortality).

For ambulatory procedures, include both cancellations for clinical and non-clinical reasons, limit to "last minute" cancellations (see NHS definition), limit to tracer procedures used for the indicator on admission after day surgery and rate of one-day surgery.

d. **Definition**

A last minute cancellation is a cancellation on the day the patient is due to arrive, after the patient has arrived in hospital, or on the day of scheduled operation. This includes telephone cancellations made on the day of their operation or day of admission. An operation which is re-scheduled to a time within 24 hours of the original scheduled operation is considered as a postponement and not a cancellation

e. **Data collection**: Undertake prospective survey during one month (for day surgery), preferably during April-May 2004 (to avoid holidays)

2. Rationale – Justification for use

a. Burden:

- From a patient centeredness perspective:
  - Cancellation results in increased anxiety, disappointment and fear of being affected by major health problems, especially in patients undergoing major surgery, such as heart operations, and already strongly affected emotionally. Many patients feel sudden postponement or cancellation to be a strongly negative experience[1,2,3].
  - Unnecessary hospital stay or increased length of stay is observed when surgery is cancelled or postponed.
- From a clinical effectiveness perspective:
  - For some interventions, prolonged waiting time increases the risk of complications.
- From a financial perspective:
  - Unused sessions due to last minute cancellations are very costly for the hospital and restricts access.
  - Prolonged hospital stays have a financial impact on patients, hospitals, and the health system.
  - Unpaid missed day of work and travel to the hospital to undergo ambulatory surgery are also costly for the patient and/or persons accompanying him.
  - New preoperative assessment or additional exams are required if operation is strongly delayed or if change in condition of the patient can be expected.
  - ***Positive aspect***: over-booking of the operating room increases risk of cancellations on day of surgery but decreases risk of unused sessions and improves access.

b. Importance – Prevalence – Potential for improvement:

- Inpatients: 8.5% (Sweden, one hospital, heart operations)[4], 10%[5] (Northern Ireland, one hospital, total joint replacement), 17%[6] (US, one acute care hospital, all type of surgeries included), 31% (United Kingdom, one hospital, maxillofacial surgery)[7]
- Ambulatory patients (one day surgery): 0.61% for administrative or organizational reasons and 0.58% for medical reasons, and 0.81% for the patient not attending (Australia, cancellation after arrival at the facility)[8], 10%[9] (Canada, pediatric day surgery)
- Illustration of the potential for improvement: In a Spanish hospital, three years after implementing quality improvement actions (e.g. prior telephone call, surgical schedule centralization), cancellations were reduced from 12.38% to 3.35 %[10]. This result is supported by another observational study for ambulatory patients, in an English hospital, the rate of cancellation decreased from 8-12% in the years prior to in the intervention to 2.25% after implementation of a program pre-operative questionnaire and telephone screening[11].

c. Hospital impact:

- Observational study: Out of the 39 Australian hospitals taking part to the National Demonstration Hospital Program (NDHP), 11 reduced cancellation on the day of surgery by 20% or more[12].
- Most cancellations are occurring because of administrative problems and are hence thought to be avoidable. Common reasons for cancellations are lack of medical clearance and outpatient not attending surgery[13]. In most instances, those cancellations could have been prevented. In one study, 10% of all day pediatric patients surgeries were cancelled on day of surgery, and half of those cancellations were considered to be preventable[14].
- Potential strategies: (1) Improved patient evaluation or pre-admission assessment[15,16], liaison with general practitioners, communication between physician and patient, and patient education, (2) planning, schedule design and waiting list system, (3) Support via follow-up telephone calls or internet based systems.
- Hospital impact is limited when resources are too tight and hospitals have no autonomy to acquire additional resources (equipment, beds, staff).
- Cancellations caused by intercurrent disease are considered inevitable.

d. Validity:

(1) Impacts on patient experience (dim: PC[i])
(2) Is influenced by and impacts on use of operating room (dim: Eff[ii])
(3) Is influenced by and impacts on waiting time (access) (dim: RG[iii])
(4) *Cancellation for organizational factor,* reflects smooth process of care (Dim: Eff[iv])
(5) *Cancellation for patient factor,* reflects patient education and preparation (Dim: PC/RG[v])

Face validity:

Very high consensus on use in performance assessment systems under study: this indicator is currently used by ACHS, Maryland Quality Indicator Project, NHS, ORYX.

Construct validity:

- Several observational studies report a decrease in cancellations following implementation of preoperative assessment clinics (see above).
- In one study[17], stepwise logistic regression indicated that patients attending both the surgeon's office and the hospital perioperative clinic were less likely to have their surgery cancelled for reasons deemed preventable.

[i] Dimension: Patient centeredness
[ii] Dimension: Efficiency
[iii] Dimension: Responsive governance
[iv] Dimension: Efficiency
[v] Dimension: Patient centeredness perspective on responsive governance

Strengths: high consensus on use, high burden, large potential for improvement

Limits: burden of data collection, hospital impact limited by exogenous variables

3. To add meaning – Guide for interpretation

Screening tool				X							Conclusive assm^{nt}

a. Direction and targets: lower rate is preferred

b. Stratification – alternative measures:

Stratification:

- Patient related reasons (patient initiated): patient does not keep the appointment or suddenly refuses the operation.
- Medical reasons (physician initiated): the patient's health deteriorates or the preoperative investigations are not complete.
- Organizational reasons (hospital initiated): no operating theatre available, no intensive care beds available, no equipment available, because of previous operations exceeding expected schedule or arrival of emergency patients, staffing shortage, administrative reasons (e.g. no insurance, no signed informed consent form, lost file).

Alternative indicator: For cancellations for hospital-initiated reasons, median time after cancellation until surgery is done. This measure is not relevant for patient-initiated reasons (if he does not show up, it is likely that he renounced to the intervention and will not show up anymore) or clinical reasons (delay is conditioned by evolution of patient health status and not under hospital's control).

For further scrutiny and for internal use, we recommend hospitals to monitor specific reasons for cancellation by department.

c. Related performance indicators:

- Operating room unused session (Core – Efficiency) and occupancy rate (Tailored – Efficiency)
  - *Expected relationship*s is mixed.
  - Cancelled surgery may result in a wasted operating room session. In most instances, surgeries resulting in wasted operating room sessions are caused by patient medical, social or administrative factors.
  - Over-booking (to compensate for no show or last minute cancellation for medical reasons) of the operating room and very tight schedules may increase the risk of a procedure being cancelled because of unavailability of resources. In this instance, more cancellations or postponements for organizational factors are expected.
- Proportion of patients admitted on day of surgery (sub-indicator of "length of stay" – Core – Efficiency)
  - *Expected relationship is mixed*:
  - Selection bias: If operating room needs to be rescheduled and procedures are postponed just a couple of days before scheduled surgery, affected patients will not have been admitted yet if admission is on day of surgery but may be already admitted if it was planned earlier
  - Less flexibility: When patients are admitted on the day of surgery and condition changed, it might be difficult to adjust for surgery and it may result in cancellation.
  - Confounding factor effect: Both indicators are related with quality and organization of pre-operative care.

- Results of patient satisfaction/experience survey, especially on continuity of care, multidisciplinary teamwork (comprehensiveness), and patient education (Core – Patient centeredness)
  - *Expected relationship*: less cancelled surgeries associated with higher score on patient survey
- Median and variance of time on waiting list, for identical tracer procedure (Core – Responsive governance)
  - *Rationale:* all three measures are related with management of waiting list. Cancellation of procedures is disturbing the waiting list management and could results in a higher variance. A long time on waiting list increases the chance of evolution of disease or occurrence of concurrent conditions and also cancellation of procedure for clinical reason. Moreover, cancellation of procedures increases the time on waiting list for the patient.
- Admission after day surgery
  - *Expected relationship*: Positive.
    Admission after day surgery and cancellation of one-day procedure for clinical reasons are both expected to be associated with inappropriate patient selection for day procedure and, to a lesser extent, with inappropriate scheduling of procedures (e.g. too late).

d. Exogenous variables:

- Patient factors
  - Cancellation for clinical reasons: evolution of disease and concurrent conditions
  - Patient initiated cancellations:
- Hospital factors (degree of hospital influence depends on the context):
  - Urban / rural area
  - Clinical practice among anaesthetists as to which patients are cancelled for clinical reasons[18].
  - Type of surgery[19]
  - Proportion of emergency surgery
  - Availability of resources to match needs
  - Bed occupancy rate (especially for intensive care beds)
- Country or regional factors
  - Availability of resources to match needs
  - Flexibility regarding to hire staff and
  - Pressure on operating room due to long waiting times

e. Quality improvement strategies:

Open question to identify strategies to decrease:

- Describe organization (timing, content, nurse/surgeon/anaesthetist) of pre-operative assessment
- Describe educational material handed out to patient to prepare for the intervention
- Describe process for informed consent (on admission, on day of surgery or before scheduling surgery)

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3 Tait AR, Voepel-Lewis T, Munro HM, Gutstein HB, Reynolds PI. Cancellation of pediatric outpatient surgery: economic and emotional implications forpatients and their families. Journal of Clinical Anaesthesia 1997;9(3):213-219.

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Patient centeredness: Indicators based on patient surveys

Rationale for use:

- patient is the ultimate arbiter of patient centeredness
- patient perception impacts on compliance (and ultimately outcomes), loyalty and recommendations to friends[1]
- feedback on patient perception is useful to align patients' expectations and hospital's mission
- it can guide quality improvement efforts to better answer patients' expectations
- it allows to monitor impact of quality improvement initiatives
- it is a tool to increase accountability towards patient and community

Reliability & validity:

- strong rationale for use
- widely accepted – consensus on use
  - In our survey among participating countries: all 11 respondents (10 countries) answered "yes, certainly" to the question "would you consider measuring patient satisfaction/perception to evaluate yourself if you were proposed a standardised questionnaire"
  - Patient surveys are compulsory in the UK, France, and Belgium (Flemish region)
- standardized questionnaires have widely been tested for internal consistency and reliability
- responsive/proved useful

Burden of data collection is limited (data already collected in some countries/hospitals). However, for hospitals not yet using patient surveys, burden of instrument development is relatively high. This is probably one of the main reasons why many hospitals do not measure patient satisfaction/perception though they say they would be interested to do so. The WHO project would have an important role to play in supporting this step by suggesting a limited number of standardized questionnaires, and by providing a database of potential items.

Instruments:

- Many standardized patient survey questionnaires – thoroughly tested for reliability and validity- are available.
- Those instruments can be organized around three different approaches:
  - Factual measures – Patient experience with care received (e.g. Picker Institute[2]) – Scoring – Frequency of occurrence of an event (typically answers: "often" to "never")
  - Affective measures – Patient satisfaction or patient judgement (Parckside[3] / Press Ganey[4], Patient Judgement on Hospital Quality[5]) – Rating – Degree of satisfaction (typical answers: "very poor" to "excellent")
  - Gap between explicit expectations and realties of the service receive (e.g. Servqual[6])
- Each approach has its own strengths and weaknesses
  - Rating: What really matters from the patient point of view is compliance with his expectations. Based on the assumption that objectivity is unrealistic, proponents of this approach support that it is better to fully recognize and accept subjectivity factor. Differences in rating can reflect differences in underlying process or differences in patient expectations. A limit of this approach is that patients are reluctant to criticize which is a potentially serious threat to discrimination and hence validity.
  - Scoring: problem-oriented approach more sensitive to differences in quality; scorings are not built on patients' expectations and hence less sensitive to case-mix and cultural variations (as long as valid in the context), points more directly on specific events calling for improvement and hence more actionable upon, BUT not value-free, contextual-validity and generalization can be a concern; perverse incentives (to easily actionable upon - focus on specific aspects in questionnaire to increase score but not overall quality)
- Different approach can be used for different dimensions within the same questionnaire

Strategies to add meaning to patient survey results – for a further understanding

- Survey of initiatives implemented during this year in order to increase patient centeredness
- Complement with measures of the degree to which hospitals listen to their patients:
  - standardized instrument (Yes/No)
  - sample size - proportion of patient asked about their opinion
  - categories of patients concerned (specific questionnaires for ambulatory/paediatric/psychiatric/… patients?)
  - participation rate (%)
  - with whom information is shared (board, senior management, managers at department level, nurses at program of department level, physicians, other hospital staff, quality committee, community at large)
  - where relevant: translation of the survey available to accommodate people not speaking the official language
  - formal structure to record patient complaints (e.g. ombudsman):

Conclusion and recommendations

1. For hospitals NOT conducting patient surveys yet or using home-made tools, PATH proposes a limited list of standardized instruments, well agreed on, and provide written documentation to support in the choice
2. For countries, where it is still very uncommon to conduct patient surveys, work at the national level to limit the number of instrument in circulation
3. For hospital already conducting patient surveys using recognized standardized instruments, provide a bank of items to complement (and not replace!) the current instruments to make sure all the sub-dimensions in the framework are covered (and specific indicators can be computed for each sub-dimension)
4. Indicator inclusion in the final report: follow a flexible an empirically rooted strategy and adjust the report to the instruments ("customized" report)
   a. If the hospital is not using a standardized instrument:
      - Include in the hospital report only variations in hospital's score (how much did he improve or depreciate over the last year? or the last three years?)
      - Match the instrument's sub-dimensions to the framework and provide specific ratings (index scores) for each sub-dimension
   b. If the hospital is using a standardized questionnaire:
      - Similar to alternative a. (rating comparative to hospital itself in the past)
      - Moreover, provide ratings comparative to hospitals using the same instrument (name the "peer group", specify the number of hospitals on which it was compared, and provide in the appendix further information if useful)