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Measures of Hospital Efficiency and Quality

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Blutitude IDB

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Disclaimer

This report was completed in December 2023. More recent developments in the country or international experiences studies may have occurred since then and are not necessarily reflected in this report.

Acronyms

AHRQ	Agency for Healthcare Research and Quality
AMI	Acute myocardial infarction
ANS	National Supplementary Health Agency (*Agência Nacional de Saúde Suplementar*)
ANVISA	Brazilian Health Regulatory Agency (*Agência Nacional de Vigilância Sanitária*)
APM	Paulista Association of Medicine (*Associação Paulista de Medicina*)
CABG	Coronary Artery Bypass Graft
CCG	Clinical Commissioning Groups
CCSQ	Center for Clinical Standards and Quality
CDC	Centers for Disease Control and Prevention
CEMECE	Mexican Center for the Classification of Diseases (*Centro Mexicano para la Clasificación de Enfermedades*)
CFR	Code of Federal Regulations
CMS	Centers for Medicare & Medicaid Services
CNPSS	National Commission on Social Protection in Health (*Comisión Nacional de Protección en Salud*)
CONASS	National Council of Health Secretaries (*Conselho Nacional de Secretários de Saúde*)
CONEVAL	National Council for the Evaluation of Social Development Policy (*Consejo Nacional de Evaluacion de la Politica de Desarrollo Social*)
COP	Clinical Outcomes Publication
CQC	Care Quality Commission
CQH	Commitment to Hospital Quality Program (*Compromisso com a Qualidade Hospitalar*)
CSG	General Health Council (*Consejo de Salubridad General*)
DATASUS	SUS Department of Informatics (*DATASUS*)
DERAC or DRAC	Department of Regulation, Evaluation and Control (*Departamento de Regulação, Avaliação e Controle*)
DEMAS	Department of Monitoring and Evaluation of the SUS (*Departamento de Monitoramento e Avaliação do SUS*)
DHSC	Department for Health and Social Care
DIS	Health Information Division (*División de Información en Salud*)
eCQMs	Electronic Clinical Quality Measures
EHR	Electronic health records
FIOCRUZ	Oswaldo Cruz Foundation *(Fundação Oswaldo Cruz)*
FUNSALUD	Mexican Health Foundation *(Fundación Mexicana para la Salud)*
GP	General practitioner
HAC	Hospital-Acquired Condition Reduction Program
HAI	Health care-associated infections
HCAHPS	Hospital Consumer Assessment of Healthcare Providers and Systems
HCQI	Health Care Quality Indicators

HCQO	Health Care Quality and Outcomes Indicators
HF	Heart failure
HHS	Department of Health and Human Services
HOPE	Health Care Outcomes, Performance and Efficiency
HQA	Hospital Quality Alliance
HQIP	Healthcare Quality Improvement Partnership
HW	Hospital wide
IAC	Indicator Advisory Committee
IBROSS	Brazilian Institute of Social Health Organizations (*Instituto Brasileiro das Organizações Sociais de Saúde*)
ICB	Integrated care board
ICD	International Classification of Diseases
ICS	Integrated Care Systems
ICP	Integrated care partnership
IDB	Basic Data and Indicators (*Indicadores e Dados Básicos*)
IES	Institute for Health Ethics (*Instituto Ética Saúde*)
IMAS	Indicator Methodology Assurance Service
IMSS	Mexican Institute of Social Security (*Instituto Mexicano del Seguro Social*)
IMSS-Bienestar	Mexican Institute of Social Security – Wellbeing (*Instituto Mexicano del Seguro Social-Bienestar*)
INDICAS	National Quality Indicators System (*Sistema Nacional de Indicadores de Calidad en Salud*)
INSABI	Institute of Health for Wellbeing (*Instituto de Salud para el Bienestar*)
IOM	Institute of Medicine
IQR	Hospital Inpatient Quality Reporting Program
ISSSTE	Institute for Social Security and Services for State Workers (*Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado*)
LAC	Latin America and the Caribbean
LGS	General Health Law (*Ley General de Salud*)
MH 2015	Best Hospitals 2015 (*Mejores Hospitales 2015*)
MMIM	Medical Indicators Methodological Manual (*Manual Metodológico de Indicadores Médicos*)
MMS	Measures Management System
MoH	Ministry of Health (*Secretaría de Salud*)
MVH	Moinhos de Vento Hospital
NCCID	National Collaborating Centre for Indicator Development
NHS	National Health Service
NHS OF	NHS Outcomes Framework
NHSN	National Healthcare Safety Network
NICE	National Institute of Health and Care Excellence
NOM	Official Mexican Standards (*Normas Oficiales Mexicanas*)
NQB	National Quality Board
NQF	National Quality Forum
OECD	Organization for Economic Co-operation and Development

ONA	National Accreditation Organization (*Organização Nacional de Acreditação*)
OPD	Public decentralized entity (*Organismo Público Descentralizado*)
PAHO	Pan American Health Organization
PATH	Performance Assessment Tool for Quality Improvement in Hospitals program
PEMEX	Mexican Petroleum Company (*Petróleos Mexicanos*)
PHE	Public Health England
PN	Pneumonia
PNASH	National Assessment of Hospital Services Program (*Programa Nacional de Avaliação dos Serviços Hospitalares*)
PNASS	National Health Services Assessment Program (*Programa Nacional de Avaliação de Serviços de Saúde*)
PROADI-SUS	SUS Institutional Development Support Program (*Programa de Apoio ao Desenvolvimento Institucional do Sistema Único de Saúde*)
PRO-ADESS	Project for the Development of a Performance Assessment Methodology for Brazilian Health System (*Projeto Desenvolvimento de Metodologia de Avaliação do Desempenho do Sistema de Saúde Brasileiro*)
PROM	Patient reported outcome measure
PREM	Patient reported experience measure
QAPI	Quality assessment and performance improvement (QAPI) program
QUALISS	Qualification Program for Health Service Providers (*Programa de Qualificação dos Prestadores de Serviços de Saúde*)
SAEH	Hospital discharges data system (*Subsistema Automatizado de Egresos Hospitalarios*)
SESA	State Health Services (*Secretarías de Salud de los Estados*)
SINERHIAS	Information Subsystem on Health Care Equipment, Human Resources and Infrastructure (*Subsistema de Información de Equipamiento, Recursos Humanos e Infraestructura para la Atención de la Salud*)
SIH	Hospital Information System (*Sistema de Informações Hospitalares*)
SIMO	Medical Operational Information System (*Sistema de Información Médico Operativo*)
SUS	Unified Health System (*Sistema Único de Saúde*)
THA	Total Hip Arthroplasty
TKA	Total Knee Arthroplasty
WB	World Bank
WHO	World Health Organization
YNHHSC/CORE	Yale New Haven Health Services Corporation — Center for Outcomes Research and Evaluation

Executive summary

Hospital care is a critical component of health care delivery globally, with the Organization for Economic Cooperation and Development (OECD) countries allocating an average of 38% of total health spending to hospital services. In Latin America, this proportion varies, with countries like Chile, Costa Rica, and Mexico allocating 36%, 51%, and 29% respectively (2021 data). This highlights the importance of hospital performance assessment and improvement efforts.

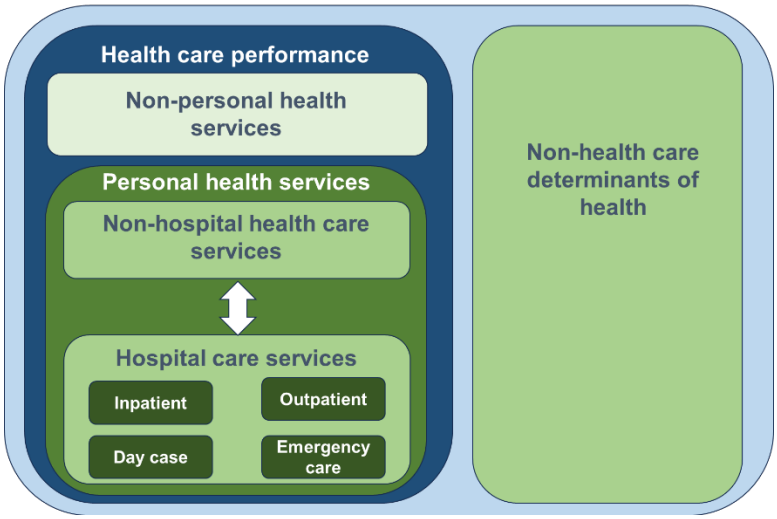
Given the significant role of hospitals in health systems, measuring hospital performance is essential for identifying variations in health outcomes, reducing ineffective care, informing policy, and minimizing disparities in performance across hospitals and regions through benchmarking.

Drawing upon a review of international and country-specific experiences — including those of Brazil, Mexico, the OECD, the United Kingdom (NHS), and the United States (Medicare) — this technical note:

1. Proposes a policy-oriented framework for measuring hospital performance in Latin America and the Caribbean (LAC).
2. Provides a short list of indicators and recommendations that can be used immediately to guide hospital performance measurement efforts in the region, with a focus on practicality, feasibility, and relevance.

The proposed hospital performance framework is based on the work developed by the OECD's Health Care Quality Indicators (HCQI) project, which contextualizes hospital performance within the broader healthcare and health system performance.

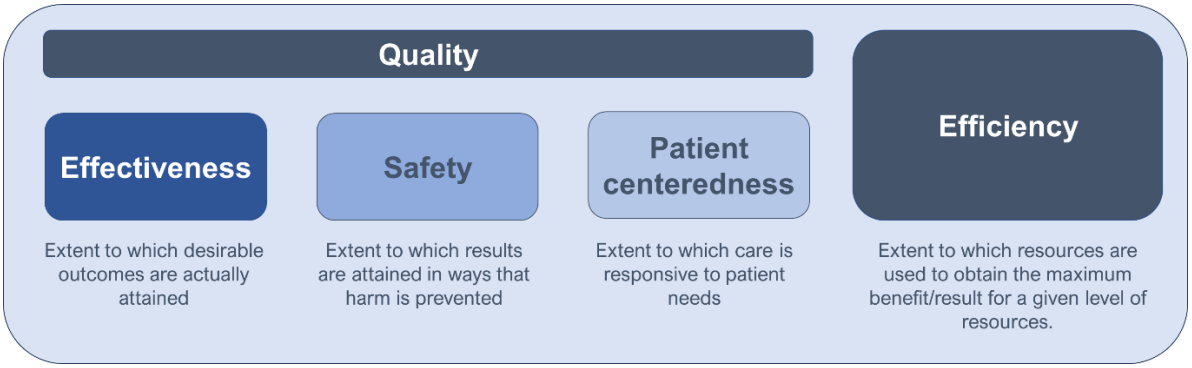
Hospital performance framework in the context of health care and health system performance



Source: Own elaboration based on Carinci et al (2015), Arah et al (2006), Murray and Frenk (2000).

The proposed framework aims to guide policymakers in the LAC region in improving hospital performance, reducing disparities, and optimizing resource allocation through systematic evaluation and benchmarking. By aligning with established international frameworks and considering both process and outcome indicators, this framework provides a structured approach to assessing hospital performance.

Proposed Hospital Performance Assessment Framework



Source: Own elaboration based on Arah et al. (2006), Carinci et al. (2015), Veillard (2005), WHO (2007b), WHO (2018).

The proposed framework considers quality of care and efficiency as critical dimensions, with equity being a vital perspective for analyzing variations in indicators to identify disparities between different population groups or regions.

Quality of care ensures optimal health outcomes and minimizes harm. It encompasses three subdomains — effectiveness, safety, and responsiveness/patient-centeredness. Effectiveness is defined as the extent to which desired health outcomes are achieved through evidence-based care. Safety refers to the ability to prevent and reduce harm in the delivery of care. Responsiveness/patient-centeredness addresses how well the health care system meets patients' non-health expectations and places the patient at the center of care delivery.

Efficiency relates to the optimal use of resources to achieve desired health outcomes. Efficiency indicators assess the relationship between inputs (such as costs and resources) and outputs (such as health outcomes), focusing on whether care is delivered cost-effectively.

Based on the review of international and country experiences and the proposed framework, a short list of indicators is recommended as a steppingstone for hospital performance measurement in the LAC region. These indicators are categorized into process and outcome measures under the dimensions of efficiency and quality (focusing on effectiveness):

Recommended short list of hospital performance indicators

Measure	Efficiency	Effectiveness	
	Process	Process	Results
	1. Average length of stay (-) 2. Bed occupancy rates (+)	3. Cesarean deliveries (-) 4. Laparoscopic surgeries (+)	5. Mortality rates (-) 6. Readmissions (-)

Note: Higher performance is associated with a reduction (-) or increase (+) in the indicator.

From this foundation, countries can start developing a hospital performance measurement initiative or strategy. The initial indicators were selected based on their relevance, feasibility, and potential to drive improvements in hospital performance. They are intended to be actionable and easily interpretable by policymakers and health care providers. Note that this selection is only meant to guide initial efforts, since there is a progression for these indicators depending on their complexity and feasibility of measurement, which must consider the characteristics of each country. More details on the indicators, their progression, and technical considerations are available in the technical note.

In the OECD, UK and US experiences, there are institutions and processes in place to agree on measures, conduct, report and revise the measurements. This is also the case for Mexico and Brazil, though to a lesser extent and often limited to specific subsystems or institutions. From the analysis of these experiences, it becomes clear that hospital performance measurement is not only about solving technical issues, such as calculating the indicators, but also addressing specific policy objectives and uses, and institutions that are crucial to the process. Based on the review of these experiences, the document also outlines a general process that countries may find useful when selecting and implementing hospital performance indicators, involving six steps:

1. Identify data sources and assess their quality: Start by evaluating available data sources, such as administrative data, discharge records, and electronic health records, to determine their quality and completeness. This assessment will guide the selection of indicators that can be adequately measured.

2. Set explicit objectives and intended audience and use: Clearly define the objectives of the performance measurement initiative and the intended audience. The goals should align with broader health policy priorities, such as improving quality, enhancing efficiency, or promoting transparency.

3. Define the scope of the hospital performance measurement: Determine the scope of the measurement effort, including the types of hospitals and services to be considered. This may involve starting with general hospitals or specific services, such as inpatient care.

4. Define and empower responsible entities: Identify and empower the entities responsible for implementing the performance measurement framework, ensuring they have the necessary authority and resources.

5. Select and review a set of indicators: Use established criteria, such as importance, scientific soundness, and feasibility, to select a set of indicators. Involve stakeholders in the selection process to ensure the indicators are relevant and actionable.

6. Define the mechanisms for dissemination: Develop a strategy for disseminating performance measurement results, considering the target audience and the intended use of the information. This may include publishing results to inform consumers, policymakers, and health care providers.

Alongside this general process, key recommendations for implementing hospital performance measurement in the LAC region include:

Adopt a gradual and practical approach to implementation: Begin with simple, easily measurable indicators using the available data and gradually expand the scope as data collection systems and capabilities improve. A gradual approach involves starting with the most basic level of data collection and coding, ensuring the creation or reinforcement of information systems. If they are already in place, make sure that information not only flows upward toward management, but is also part of a wider performance improvement policy that provides feedback at the hospital level.

Involve stakeholders: Engaging stakeholders, preferably from the early stages, helps to gain legitimacy and support for the initiative, as well as to obtain technical expertise in testing indicators.

Revise and evolve: Continuously review and update the set of indicators to reflect new scientific evidence, changing health care needs, and advances in measurement techniques. Ensure that the set of indicators remain relevant and actionable.

Use positive incentives: Link performance measurement to positive incentives, such as financial rewards or public recognition, to motivate hospitals to improve their performance. Even small incentives/disincentives may be useful, especially for private hospitals, but also for public ones.

Learn from international experiences: Adapt successful models to the specific context and needs of the LAC region. Learning from successful regional, country or within country experiences, and prioritizing the secondary level of care — where inefficiencies are generally most prevalent — are also critical considerations.

The report concludes by outlining a vision for the future of hospital performance measurement in the LAC region. It emphasizes the importance of establishing hospitals with exemplary performance as benchmarks to guide other institutions. Additionally, it suggests implementing a regional performance ranking system to enable cross-country comparisons, particularly among highly specialized hospitals. The technical note also advocates for the creation of permanent, independent organizations dedicated to hospital performance measurement, operating separately from health care providers and Ministries of Health, with their own governance and budgets.

A key recommendation is to adopt a bottom-up approach, fostering collaboration and buy-in at the hospital level to mitigate resistance to external evaluation. Positive incentives and alignment of goals are crucial for encouraging continuous improvement. By following these

recommendations, the LAC region can develop a robust framework for hospital performance measurement that enhances the quality, efficiency, and equity of health care.

Keywords: Health systems, Hospitals, Performance measurement, Efficiency of care, Quality of care.

JEL codes: I10; I12; I18

Introduction

Hospital care is a key pillar of health care delivery. Among OECD countries, hospital expenditures represent on average 38.2% of total health spending (2021 data). In Latin American countries like Chile, Costa Rica and Mexico, hospital expenditures in 2021 accounted for 36.1%, 51.1%, and 28.8%, respectively (OECD 2023a). Ensuring high performance of hospitals is increasingly becoming a policy concern, as reflected in international and country efforts and initiatives to measure and improve care.

Hospital performance is a broad notion encompassing both quality of care and efficiency. The former is central to achieving the best possible health outcomes and avoiding harm while the latter is crucial to secure that available resources are optimally used. Assessing hospital performance is also relevant to identify sources of potentially unjustified variations in health outcomes — both internationally and within countries and across subsystems — and in general, to guide efforts to improve health outcomes through the delivery of health care services. Moreover, hospital performance measurement can help reduce ineffective care or unnecessary resource use, and through benchmarking, to reduce unwarranted variations in quality of care between hospitals and geographic areas (OECD 2017a).

Hospital performance is influenced not only by internal processes but also by the overall health system. Therefore, considering the environment and context is critical to interpreting any performance indicator at the hospital level. For example, context will be relevant to fully understand whether extended lengths of stay result from poor hospital performance or from a broader health system issue, such as lack of medical equipment or services, or human resources. Similarly, hospital mortality rates following acute myocardial infarction may also be affected by how fast and responsive ambulance services are and the resulting conditions in which patients arrive at the hospital.

In addition, the relevance of discussing performance lies in the objective of obtaining better health results. However, measuring performance should not be considered a goal. Once countries start measuring, there must be a policy response and accompaniment including resource allocations or other measures to improve the hospital care delivery system. The emphasis in the commonly “missing link” between measuring and improving the health care system often results from a generalized lack of accountability, at the global level, but also more noticeably in the Latin American context. Therefore, learning from country or international experiences on how measurement is used to improve performance is highly relevant.

The aim of this technical note is to provide elements to support hospital performance measurement in Latin America and the Caribbean (LAC), by proposing: i) a policy-oriented conceptual framework for measuring hospital performance, and ii) a list of indicators that can be useful to guide efforts in this area in LAC countries. The underlying work to this technical note involved reviewing international frameworks, as well as experiences in hospital performance measurement aimed to support policy in Brazil, Mexico, the United States, the United Kingdom, and the Organization for Economic Co-operation and Development (OECD). These experiences were selected to provide a diverse mix of experiences covering Latin American countries (Brazil and Mexico), more developed countries with a track record of indicator development (United Kingdom and United States),

and an international experience (OECD) known for its longstanding tradition of indicator development and international benchmarking.

The technical note is structured as follows: Section 1 presents a proposed framework for measuring hospital performance. Section 2 offers some recommendations on the general process of selecting and implementing indicators, drawn from the review of international experiences. Section 3 includes a list of indicators that could be useful for further work in this area in the LAC region. Section 4 summarizes key challenges, opportunities and practical insights derived from expert interviews to guide potential hospital performance measurement initiatives in the region. Section 5 contains a review of hospital performance measurement experiences or case studies. Annex 1 provides some examples of hospital-level, wide-health system performance indicators. Annex 2 details the full set of indicators based on the review of international and country experiences. Annex 3 contains profiles for six proposed indicators, and Annexes 4, 5 and 6 list complementary indicators identified in Brazil, Mexico (IMSS) and the United States (AHRQ), respectively.

1. Framework for hospital performance measurement

This section presents a proposed framework for hospital performance measurement amenable to support policy initiatives in this area in LAC, based on a review of internationally used frameworks. The first subsection highlights key features of international hospital performance frameworks, contextualizing hospital performance within the broader notion of health care and health system performance. This is followed by a subsection where, drawing upon health care quality frameworks, a hospital-specific performance framework is presented, including the definition of its key measurement domains.

Hospital performance international frameworks, health care and health system performance

The frameworks considered include the OECD Health Care Quality Indicators (HCQI) project, the WHO Health Care Outcomes, Performance and Efficiency (HOPE) Project, and the United States' Agency for Healthcare Research and Quality (AHRQ).

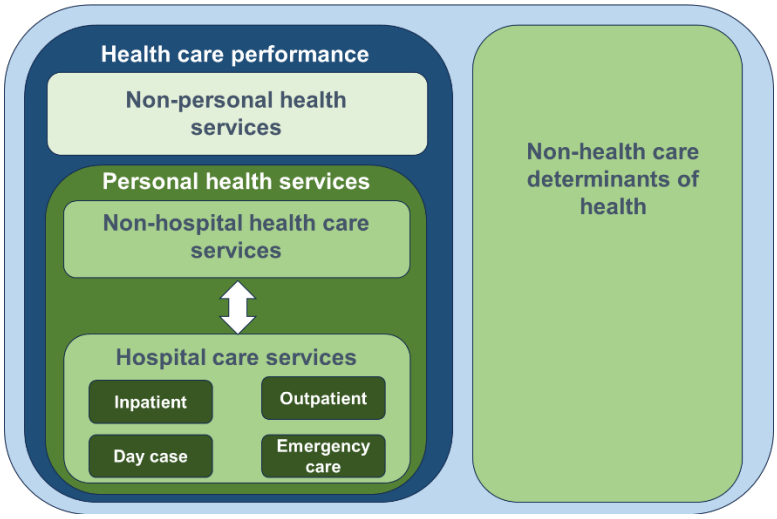
Some highlights from the review of these frameworks are as follows:

- Performance encompasses notions of quality and efficiency.
- The frameworks considered a health systems approach and, in some cases, draw upon broader health system performance assessment frameworks. This is particularly relevant in the context of this project, as the goal is to provide a tool that is useful for policy makers and further policy developments.
- In all cases, the frameworks are structured based on domains or areas of measurement and are intended to enable comparability. Although some of these frameworks provide health system wide indicators for international comparisons, they are also amenable to analyze within-country comparisons, such as between subsystems of health care delivery, institutions, regions, or hospitals.

The proposed framework mainly draws on the OECD HCQI project (Carinci et al. 2015, Arah et al, 2006), which in turn builds upon the work developed by the World Health Organization since the 2000s, leading to health system performance initiatives worldwide (Hurst and Jee-Hughes, 2000). The HCQI is also a long-established project resulting from a detailed review of existing performance frameworks, as well as periodic consultations with experts and member countries (Arah et al., 2006; Kelley and Hurst, 2006; Carinci et al., 2015). By design, the OECD's work strongly focuses on actionable indicators, i.e., indicators that are useful for informing and supporting countries' health policies and actions.

This pragmatic approach allows zooming in into health care performance assessment while keeping in mind a wider overarching framework of how personal health services affect health, alongside non-personal health services, such as the delivery of public goods, and non-health care determinants (see **Figure 1**). This is important because the meaningfulness and actionability of any performance measurement framework must be contextualized within the wider health care and health system performance assessment.

Figure 1. Hospital performance in the context of health care and health system performance



Source: Own elaboration based on Carinci et al. (2015), Arah et al. (2006), Murray and Frenk (2000).

The ultimate goal of health systems is to improve population health, not only by enhancing overall health levels, but also in terms of how health improvements are distributed (Arah et al., 2006; Murray and Frenk, 2000; WHO, 2007a)[1]. However, various factors influence health levels and their distribution, and the health system has varying degrees of control over them.

Non-health care determinants of health — including socio-economic or environmental conditions — fall outside the direct influence or traditional boundaries of the health system. Health systems attempt to address these determinants through intersectoral policies. However, most actions directly undertaken by health systems to influence health occur within the health care system itself. These actions involve the production and delivery of two types of health services: non-personal or public health services and personal health services. The former are services delivered to collectivities, and often involve the production of public goods, such as mass vaccination campaigns, collective health education, epidemiological surveillance, and regulation of the environment, food or drugs. In contrast, personal health services are consumed by individuals and are associated with what is traditionally known as “medical care”. These services comprise a wide array of services provided most often (but not exclusively) in health facilities, including hospitals.

Non-hospital services include primary care consultations and diagnostic, preventive and curative interventions. Hospital services specifically refer to outpatient care (mainly consultations and diagnostic procedures), inpatient care, day case procedures, and emergency care. Inpatient services are those delivered to patients requiring hospitalization and thus resulting in a hospital stay (Carinci et al., 2015; Arah et al., 2006; Murray and Frenk, 2000). Definitions of outpatient services can vary between countries, as can the classification of accident and emergency services, which may or may not be considered a

[1] Other health system goals are responsiveness, fairness in financing (including financial risk protection), and making an efficient use of available resources (WHO 2007a).

separate category of hospital services. How emergency care is organized and understood can substantially impact hospital performance.

While health system performance encompasses all factors potentially affecting health, including non-health care determinants, health care performance focuses more specifically on how well the delivery of health services meets established goals, mainly in terms of health improvements, but also in terms of equity and efficiency (Arah et al., 2006; Murray and Frenk, 2000). Since hospital care represents just one aspect of personal services within the broader health care system, hospital performance assessment should not be considered in isolation but as part of a comprehensive health care performance evaluation. This approach is relevant since patients often flow between levels of care and require multiple services provided across different care settings.

In publicly funded health systems in LAC, the relevance of any conceptual framework for measuring hospital performance is determined by its potential to enable ownership, facilitate actionable policy measures, and be linked to the rest of the health care system and an overall intention to improve performance in health care delivery.

Therefore, hospital performance measurement should be relevant to assess — either through international or within-country comparisons[2] — how well the hospital sector is performing and to inform overall hospital policies, as well as to encourage internal analysis to improve their own performance. From a health systems perspective, assessing hospital performance can be instrumental to enhance health outcomes, reduce unjustified or unwarranted variations in services, quality, and outcomes (equity), and optimize the allocation and use of available resources (efficiency). Benchmarking and systematic performance measurement also enable the identification of best practices and the tracking of progress.

Proposed hospital performance framework drawing upon international health care quality frameworks

Although there is no single definition of hospital performance, health services performance is usually ascertained through a comprehensive understanding of quality of care (Hurst and encompassing a series of indicators. Domains are useful to address different aspects involved in health care delivery and relevant for achieving expected health outcomes. There are multiple domains and aspects referred to in the literature, but nomenclature and definitions vary extensively (Arah et al., 2006). The WHO summarizes a set of dimensions or domains that emerge as desirable attributes for quality care (WHO, 2018) (see **Table 1**).

[2] Within country comparisons can include comparisons between institutions or subsystems, regions or hospitals.

Table 1. WHO quality dimensions

Dimension or domain	Definition
Core domain	
Effectiveness	Providing evidence-based health care services to those who need them.
Safety	Avoiding harm to people for whom the care is intended.
People-centeredness	Providing care that responds to individual preferences, needs, and values.
Other dimensions or attributes necessary to realize the benefits of quality care	
Timeliness	Reducing waiting times and harmful delays for both those who receive and those who give care.
Equity	Providing care that does not vary in quality on account of age, sex, gender, race, ethnicity, geographical location, religion, socioeconomic status, linguistic or political affiliation.
Integration*	Providing care that is coordinated across levels and providers and makes available the full range of health services throughout the life course.
Efficiency	Maximizing the benefit of available resources and avoiding waste.

*This dimension becomes particularly important when measuring health care performance, involving different health care settings.

Source: Extracted from WHO (2018).

The core domains shown in **Table 1** are equivalent to those considered in the OECD framework's conceptualization of quality, with the primary distinction being that *people centeredness* is referred to in the OECD's HCQI framework as *responsiveness/patient-centeredness*. Additionally, the OECD framework contains the integration of care, and efficiency and equity are considered separately (Carinci et al., 2015; Arah et al., 2006).

In this technical note, **hospital performance** is proposed to be measured in two broad dimensions or domains: **quality of care** and **efficiency**, following the same rationale of the OECD framework (see **Figure 2**).

Equity, rather than being considered a domain itself, is proposed herein as a perspective for further analyzing variations in indicators within domains, either across geographic regions or between health subsystems that cover different population groups. This is particularly relevant in countries with significant socioeconomic disparities or health system fragmentation.

Quality of care covers in turn three subdomains: effectiveness, safety, and responsiveness/patient-centeredness. Their definitions are drawn from the OECD framework (Arah et al., 2006) and reproduced as follows:[3]

- **Effectiveness** reflects the degree to which desirable outcomes are achieved, given the correct provision of evidence-based health care services to all who could benefit, but not to those who would not. This subdomain includes the notion of appropriateness.
- **Safety** reflects the ability to avoid, prevent, and reduce harmful interventions or risks for health professionals and patients, and for the environment. This implies that care provision relies on the right structures and processes to deliver services and attain results in a way that prevents harm.
- **Responsiveness/patient-centeredness** combines measures of whether care delivery responds to patients' non-health expectations and whether the health care system places the patient/user at the center of its delivery, thus providing care that responds to individual preferences, needs, and values. This broad set of concepts is increasingly being measured through patient experiences of health care and, lately, through more sophisticated tools to record patient-reported outcomes. Notions such as timeliness and acceptability are comprised in this subdomain.

Efficiency is defined herein in terms of technical efficiency or the optimal use of resources to attain certain output or results through the production of hospital care. It thus considers the relationship between inputs and outputs and questions whether a given result/output is produced at the least cost or resource use, or vice versa, whether results/outputs are maximized for any given level of resources use or expenditure (OECD, 2006). It is worth noting that low quality can also imply inefficiency.

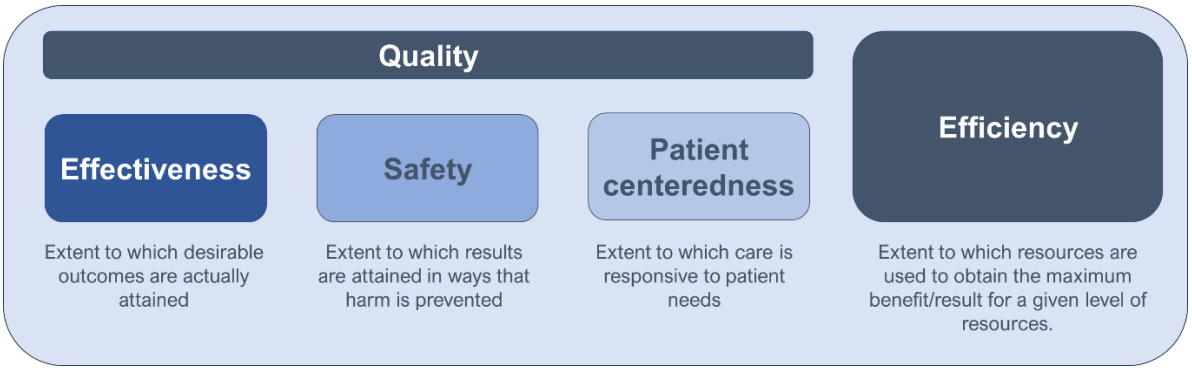
Efficiency involves considering the process of health care delivery as such, including productivity, but it also allows for the analysis of process and results indicators in relation to resources or expenditures (OECD Health Committee, 2012). For this reason, it is proposed to follow the OECD's route and visualize efficiency as a domain in addition to quality, rather than as a subdomain within quality as proposed by WHO (2018).

This compact framework enables to focus hospital performance measurement on hospital activity data, more specifically on hospital discharges or inpatient activity data. Other hospital services — including emergency care and outpatient care not involving a hospital stay, such as day case procedures (for example, some endoscopic/laparoscopic procedures, cancer care, hemodialysis), consultations, diagnostic and laboratory tests — are also **relevant but they are not part of the central focus of this technical note**.[4]

Figure 2. Proposed hospital performance assessment framework

[3] To a large extent these definitions are also consistent with those included in Veillard et al. (2005).

[4] Emergency care is closely related to inpatient health services. How a patient was managed in the emergency department before being admitted is likely to influence the number of resources needed and the outcome of that admission. Ideally, hospital performance assessment should also consider emergency care, but for the purposes of this technical note, it was considered necessary to focus only on inpatient care as a starting point.



Source: Own elaboration based on Arah et al. (2006), Carinci et al. (2015), Veillard (2005), WHO (2007b), WHO (2018).

The most often used quality indicators under these domains/subdomains tend to focus on processes and results/outcomes according the Donabedian model of quality of care assessment, whereas efficiency is more often linked to resources/structure or the relationship between outcomes and resources.[5]

The proposal to consider these domains and subdomains is consistent with the OECD and WHO frameworks referred above, as well as with some more recent literature reviews that highlight their prominence in the available literature (Carini et al., 2020). Performance measurement has been traditionally approached through quality assessment and only more recently through efficiency. The proposed framework allows to consider a gradual approach, perhaps prioritizing quality indicators before attempting to measure efficiency. Moreover, the proposed framework is useful to review in an orderly fashion the myriad of indicators found in international and country experiences.

It is also worth highlighting that hospital activity data is also useful for evaluating the performance of other services delivered in out-of-hospital settings. For example, measuring admission rates for primary-care sensitive conditions can help assess how effective is primary care in controlling non-communicable diseases, such as diabetes or hypertension. In principle, diabetic patients who are adequately controlled should not be expected to be admitted to a hospital with diabetes as a primary diagnosis. To illustrate this, **Annex 1** presents some examples of hospital-based indicators that are useful for assessing the effectiveness of primary care.

Finally, although health financing is not the focus of this technical note and hence no financial or financial-related efficiency indicators are included, it is important to emphasize the role of health financing in hospital performance. Financing is crucial both at the macro level — for discussions with Ministers of Finance about overall health sector budgets, productivity, and efficiency gains — and at the micro hospital level, when evaluating operating margins or productivity (even in the public sector). Furthermore, there is a link

[5] Donabedian defined quality of care in terms of the analysis of the structure, processes and outcomes of the services delivered. Structure corresponds to whether the setting and resources needed to deliver care are in place and are adequate. Processes involve how care is delivered and the extent to which this delivery is based on appropriate rules, criteria, technical competence, proper management, coordination, and continuity of care — in other words, everything that happens to attain a health outcome. Outcomes relate to the result of care delivery in terms of health recovery, restoration of function and survival (Donabedian, 2005).

between efficiency, quality, and health financing, which policymakers should also be aware of.

2. Recommended general process for selecting and implementing indicators

Based on the review of international experiences, it becomes clear that there is no one-size-fits-all process for both selecting and implementing indicators. However, from the experiences presented in **Section 5**, three elements are identified to varying degrees:

Graduality

The scope, number, and complexity of indicators advances as data sources evolve and more data on hospital activity become available. In some cases, like the US Medicare, piloting indicators before they have full effect on provider payments has been a way to instill graduality in the implementation. Similarly, the US CMS ***Blueprint Measure Lifecycle*** has provided a structured approach to develop, use, and review the indicators. Similarly, under the ***Care Compare*** website, the US also developed a *"Ten measure starter set",* which now encompasses over 150 hospital quality measures concerning the process of care, outcomes, and patient experience. Brazil has also included piloting indicators for private hospitals as a first stage under QUALISS. Gradual implementation can be supported through explicit policies but also through specific incentives, as shown in the US case where data collection was also incentivized (for more detail, see **Section 5**).

Involvement of various stakeholders

Engaging stakeholders (preferably since early stages) is helpful to gain legitimacy and support for the initiative, as well as to obtain technical expertise and to test indicators. In the US Medicare case, the Hospital Quality Alliance has enabled collaboration between public and private stakeholders, including consumers, hospitals, providers, employers, accrediting organizations, and federal agencies. In the OECD HCQI experience, in line with the organization's mandate, country experts have actively participated in developing indicators since the program's inception. In Brazil, the *Hospital Quality Monitoring Program* involved the PROADI/SUS alliance with private hospitals. On the other hand, Mexico's experiences comprise relatively less involvement from health sector-wide stakeholder throughout the process, beyond interactions with their internal constituencies. Independent organizations such as think tanks/charities or private entities can also play a role in promoting performance measurement and benchmarking. This is the case of work developed by the Nuffield Trust, The Health Foundation and The King's Fund in the UK, and the Best Private Hospitals ranking in Mexico (for more detail, see **Section 5**).

Revision and evolution

In all cases, the set of indicators is dynamic, with adjustments undertaken periodically. In most reviewed cases, there is a clear mandate or expectation for regular appraisal of indicators involving third parties. New indicators may be included, while existing ones are adjusted or eliminated. In terms of reporting periodicity, in most cases, reporting is annual, especially for the most widely used indicators.

In addition to these elements in common, the following **general steps** are suggested as an initial pathway for countries to consider when selecting and implementing indicators:

STEP 1. Identify data sources available and assess their quality

The choice of indicators depends on the type and quality of data available at the hospital level. Therefore, countries may start by doing a quick assessment of their data sources, evaluating their quality, and identifying potential areas for improvement or further development.

Data sources vary across international experiences, depending on the development level of each health system, its underlying structure, and the availability of hospital information systems. Hospital data sources can range from administrative and discharge data, claims data, electronic health records and patient registries, to patient surveys, or even surveillance systems, and vital statistics (see **Figure 3**). These sources vary in complexity, depending on the time and resources required for data collection, the availability of robust health information systems, and the extent to which these systems are interconnected and integrated into hospital routine operation.

Figure 3. Categories of hospital data sources*

* Data sources vary in complexity depending on the time and resources required for data collection, the availability of health information systems, and the degree of interconnectedness between these systems, among other considerations.

For example, Mexico and Brazil initiatives privilege discharge and administrative datasets, whereas the US Medicare and the UK NHS use electronic health/clinical records alongside patient surveys, in addition to discharge or claims data (for more detail, see **Section 5**).

Hospital discharges data tend to be the most standardized and systematized source of information on hospital activity. Moreover, it is one of the key data sources where efforts to implement standard best coding practices have been made over time. Most countries have moved toward recording basic minimum data sets for discharge activity and using ICD-coding for diagnoses and procedures. As a starting point, discharge data, along with administrative data relating to the number of beds and other hospital resources or activities, can provide the best option for developing performance indicators, while hospitals move toward more sophisticated data sources like electronic health records. Regardless of the data source chosen, quality checks to ensure appropriate registration and coding are fundamental (see **Box 1**).

Box 1. Improvement of coding practices in health systems: the Mexican case

Clinical coding systems are in place not only to simplify the complexities and ambiguities of language, but also to facilitate large-scale data analysis, providing essential insights into the scope, origins, and outcomes of illness and mortality. Coded clinical terms serve as basis for documenting and compiling health-related data and statistics across primary, secondary, and tertiary health care settings (Blundell, 2023; WHO ICD, 2023). Furthermore, the advantages of effective

clinical coding are evident at the individual clinician and patient level, at the hospital or practice level, and at the national and international levels. These data and statistics play a crucial role in supporting various aspects within the broader provision of health care services, such as payment systems, service planning and strategic resource allocation, quality and safety policies, and overall health research (Blundell, 2023; WHO ICD, 2023). In particular, the World Health Organization (WHO) *Family of International Classifications* (FIC) has served as a basis for globally comparable statistics on causes of mortality and morbidity (WHO ICD, 2023), as most countries have implemented the recording of basic minimum data sets of discharge activity using FIC-coding of diagnoses and procedures. Moreover, different efforts and strategies — including regulation, quality checks, and recurrent training to ensure appropriate registration and coding — have been implemented, regardless of the chosen data source and country.

1. Mexican Ministry of Health – health information regulation and CEMECE

In Mexico, there is a relatively robust regulatory framework for health information, which spans from the *General Health Law* (*Ley General de Salud* – LGS) to other more specific ordinances, including Official Mexican Standards (*Normas Oficiales Mexicanas* – NOM). The Ministry of Health, in its role as steward of the Mexican Health System, has the responsibility to *determine the periodicity and characteristics of the information that must be provided by the agencies and entities of the health sector, subject to the applicable general provisions* (Presidencia de la República 2023). In particular, the NOM-035-SSA3-2012 on health information, establishes the criteria and procedures that must be followed to *produce, collect, integrate, process, systematize, evaluate, and disseminate, health data or information* (Secretaría de Salud NOM-035-SSA3-2012 2012). It also requires the continued training of personnel responsible for coding, abiding to WHO guidelines, in accordance with the *International Statistical Classification of Diseases and Related Health Problems* (ICD), as well as the training of those in charge of operating health information systems (Secretaría de Salud NOM-035-SSA3-2012 2012).

The implementation of national health information regulation is also underpinned by the ***Mexican Center for the Classification of Diseases*** (*Centro Mexicano para la Clasificación de Enfermedades* or CEMECE). CEMECE serves as the national reference center for promoting and monitoring the correct use of the WHO FIC, including the ICD, the *International Classification of Functioning, Disability and Health* (ICF) and the *International Classification of Health Interventions* (ICHI). CEMECE also plays an advisory and training role to users of these classifications, solving any problems arising during their application, and hence contributing to improving the quality of health-related statistics in the country (Secretaría de Salud, 2016).

It is important to highlight that CEMECE does not operate as an independent structure within the Ministry of Health – it is headed and run by the General Directorate of Heath Information (Dirección General de Información en Salud – DGIS). Established in1985 following a WHO recommendation, CEMECE is a collegiate body within (and coordinated by) the Ministry of Health, with representatives from major public and private health providers in Mexico, such as the Mexican Institute of Social Security (IMSS), the Institute of Social Security and Services for State Workers (ISSSTE), and the National Institute of Statistics and Geography (INEGI), the main body responsible for generating official information, both statistical and geographical, in Mexico (Secretaría de Salud, 2016). As of 2008, CEMECE has been recognized as a **WHO Collaborating Centre for FIC**, one of two in the Latin American region, the other being the Ministry of Health of Argentina (*Ministerio de Salud de la Nación* or MSAL) (WHO, 2023).

2. Mexican Institute of Social Security (IMSS) – internal regulation and coding training process

Within the IMSS, the largest public health care provider in Mexico, additional internal regulation and training has been set up to supplement federal level regulations on health information, including coding, mainly through IMSS' Health Information Norm 2000-001-015 (*Norma en Materia de Información en Salud en el Instituto Mexicano del Seguro Social* – 2000-001-015). Of particular interest in this norm is the emphasis placed on coding. Among other responsibilities, the Health Information Division (*División de Información en Salud* – DIS) is charged with *implementing, documenting, maintaining, and guaranteeing that the classification and coding of data is carried out effectively…*[also] *defining indicators on coding quality to measure the assignment of imprecise, incorrect, and insufficient codes for the determination of well-defined diagnoses and content* (IMSS, 2023).

The DIS provides permanent training through recurrent national and regional forums, as well as more local training and awareness programs for all IMSS' personnel involved in coding, from health workers at the clinics and hospitals, to staff in local administrative entities (formerly known as delegations). Training encompasses at least the following aspects: i)

training and supervision of the coding process, and ii) quality control of information (IMSS, 2023). Most of these efforts primarily focus on personnel specifically dedicated to the clinical/patient file process in medical units (known as ARIMAC or OIMAC, in the case of tertiary level units).

Challenges ahead of the WHO ICD – 11 implementation and its role in hospital performance evaluation

The International Classification of Diseases, 11th Revision (ICD-11), represents a milestone in global health care, combining the standardization of health information with enhanced hospital performance evaluation. The gradual implementation of ICD-11 brings about a paradigm shift in hospital evaluation and health care delivery. It introduces updated disease categories and definitions that reflect modern medical knowledge. For instance, these detailed classifications enable more precise diagnoses and treatment monitoring, which are crucial for developing targeted treatment protocols and efficient resource allocation (WHO, 2023).

In principle, according to the WHO, the ICD-11 should provide a better basis for hospital performance (WHO, 2023) in aspects such as:

1. **Patient safety monitoring** allows for detailed tracking of patient safety incidents, including adverse events and medical errors, thereby improving health care quality and safety.
2. **Efficiency assessment in treatment:** ICD-11 granular categorization aids in evaluating treatment efficacy, enabling hospitals to refine their practices and enhance patient outcomes.
3. **Trend analysis of diseases or procedures:** hospitals can leverage ICD-11 to analyze trends within their patient populations, which is essential for performance evaluation, resource planning, and public health responsiveness.
4. **Resource and cost management:** the system underpins the calculation of Diagnosis-Related Groups (DRGs), which is crucial for efficient resource allocation and financial planning in hospitals.
5. **Quality of care evaluation:** ICD-11 enables hospitals to measure care quality, including clinical outcomes, patient satisfaction, and adherence to medical standards.

Despite its official rollout in 2022, the adoption of ICD-11 is a protracted process, with countries being at different stages due to diverse health care infrastructures and resource availability. The online nature of ICD-11 could facilitate a more expedited adoption through continuous updates, support, and training resources (WHO, 2023). However, the ICD-10 experience has shown that implementing new classifications and improving coding requires time and, most of all, a sustained effort at the national and hospital levels to guide and support the implementation, as well as an investment in human resources. CEMECE's role in the rollout of ICD-11 will be important.

Mexico's experience in public hospitals has been positive in this regard due to a continued effort spanning more than 20 years at the federal level to strengthen health information systems. This effort led, for example, to the setting up of instances such as the CEMECE, aimed at improving national statistics on focused issues such as maternal mortality and fatalities in general. Furthermore, the Mexican experience showcases the relevance of having dedicated personnel at the hospital level who receive constant support and training.

Sources:

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STEP 2. Set explicit objectives and intended audience and use

Most of the reviewed experiences explicitly set the objectives of the assessment. These objectives are directly linked to the scope and audience benefiting from the results. There can be multiple objectives, and the OECD case shows that transparency and accountability tend to be at the center of the initiatives, alongside goals to improve health care performance or quality. Obtaining value for money or efficiency is part of the objectives underlying the US Medicare and the UK NHS experiences (for more detail, see **Section 5**).

At the same time, defining the audience for these indicators is crucial, as it can even affect the specifications and construction of the measures. For example, US Medicare emphasizes consumer empowerment, allowing users to compare the performance between providers. Therefore, indicator results and thresholds are easier to interpret as they are designed for consumer's health care decisions, despite the underlying technical complexity in their calculation). Meanwhile, internal management and monitoring of institutional programs are at the center of Mexico's IMSS indicators (for more detail, see **Section 5**).

STEP 3. Define the scope of the hospital performance measurement

Determine the number and type of hospitals and services to be considered. Countries may choose to begin with general or secondary care hospitals or to focus solely on inpatient care vis a vis a zoom in into surgery or emergency care. A clear categorization of hospitals and services is useful to support this definition.

For example, the US AHRQ defined a national scope to assess the overall quality of care across multiple health subsystems, resulting in indicators at the national level. Mexico's MH 2015 and IMSS focused only on hospitals for the uninsured and for IMSS beneficiaries, respectively. Both MH 2015 and IMSS present results by groups of hospitals that are similar in size and nature. In Brazil, SUS initiatives focused only on hospitals receiving SUS funding. In most experiences, hospital performance is embedded into a broader health care performance or quality assessment (for more detail, see **Section 5**).

STEP 4. Define and empower responsible entities

Selecting and implementing indicators involves two main strands of work: a technical one and another involving political visibility and engagement. It is essential to identify areas within the Ministry of Health or equivalent entities that can lead/own the technical work, and, if necessary — depending on the aims and scope —, those who can lead the engagement and operation of the initiative. This is a necessary step for successful implementation.

Most international experiences reviewed suggest that hospital performance measurement is not an isolated initiative but is embedded in broader health care quality or performance improvement efforts. Therefore, securing support from high-level officials, congress mandates, or overarching national programs from the inception of the initiative is helpful to empower the entities responsible for implementation. In Mexico, either at the institutional level (like IMSS) or within the Ministry of Health, there are designated areas responsible for promoting quality and developing indicators. In the US, CMS has also a clear responsibility to link measurement to payments and monitor quality and transparency (for more detail, see **Section 5**).

Another approach to securing engagement is to incentivize reporting and quality/performance improvement. Among all the countries/cases considered in this technical report, the US stands out by explicitly using financial incentives. In the context of Medicare, the split between financing/purchasing and health care delivery facilitates the use of these incentives. In countries with a different system structure, like those in LAC, stakeholder ownership, public recognition, policy, and political support can play a more significant role in incentivizing continued engagement.

In terms of *who should evaluate* or *where to position the "measurement lens"* (in other words: *who* and *at what level*), some options include assigning to an external entity the responsibility of monitoring and evaluating the system, or to an entity within each individual hospital. This distinction is relevant when it comes to policy: where the evaluation responsibility lies greatly defines the policy scope. For example, evaluation at the system level tends to be aligned with regulation, while evaluation at the local/hospital level is seen more as part of an individual hospital's improvement process.

STEP 5. Select and review a set of indicators

In principle, the choice and definition of indicators can be made considering the criteria shown in **Table 2**.

Table 2. Criteria to assess and select indicators

Criteria	OECD Mattke et al. (2006)	OECD Carinci et al. (2015)	PATH Veillard et al. (2005)
1. Importance in terms of health care performance			
Health impact	What is the health impact associated with this problem? Does the measure address areas where there is a clear gap between actual and potential health levels?		
Policy importance or relevance	Are policymakers and consumers concerned about this area?	An indicator measures an aspect of quality with high clinical importance, a significant burden of disease, or high health care utilization.	Whether the indicator reflect aspects of functioning that matter to users and are relevant in current health care context.
Actionability or measured issue is susceptible of being influenced by the health system	Can the health care system meaningfully address this aspect or problem? Does the health care system impact the indicator independently of confounders like patient risk? Will changes in the indicator provide information about success or failure of policy changes?	An indicator measures an aspect of quality that is subject to control by providers and/or the health care system and is used at a national level for policymaking, monitoring or strategy development.	Framed as potential for use (and abuse) and sensitivity to implementation, refers to whether hospitals can act upon this indicator if it reveals a problem.
2. Scientific soundness			

Criteria	OECD Mattke et al. (2006)	OECD Carinci et al. (2015)	PATH Veillard et al. (2005)
Validity	**Face validity.** Does the measure make logic and clinical sense? **Content validity.** Does the measure capture meaningful aspects of the care quality?	Sufficient scientific evidence exists to support a link between an indicator's value and one or more aspects of health care quality.	In reference to the **indicator set**, whether it is acceptable as such by its potential users (***face validity***) and if all dimensions are covered properly (***content validity***), how do indicators relate to the underlying constructs they were designed to evaluate (***construct validity***). In reference to **measurement tools**, whether there is a consensus among users and experts that this measure is related to the dimension (or subdimension) it is supposed to assess (***face validity***), if the measure relates to the subdimension of performance it is supposed to assess (**content validity**), if the indicator is valid in different contexts (***contextual validity***), if the indicator relates to other indicators measuring the same subdimension of hospital performance.
Reliability	Does the measure provide stable results across various populations and circumstances? The reliability of each indicator is assessed through a literature review of studies evaluating the stability of results across populations or circumstances.	Repeated measurements of a stable phenomenon yield similar results.	Whether there is demonstrated reliability (reproducibility) of data.
Feasibility		In reference to international comparability, if an indicator can be derived for international comparisons without substantial additional resources.	If data are available and easy to access (burden of data collection).
International comparability		Reporting countries comply with relevant data definitions, and where differences in indicator values between countries reflect issues in quality of care rather than differences in data collection methodologies, coding, or other non-quality of care reasons.	

Source: Extracted and adapted from Carinci et al. (2015) and Veillard et al. (2005).

Countries may opt to rank these criteria depending on their priorities. The OECD and WHO indicators have successfully passed these filters. Similarly, in the selection of indicators the US Medicare has considered the overall importance of the quality aspects being measured, the scientific soundness of the measures, and their feasibility (for more detail, see **Section 5**).

In most cases, the selection of indicators is subject to discussion with experts and other stakeholders engaged in the process of developing and implementing them. Brazil's QUALISS used a framework and undertook a literature review and consultation with experts and hospitals to develop its set of indicators. These are discussed in a Steering Committee that include hospital experts and medical societies, employing well-established methods to reach consensus. Mexico's MH 2015 was developed using the WHO's PATH framework and contributions from Ministry of Health experts, who considered the characteristics of the available information. Mexico's IMSS develops its indicators based on its own technical experts' input. In OECD's HCQI, indicators were developed and further reviewed through groups that included experts and country correspondents. At a higher level, validation and political engagement is done through the OECD Health Committee (for more detail, see **Section 5**).

In some cases, external technical support is also used to inform the development of indicators. For example, in the US, the CMS liaised with the Yale New Haven Health Services Corporation — Center for Outcomes Research and Evaluation (YNHHSC/CORE) to update some indicators reporting through a process of measure reevaluation. Similarly, the AHQR, in its early stages, was supported by the Institute of Medicine (IOM), which provided the criteria for selecting quality measures (these criteria are very much in line with those synthesized in **Table 2**) (for more detail, see **Section 5**).

The review process not only includes adding new indicators but also modifying or discontinuing existing ones. Some identified reasons for discontinuing or modifying indicators are: i) when an indicator is deemed as not representing high-quality care in light of new scientific evidence or changes in clinical recommendations; and ii) when values obtained are, for most players, at or close to its highest possible value, which may limit the indicator's value to monitor progress or improvements over time. This is the case, for example, of indicators that measure levels of achievement or coverage. For instance, Medicare's Measures Management System identifies specific criteria for modifying or discontinuing of indicators (for more detail, see **Section 5**).[6]

STEP 6. Define the mechanisms for dissemination

[6] The CMS' Measures Management System, specifically the *Blueprint Measure Lifecycle,* includes processes of measure production and monitoring, continuous evaluation, and three types of measure maintenance reviews: annual updates, comprehensive re-evaluation, and early maintenance review (CMS, 2023b). Maintenance reviews can result in **5 different outcomes depending on the results**: retain or revise, retire, suspend, or remove. Specifically, measure retirement can occur due to different criteria, among which the following stand out: *no longer adds value commensurate with the cost of data collection and reporting*; *does not align with current clinical guidelines or practice*; *measure performance is so high and unvarying that CMS can no longer make meaningful distinctions and improvements in performance*; *the availability of a better measure*, among others (CMS, 2023b).

Regarding dissemination, it is important to consider the target audience or users and how to effectively reach them. Countries like the UK utilize multiple indicators through different programs, depending on their scope. For example, the Clinical Commissioning Group Indicator Set uses certain indicators to inform the commissioning of hospital services. In contrast, Mexico's IMSS makes use of the indicators only internally to support policies, whereas the MH 2015 exercise attempted to shed a more open light towards the issue of hospital performance measurement and benchmarking through a formal publication intended for any audience. In this case, MH 2015 could have guided the demand/users if the possibility of choosing a hospital had been available. Without consumer choice, the relevance of publicly available benchmarking results is limited to increasing awareness and transparency. In such cases, dissemination could be targeted at the local level or at the system level, to direct resources or for accountability purposes.

In contrast, in the US, where consumer choice is widespread, Medicare uses most of the indicators to support CMS programs aimed at improving quality and has placed great importance on empowering consumers. In consequence, the Care Compare website is central to disseminating results, similar to the AHQR report. The OECD, for example, uses indicators as benchmarks to support the shared learning of experiences and joint policy developments intrinsic to the OECD membership, alongside publishing periodical datasets (OECD Data Explorer) and reports (Health at a Glance) for the wider general audience. These are public goods serving all stakeholders, whether internal or external, who are interested in health policy. **Box 2** illustrates the cases of US Medicare and Mexico's IMSS (for more detail, see **Section 5**).

Box 2. Relevance of audience and users of hospital indicator webpages: the cases of Care Compare – United States Medicare and IMSS Health Indicators internal web page

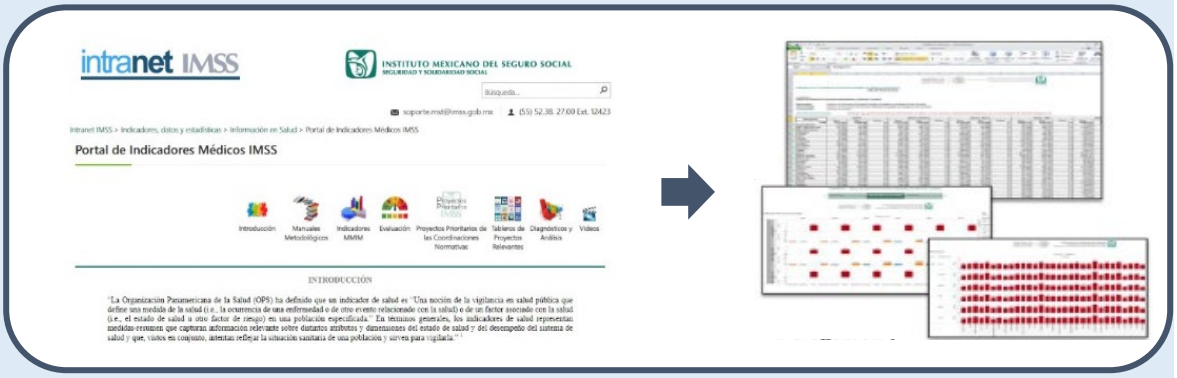
Reporting of health care indicators on government websites is a common feature in several health systems and can serve different purposes. In the case of hospital efficiency and quality measures, it is a powerful tool for enabling more accessible comparability of performance at different levels — including international, national, regional, hospital and even health service levels. It can also serve to push forward transparency and accountability in hospitals. Nonetheless, the audience and users of these web pages are crucial, as in a way they shape the structure, content and characteristics included in them. Here are two examples from the countries examined in the report:

IMSS Health indicators internal web page

As part of the final phase of evaluating different health measures within IMSS, and in compliance with institutional regulatory provisions, the results of all indicators included in the *Medical Indicators Methodological Manual* (*Manual Metodológico de Indicadores Médicos* – MMIM) are published in an ***intranet portal*** managed by the Epidemiological Surveillance Coordination. The information on the website, including measures of hospital efficiency and quality, **is available for consultation by institutional staff only and cannot be accessed by outsiders**. This means users of the website include only IMSS personnel at different levels and with distinct responsibilities — from hospital and service directors more locally, to individuals responsible for health policy at the national level (*Health Benefits Directorate*) and regional level operation (*Deconcentrated Administrative Operation Entities* or OOAD) (IMSS, 2023; IMSS, 2019).

The website includes various analysis and products, including current and historical data on medical indicators, some of which can be reviewed at national, regional and hospital levels comparatively through Tableau visualizations (see **Figure 1**). It also includes a performance evaluation made up of different indicators at the hospital, OOAD and tertiary level units (IMSS, 2023; IMSS, 2019).

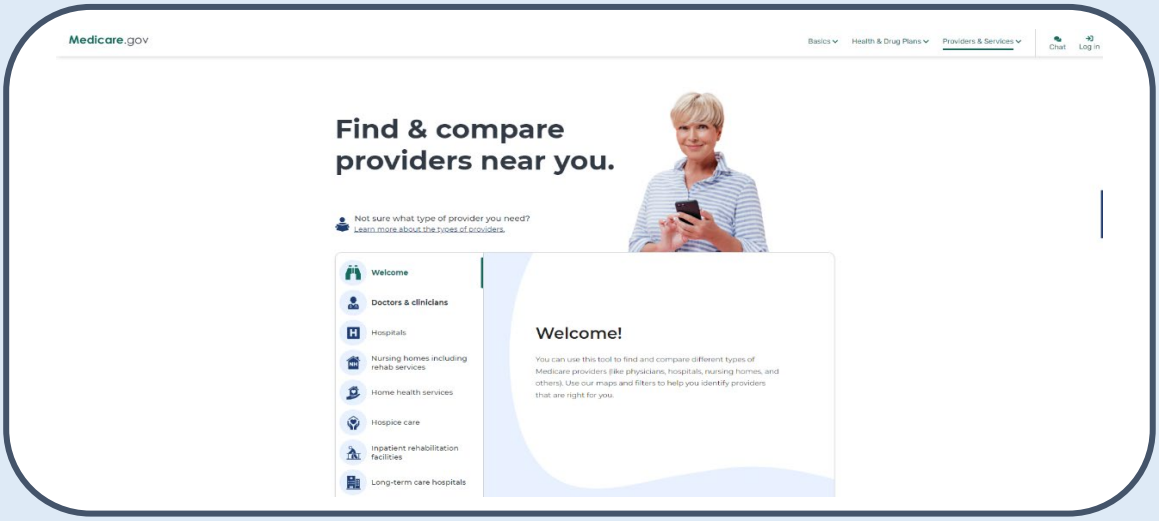
Figure 1. IMSS Health indicators intranet web page and possible data visualizations



Care Compare – Medicare web page

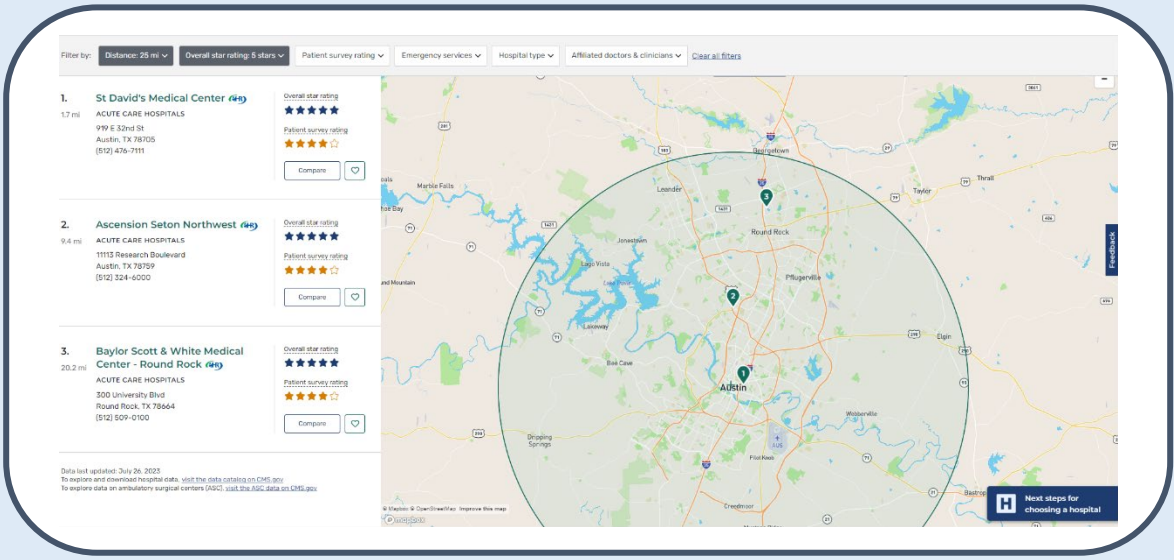
In 2020, the Hospital Compare website was merged with other Centers for Medicare & Medicaid Services (CMS) "Compare" websites into the single Care Compare website (see **Figure 2**). The site includes Medicare-certified hospitals, Veterans Administration (VA) medical centers, and military hospitals. It was created by CMS in collaboration with other federal agencies, as well as organizations representing people with Medicare and other stakeholders (CMS, 2023). Although the website was primarily meant as a tool for people with Medicare, it provides useful information for decision-making to those who may not have Medicare (CMS, 2023).

Figure 2. Care Compare homepage



The website features clear maps and filters that help users to compare among providers, empowering consumers to make informed health care decisions (see **Figure 3**). Care Compare is a consistent, unified, and credible one-stop shop for health care services, including those delivered in hospitals (CMS, 2023). Nonetheless, the webpage is careful to point out that the data shown on the site, including hospital ratings, should not be considered an endorsement or advertisement by the federal government of any provider, not assuming any legal liability that could arise from this information (CMS, 2023).

Figure 3. Hospital comparative through rating and distance



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- IMSS. Infosalud health information repository (accessible only via the Institution's Intranet service. 2023. http://intranet/datos/infosalud/Paginas/Indicadores_Medicos.aspx

3. Key hospital performance indicators, data inputs and core criteria required for calculation and interpretation

This section provides an overview of indicators drawn from a review of country and international experiences. It presents a set of hospital performance indicators that are used internationally and are recommended as a general guide to promote performance measurement. It also proposes a short list of indicators selected from this broader overview and set of indicators, which Latin American countries can adopt to move forward more quickly in their performance measurement initiatives.

An indicator matrix of the full set of measures drawn from the review of international and country experiences, contained in **Section 5,** is included as **Annex 2** (Excel file). This matrix comprises a total of 95 indicators (15 from Brazil, 9 from Mexico MH 2015, 18 from Mexico IMSS, 14 from OECD, 15 from UK NHS, and 24 from US Medicare). The indicators vary with regards to the domains and subdomains covered, based on the conceptual framework. **Table 3** summarizes the 95 indicators, grouping them by domain and subdomain. Most indicators are classified under the *Quality* domain, mostly within the *Effectiveness* subdomain as *Results or Outcomes*.

Table 3. Indicator matrix* classification by domain and subdomain

Domain / Subdomain	Number of indicators
Efficiency	**14**
Process	14
Quality	**81**
Effectiveness	**45**
Process	14
Results or Outcomes	31
Responsiveness/Patient centeredness	**8**
Process	5
Results or Outcomes	3
Safety	**28**
Process	3
Results or Outcomes	25
Total general	**95**

*The full indicator matrix is included as Annex 2 (Excel file).

From the broad indicator matrix, **Table 4** showcases key types of indicators and examples of specific indicators.[7] These are listed by domain and potential progression in complexity linked to data sources or calculation methods, both within the domain and within specific indicator categories. These types of indicators aim to illustrate a potential path or menu that countries can consider based on their policy priorities and the availability of hospital level data. Indicators were chosen considering their frequency of use, ease of calculation using

[7] The list considers only inpatient hospital care. Emergency care, day case procedures or short stays are not considered.

administrative and discharge data, and their potential to set an agenda for the development of more complex indicators in the future. It is worth noting the advantage of prioritizing indicators that are widely used, have been tested, and allow for international comparisons, such as those from the OECD HCQI.

Table 4. Types of indicators useful to guide performance measurement efforts

Quality			Efficiency
Effectiveness	**Safety**	**Responsiveness/ Patient centeredness**	
Process indicators			
Rates per 1,000 or percentages of procedures delivered for specific conditions (appropriateness of care) • Caesarean sections* • Laparoscopic procedures (appendectomy, cholecystectomy, repair of inguinal hernia, hysterectomy)*	**Proportion of patients receiving care to prevent adverse events** • Venous thromboembolism prophylaxis	**Timely surgery** • Emergency hospital admissions and timely surgery for fractured proximal femur • Hip fracture surgery initiation for patients aged 65 and over within two days of admission*	**Average length of stay** • Average length of stay can be presented as it is or also be standardized • All causes/ all discharges* • Cause-specific
Rates per 1,000 or percentages of support procedures delivered for specific conditions (adherence to best practices) • Antithrombotic therapy administered in ischemic stroke patients by the end of hospital day 2 • Anticoagulation therapy or statin medication prescribed at discharge in patients with ischemic stroke			**Bed occupancy rate** • All hospital beds* • Type of service (inpatient vs non-inpatient: ICU, etc.)
			Bed turnover / substitution rate • All hospital beds • Type of service (inpatient vs non-inpatient: ICU, etc.)
Results or outcome indicators			

Mortality rates
• Rates can be crude or standardized by age/sex, case-mix, or patient risk
• General intrahospital or specific by:
  • service/specialty, condition, or procedure (surgical, acute myocardial infarction (AMI), stroke, coronary artery bypass grafting (CABG)
  • population group-specific (maternal, neonatal, perinatal)
• AMI or stroke mortality within 30-days after admission*
• Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk standardized mortality
	Adverse events
	• Adverse events in hip and knee surgeries: postoperative pulmonary embolism or deep vein thrombosis in hip and knee surgeries*
	• Deaths from venous thromboembolism (VTE) related events within 90 days post-discharge from hospital
	• Incidence of falls resulting in injury
		Patient Reported Outcome Measures (PROM)
		• Adjusted mean change between pre- and postoperative Oxford Hip Score and HOOS-PS (Scales: Oxford 0-48; HOOS-PS 0-100)*
		• Adjusted mean change between pre- and postoperative Oxford Knee Score and KOOS-PS (Scales: Oxford 0-48; HOOS-PS 0-100)*
		• Patient Reported Outcome Measures (PROMs) for elective procedures (4 procedures –	

Quality			Efficiency
Effectiveness	**Safety**	**Responsiveness/ Patient centeredness**	
• 30-day risk-standardized mortality rates following admission for 5 conditions (acute myocardial infarction (AMI), chronic obstructive pulmonary disease (COPD), heart failure (HF), pneumonia, and stroke admissions) or 1 procedure (isolated Coronary Artery Bypass Graft (CABG) Surgery)		reported separately): a) Hip replacement (primary and revision), b) Knee replacement (primary and revision), c) Groin hernia (primary), d) Varicose veins (primary)	

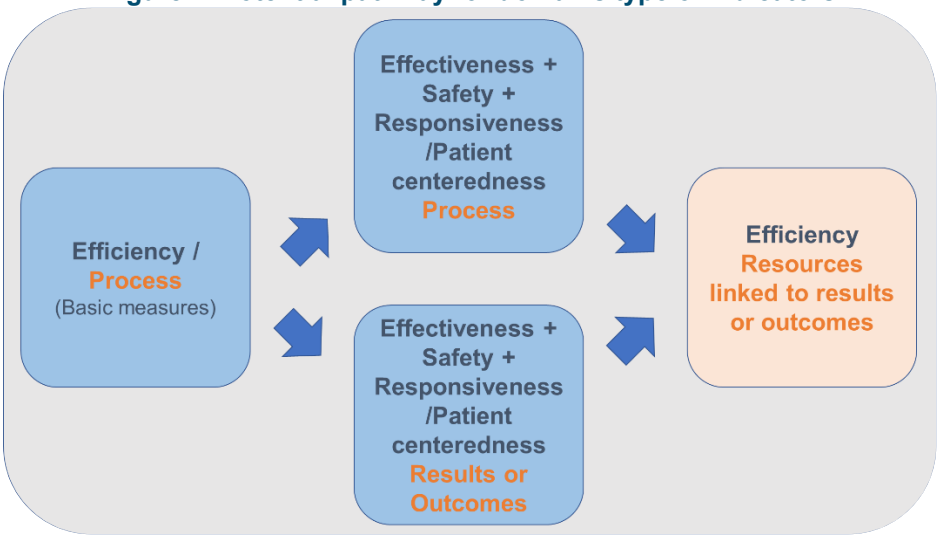
Readmissions rates
• Intrahospital service/specialty/department, condition, procedure specific (surgical, AMI, stroke, other)
• Time elapsed or events occurred (readmissions) from discharge (includes intra and out of hospital)
  • Proportion of readmissions within 30 days of hospital discharge
  • Emergency readmissions within 30 days of discharge from hospital
  • Hospital-level 30-day risk-standardized readmission rates (RSRRs) following 4 conditions (AMI, COPD, heart failure, and pneumonia admissions) or 3 procedures (CABG, surgery, elective primary total Hip arthroplasty, and/or total knee arthroplasty)
	Infections rate
	• Per service type or population-group specific
	  • Neonatal mortality related to infections associated with health care
	• Procedure-related or bacteria specific:
	  • Post-operative sepsis – abdominal discharges*
	  • Catheter-associated urinary tract infection (CAUTI) outcome measure
	  • Rate of bloodstream infection associated with central venous catheter
	  • Incidence of Health care Associated Infection (HCAI) – C. difficile		

Complications • Severe obstetric complications • Procedure-Specific Complication (PSC): Hospital-level 90-day risk-standardized complication rates (RSCRs) following an elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) procedure			
Recovery after a procedure • Proportion of patients with hip fracture recovering to their previous levels of mobility/walking ability, produced at 30 or 120 days – two separate indicators			

* These indicators are included in the OECD HCQI initiative. OECD mortality indicators are population standardized.

In terms of domains and type of indicator (process or results/outcome), a potential pathway or progression is depicted in **Figure 4**. The main takeaway is that efficiency-process indicators are the easiest to produce and subsequently, countries can work in parallel on either process or results/outcomes indicators for the core quality domains. From the review of international experiences, more complex efficiency measures of hospital performance have yet to be fully incorporated into institutional programs.

Figure 4. Potential pathway for domains/type of indicators



Note: Effectiveness, safety and responsiveness/patient-centeredness are part of the quality domain.

Furthermore, from the indicators included in **Table 4**, a short list of proposed measures has been selected to form a "basis" from which countries can start developing a hospital performance measurement initiative or strategy more immediately (see **Table 5**). Note that this selection is only intended to guide initial efforts, considering the review of the country experiences presented before. As noted earlier, there is a progression for these indicators depending on their complexity and feasibility of measurement, in which the characteristics of each country must be taken into account. **Annex 3** contains the detailed profiles for the six proposed indicators indicated below.

Table 5. Short list of proposed indicators (selection)

	Efficiency	Effectiveness	
	Process	Process	Results
Measure	1. AloS (-) 2. Bed occupancy rates (+)	3. Cesarean deliveries (-) 4. Laparoscopic surgeries (+)	5. Mortality rates (-) 6. Readmissions (-)

Note: Higher performance is associated with a reduction (-) or increase (+) in the indicator.

3.1. Progression in the measurement of indicators

Regarding the specific potential progression in the measurement of indicators, usually the simplest form of indicators, such as mortality rates, readmissions, or average length of stay, consider all ages and conditions (primary diagnosis) — or fatalities in the case of mortality rates — recorded in discharge data. A next step is to narrow the indicator to a specific condition (such as acute myocardial infarction or hemorrhagic and/or ischemic stroke) or procedure (for example, following a coronary artery bypass grafting). These examples represent cases where health outcomes are amenable to health care and avoidable mortality, and where the identification of the condition is more straightforward. However, in some cases they may reflect more than just effective hospital care processes, such as how fast patients are transported to the hospital and cared for in the emergency department. To disaggregate some indicators by diagnostic categories, the OECD uses a shortlist of hospital morbidity.[8] This is, for instance, the case for average length of stay. Indicators such as the percentage of caesarean deliveries or specific laparoscopic procedures are, by definition, procedure-specific.

Alternatively, the indicator can be specific to a particular population. This is typically the case of maternal, neonatal, or perinatal mortality rates. Some countries include modules with more detailed information on births in their discharge data.[9] When this is not available, some countries may resort to maternal health programs, which may record data on deliveries and their outcomes in hospital settings.

A further step involves indicators with a longer or more extensive follow-up of patients, even after they have been discharged from hospital or referred to other levels of care. This requires more sophisticated and integrated information systems capable to track and link patient data using unique identifiers throughout the health system and other datasets (e.g., mortality records). An example of this would be deaths from venous thromboembolism (VTE)-related events within 90 days post hospital-discharge.

Most indicators shown in **Table 4** can be drawn from discharge data. The feasibility of estimating condition- or procedure-specific indicators depends on how complete the discharge data recorded is, including the quality in coding diagnosis and procedures. Completeness requires, for example, adequate recording of variables such as the primary and, if possible, secondary diagnosis, procedures performed, and dates of admission and discharge. Additionally, some efficiency-related indicators, like bed occupancy rates, also require information on hospital infrastructure, such as the number of beds. Patient Reported Outcome Measures (PROMs) are obtained from standardized validated patient surveys, thus requiring a different data collection and processing within hospitals.

3.2. Standardization and other comparison methods

Indicators can be calculated at the hospital level and aggregated to subnational or national levels. Yet, ensuring comparability as much as possible, is essential, regardless of the level at

[8] Available at: http://stats.oecd.org/wbos/fileview2.aspx?IDFile=e477970b-3024-4188-8dc6-13f3db201846

[9] This is Mexico's case. For more information on the discharge data recorded refer to: http://www.dgis.salud.gob.mx/descargas/egresos/pdf/Formato_Egresos_2023.pdf?=2022.12.22

which indicators are estimated or used for benchmarking. **Standardization** is particularly important to enable comparability of outcome indicators, such as mortality rates, since other factors — beyond the specific health care received — may influence the results, including differences in patient characteristics or hospital case-mix. Standardization is also relevant for other indicators, such as length of stay.

There are different methods to standardize indicators. The most straightforward one identified in the review of country/international experiences is **direct standardization.** This method is based on the traditional epidemiological approach, whereby the age or age/sex-specific rates or means observed for a particular hospital (country or region), are weighted by the age or age/sex specific structure of a reference population. The simplest form of standardization is by age, but age-sex or age-sex-procedure, or condition-specific standardization can also be used.

The OECD HCQI and MH 2015 use direct standardization, whereas more sophisticated **indirect standardization** methods, involving regression analysis to adjust for patient risk, tend to be used in the US and the UK.[10] The OECD employs direct age-sex standardization with specific-disease populations for 30-day mortality rates for acute myocardial infarction (AMI) and stroke, yet in some hospital-level pilot data collections, they also use indirect standardization. The 2013 OECD population serves as the reference population since these indicators are meant for comparison among OECD countries. MH 2015 uses direct standardization with aggregate discharges as the reference population (for more detail, see **Section 5**). Direct standardization enables comparisons among hospitals, regions, or countries. It has been reported that this method may have larger variances for hospitals with lower number of cases, but if the priority is to undertake benchmarking exercises, this would be the preferred choice.

When key information is not readily available in datasets (for example, diagnoses), the next best option to ensure comparability is to group hospitals with similar characteristics. That is, comparing within **groups of hospitals** defined by **type of hospital** or by **size,** considering the number of inpatient beds. Although this has several caveats, if the focus is on the public sector, for example, hospitals tend to be more homogenous. This is relevant not only to types of hospitals, but also to those that are “monothematic” (purely psychiatric, obstetric, cardiological, oncological, etc.). For instance, in Mexico, MH 2015 compared hospital results within the following categories: community hospitals (small and often rural), general hospitals, and specialized hospitals. Within general hospitals, subgroups were divided by the number of beds: under 60, between 60-119, and 120 and more. For IMSS, indicators are calculated by hospital type — secondary or tertiary — and this categorization is closely related to the number of beds.

In background analyses, the OECD considered, for example, grouping hospitals with less than 50 beds, between 50-100 beds and with more than 100 beds. Any chosen classification would need to consider the specific context, as the size of hospitals will depend on the size of the country, among other variables.

[10] For further details on the direct standardization method used in OECD indicators and MH 2015, refer to: OECD (2023b) and Secretaría de Salud (2015).

3.3. Other considerations/criteria relevant when measuring indicators

Another relevant issue when estimating indicators relates to small hospitals or hospitals with few cases either in total discharges or for specific conditions. In such instances, results may have larger variances and may be highly sensitive to small changes over time. In the OECD's experience in developing the acute myocardial infarction (AMI) 30-day mortality rate through a pilot data collection at the hospital-level, two criteria have been applied to guide data collection and analysis: considering three years of data and excluding, from the calculation of rates, hospitals with fewer than 50 cases of AMI admissions during the reference period (OECD 2019). In the US, if a hospital has fewer than 25 eligible cases for a measure, CMS assigns the hospital to a separate category: "Number of Cases Too Small". In this case, the hospital's mortality rates and interval estimates are not publicly reported for the measure. In Mexico's MH 2015, hospitals with 30 or more discharges for condition-specific mortality rates or procedure-specific indicators (e.g., the percentage of day case hernioplasties), are compared.

Another example of relevant criteria when calculating indicators is the exclusion of outliers or extreme resulting values. This is the case of OECD and MH 2015. Similarly, there is a need for an explicit decision regarding the inclusion or exclusion of mental health hospitals. MH 2015 excludes these hospitals, while the OECD includes them when measuring length of stay and discharge volumes.

Regarding alternatives to benchmark, the US offers an interesting example of how to transform results into simple messages for a wider audience for condition-specific mortality measures in the *2023 Measure Updates: AMI, COPD, HF, Pneumonia, Stroke Mortality 1 2023 Condition-Specific Mortality Measures Updates and Specifications Report*, where comparative performance of hospitals with 25 or more eligible cases is classified as follows (CMS 2023c) (for more detail, see **Section 5**):

1. *"Better than the National Rate" if the full 95% interval estimate surrounding the hospital's rate is lower than the national observed mortality rate.*
2. *"No Different than the National Rate" if the 95% interval estimate surrounding the hospital's rate includes the national observed mortality rate.*
3. *"Worse than the National Rate" if the entire 95% interval estimate surrounding the hospital's rate is higher than the national observed mortality rate.*

The OECD usually compares indicators between countries graphically, while MH 2015 also presents benchmarking results based on a composite score at the state level, considering various indicators (for more detail, see **Section 5**).

Finally, interpreting hospital performance indicators may require additional analysis, as hospital performance also depends on the overall health system performance and the specific circumstances of each hospital.

4. Challenges, opportunities, and perspectives for hospital measurement in the LAC region

Understanding and improving hospital performance in the LAC region requires attention not only to technical aspects, but also to implementation processes. In this section, key challenges, opportunities, and practical insights derived from expert interviews shed light on potential avenues for future expansion of hospital performance initiatives across the region.

4.1 Challenges, opportunities and practical steps

Countries in the LAC region share similar **challenges** in implementing hospital performance measurement, including:

Data availability and reliability: One of the main obstacles in hospital performance measurement is the availability of complete and good quality data. Many countries face challenges such as underreporting, coding errors, and poor data quality, which hinder accurate measurement and evaluation.

Resistance to evaluation: There is a prevalent resistance to being monitored and evaluated within the health care sector in Latin America. This resistance stems from a lack of an overall culture of accountability and evaluation, compounded by a limited managerial expertise in hospitals.

Limited use of indicators for improvement: Even when data and measurement systems are available, there is often a gap between measuring performance and using the results to drive improvement, especially at the hospital level. Effectively leveraging indicators to enhance hospital performance remains a persistent challenge.

Incentive structure: The current incentive structure in health systems often emphasizes punitive measures over positive reinforcement, making it challenging to instill a culture of continuous improvement. Shifting towards a more balanced approach that prioritizes positive incentives is crucial for motivating hospitals throughout the full cycle of measurement: from data collection to action at the hospital level.

At the same time, there are also **opportunities,** including:

Introducing positive incentives: There is an opportunity to link good performance to positive incentives, fostering a culture of recognition and reward. Targeting outliers to reduce unjustified variations in performance and implementing targeted interventions, could yield significant improvements with minimal effort.

Budget constraints and health care delivery policies: Budget constraints offer an opportunity to prioritize health care delivery improvement policies, including performance measurement initiatives. Developing performance indicators can also aid in closing access gaps and promoting equity within the health care system.

Exploration of alternative health care financing models: There is growing openness to exploring alternative health care financing models, such as pay-for-performance (P4P), which provide a broader array of incentives for performance measurement and improvement. These models can also help introduce positive incentives, and even small incentives/disincentives may be useful — especially for private hospitals but also for public ones.

Post-COVID-19 realignment of health expenditure: The post-COVID-19 landscape offers an opportunity for Ministers of Finance to revisit health financing and prioritize efficiency agendas. Strategic performance indicators can facilitate dialogue between Ministers of Health and Finance, leading to a more efficient resource allocation.

Overcoming the challenges and seizing these opportunities require sustained commitment from all stakeholders across the health system to develop robust datasets and indicators, but also entails fostering a culture of performance evaluation, and effectively using indicators to drive improvement at the hospital level.

Countries can kickstart initiatives by **adopting a gradual and practical approach**, acknowledging the diverse starting points across the region. In many countries, medical records do not exist, and the region is far from being able to comply with some standards on data collection and coding. A gradual approach implies starting with the most basic levels of data collection and coding and ensuring that information systems are created or reinforced first. If these systems are already in place, it requires making sure that the information flows not only upward to management, but it is also part of a wider performance improvement policy that provides feedback at the hospital level.

However, the absence of complete information in hospital datasets should not be an obstacle for implementation. **Early strategies can focus on obtaining simple indicators using the available data.** For example, countries can start measuring length of stay, mortality rates, or rates of specific procedures while ensuring comparability between hospitals, even in the absence of diagnostic information.

Another strategy is to **target outliers**. Early analysis can concentrate on identifying and improving the performance of outliers rather than on reducing small variations. Countries can do this by defining a broad margin of “tolerance” in variations and focusing on hospitals falling outside a defined threshold or band — for example those whose indicators show a deviation of plus or minus 10% or 20% from the average. In general, hospital performance policies should first focus on reducing very atypical behaviors. It is more important to improve performance in lagging hospitals, rather than to minimally increase the average or improve the performance of those hospitals already showing a higher-than-average performance.

The outlier approach could also help counterbalance arguments that differences in case-mix across hospitals differences in performance, and that performance measures should be fully adjusted for case mix (which is often not feasible). The large differences that characterize outliers are unlikely to be entirely due to case-mix.

Given differences in countries’ starting points and contexts, **setting minimum standards** is also relevant. Without minimum standards, international comparisons can be limited because countries start off from different conditions. Therefore, regulatory frameworks must be in place to establish a minimum (such as licensing/accreditation) and ensure everyone can be measured against that standard. In this regard, the regulatory framework is just as important as the indicators developed to measure results.

Another key consideration to guide hospital performance measurement efforts in LAC is to **consider a bottom-up approach**, fostering buy-in at the hospital level and promoting collaboration among peers to mitigate resistance to external evaluation. Clear and aligned incentives, with an emphasis on positive reinforcement over punitive measures, are crucial.

Ownership of the measurement agenda is paramount, necessitating the involvement of hospitals, managers, and local authorities in its development. Learning from successful regional or country examples and prioritizing the secondary level of care, where inefficiencies are generally most prevalent, are also critical considerations. There are successful examples in the region, and even within countries, and the best approach should consider these examples instead of "importing" external blueprints from very different contexts.

4.2. The future of hospital performance measurement in LAC

Envisioning the future of hospital performance measurement in LAC entails several key considerations. Firstly, establishing hospitals with exemplary performance as benchmarks is crucial. Additionally, standardizing processes — not just indicators — and implementing a regional performance ranking system could facilitate cross-country comparisons. This is particularly important for highly specialized hospitals, as there are fewer to compare among within each country (i.e., it would enable comparisons across countries between similar hospitals). Moreover, institutionalizing the evaluation process through the creation of permanent and independent organizations outside of the Ministries of Health and at arms-length from health care providers, would enhance credibility and ensure effective governance. Such entities should have independent governance structures, budgets, and a flagship product.

The evolution of the performance measurement agenda is intertwined with the digital transformation in health care. Leveraging digital technologies — including big data analytics and user perception evaluations — is essential not only for advancing digital transformation but also for enhancing patient-centered care, where the main challenge has been how to transform this concept into measurable outcomes. Digital tools have allowed for direct contact with patients, greatly evolving patient-centeredness measurement. This integration between the digital and the performance measurement agendas is pivotal for shaping future perspectives in hospital performance assessment.

While primary care has been the center of attention over the last decades, there is a growing recognition of the importance of focusing on hospital efficiency and quality within the broader health care system. To elevate the significance of the hospital sector, collaboration between Ministers of Finance and Ministers of Health is critical. By prioritizing efficiency improvements and recognizing the substantial portion of health care expenditure allocated to hospitals, these ministries can foster a shared agenda, ensuring a progressive development approach for hospital performance in the region over the next decade. Hospital performance measurement should be closely linked to broader health system performance, with a focus not only on quality but also on efficiency, productivity, and financing.

Collaboration between international organizations and LAC countries can play a pivotal role in consolidating a hospital performance measurement agenda. By identifying best practices tailored to the region's context, providing capacity-building, and offering technical cooperation adapted to the specific needs of each country, international organizations can help LAC develop and implement effective performance measurement systems.

In summary, a nuanced understanding of context, ongoing stakeholder engagement, and a focus on practical, actionable insights, will be instrumental in advancing hospital performance measurement initiatives in LAC countries. By embracing a collaborative and adaptive

approach, the region can strive towards better-performing hospital care and more effective health care systems in the years to come.

5. Review of international experiences on the measurement of hospital performance

Countries and experiences selected for the review presented in this section are relevant because they reflect a combination of different features. Brazil and Mexico reflect public and predominantly fragmented Latin American health systems, the US reflects a system where performance is relevant in a system with purchaser/provider split with predominance of private care, the UK reflects a unified public health system, and the OECD an international benchmarking experience.

The review of international experiences in hospital performance measurement reveals diverse approaches, each with its own focus and lessons. Brazil's experience suggests the value of engaging stakeholders and piloting indicators, especially in private hospitals, which may support gradual implementation. Mexico's initiatives draw attention to the ongoing challenges with data quality and the necessity for robust coding practices, alongside the advantages that come from strong internal management and monitoring systems. The OECD's model, which emphasizes both quality and efficiency, offers a framework that facilitates comparability and can be useful for international benchmarking.

In the UK, there is an emphasis on linking performance measurement to policy actions, with the aim of using indicators to drive improvements in quality and efficiency. The US approach demonstrates how integrating performance measurement with financial incentives and consumer empowerment can enhance transparency and accountability. Across these examples, the objectives of measurement vary. In the US, the focus includes both internal uses, such as payment systems, and public transparency; in the UK, the emphasis may lean more toward public accountability; whereas in Mexico, the focus appears to be more internal, geared towards management within the health system. These varying approaches reflect the specific contexts and priorities of each country.

5.1. Brazil

5.1.1 Initiatives' context and motivation

The Brazilian health system is made up by the public sector — organized around the ***Unified Health System*** (*Sistema Único de Saúde* – SUS), which provides universal and free access to a set of health care services (de Almeida, 2020) and covers around 75% of the population — and the private sector (including private health plans known as ***Supplementary Health*** – *Saúde Suplementar*), which covers the rest of the population (Montekio, 2011; Machado, 2014; OECD, 2021). SUS is both responsible for both coordinating the public sector and providing health care through a decentralized network of health units and hospitals, in addition to contracting services with private and philanthropic (non-profit) health providers. SUS is financed through general taxes and government social contributions (federal, state, and municipal) (Montekio, 2011).

Within the Ministry of Health (*Ministério da Saúde*), the ***Department of Regulation, Evaluation and Control*** (*Departamento de Regulação, Avaliação e Controle – DERAC or DRAC*) is responsible for evaluating health services, including the former *National Assessment of Hospital Services Program* (*Programa Nacional de Avaliação dos Serviços Hospitalares* –

PNASH), the *Hospital Information System* (*Sistema de Informações Hospitalares* – SIH), and other hospital programs and initiatives (Schilling, 2006; Montekio, 2011). On the other hand, the ***National Supplementary Health Agency*** (*Agência Nacional de Saúde Suplementar* – ANS) is the Ministry of Health's agency specifically dedicated to regulating the private health plans sector in Brazil, including quality and performance in hospital care (ANS, 2023a).

Hospital expenditure as a share of total health expenses amounted to approximately 36% in 2012–2014, which was similar to the OECD average and can be partly explained by the model's emphasis on inpatient care (de Almeida, 2020). Overall, the Brazilian hospital sector is characterized by low-value care, as exemplified by caesarean sections performed without medical indication (OECD, 2021). This, alongside intrinsic socioeconomic and geographic disparities, can result in potentially poor health care quality and patient safety (La Forgia, 2008; OECD, 2021).

Furthermore, although Brazil generates a considerable amount of digital health data, the systematization and reporting of hospital quality and performance indicators are not as developed compared to other countries, both in the region and within the OECD. Most efforts to develop quality or performance indicators have focused on primary care (OECD, 2021) and descriptive statistics (demographic, epidemiologic, and other information). Although the need to develop and implement standardized quality measurement systems in the hospital sector has been recognized previously (La Forgia, 2008), this is still regarded as a missed opportunity for the Brazilian health system, as such systems could support system-wide quality of care improvement initiatives (OECD, 2021). Brazil has been recurrently invited to fully participate in OECD quality and performance projects, such as the *Health Care Quality and Outcomes Indicators* (HCQO) and, more recently, the *Integrated Care indicators* data collection rounds. However, limited data have been published to date (OECD, 2021).

Regarding hospital care quality and performance measures, there is a myriad of programs, policies, and initiatives in place, mostly within the SUS and Ministry of Health, and non-government hospital accreditation organizations. In general, these programs are neither mandatory nor consistent, and are not easily accessible for public consultation.

Public sector hospital quality programs and initiatives

Hospitals contracted under the SUS are legally obligated[11] to, at least, monitor the following hospital indicators: i) bed occupancy rate; ii) average length of stay for hospitalization beds; iii) average length of stay for surgical beds; iv) institutional mortality rate; v) occupancy rate of intensive care unit (ICU) beds; and vi) incidence of central venous catheter (CVC) infections (Ministério da Saúde, 2013a).

Hospital data are available in the SIH, within the **SUS *Department of Informatics*** (DATASUS). This includes public or associated private hospitals, hence covering most hospital admissions, mortality, access to health services, and several health indicators in Brazil (DATASUS, 2023a). However, there is a general lack of widely available hospital care quality indicators given that focus is more on coverage, mortality, morbidity, epidemiology, demographic variables, risk factors, and health resources (DATASUS, 2012; PAHO, 2009). This is evident from the indicators evaluated in the *Basic Data and Indicators* compilation (*Indicadores e Dados Básicos* – IDB) (DATASUS, 2012) and from official Ministry of Health

[11] Portaria Nº 3.410, de 30 de Dezembro de 2013. Art. 11º and 12º.

planning documents, such as the *2013-2015 Guidelines, Objectives, Targets, and Indicators* document (*Diretrizes, Objetivos, Metas e Indicadores para os anos de 2013 – 2015*) (Ministério da Saúde, 2013b). Exceptions include the widely available calculations of length of stay and mortality rate, which are indicators recurrently included in SIH variables (DATASUS, 2023a). Nonetheless, these indicators are relatively simple and no formal methodology, beyond basic DATASUS technical notes (DATASUS, 2023b), could be obtained to ascertain the precise indicator construction and reporting process.[12]

In 2011, the Brazilian government launched a proposal of the ***SUS Evaluation Program for Qualification*** (*Programa de Avaliação para a Qualificação do Sistema Único de Saúde*), led by the Ministry of Health at the federal level and aimed to analyze two strategic and priority dimensions: access and quality. One of its main objectives was to compile indicators capable of measuring and reflecting the status of health services — including, but not specifically focusing on hospital care — synthesized into a composite indicator (CONASS, 2011; Machado, 2013). Few indicators encompassed in this program relate to hospital quality and performance.[13] However, also in this case, no formal methodology, beyond basic indicator specifications has been available, and it is uncertain whether this program continues to be implemented. An explicit conceptual framework was included as part of this program (see **Section 5.1.2**) (CONASS, 2011).

On the other hand, the ***National Health Services Assessment Program*** (*Programa Nacional de Avaliação de Serviços de Saúde* – PNASS), derived from the previous PNASH, was established in 2015 to evaluate all health institutions, including hospitals, that receive government funding (PNASS 2015). It was designed as an evaluation tool linked to the transfer of funds to local managers (Machado, 2013). The PNASS includes 29 indicators in the *Hospital Care Indicators* section, but there was limited information available beyond their description as results-oriented metrics, constructed from various databases or information systems. The definition and construction of these indicators fall under the purview of a technical group from the *Department of Monitoring and Evaluation* of the SUS (*Departamento de Monitoramento e Avaliação do SUS* – DEMAS) (PNASS, 2015). No publicly available methodology for the construction of these indicators was found. A relevant takeaway from PNASS' structure is the explicit acknowledgement of the need to use statistical methods to make hospital indicators more comparable. PNASS proposes two mechanisms: i) *indirect standardization by age group, gender, and ICU use* (it adjusts indicators to reduce the influence of age groups and sex, in addition to consider and equalize the higher risk of death when the use of ICU is necessary); and ii) *Empirical Bayesian approach,* which seeks to reduce the effect of variation in indicators in small populations (PNASS, 2015).

Private sector hospital quality and hospital accreditation programs and initiatives

The ANS has recurrently established quality and performance indicators to assist its mandate of regulating private health plans. Since 2004, the ANS has published the quality scores of

[12] This situation is exacerbated by findings from the current project, which show some methodological inconsistencies in DATASUS recurrent indicator calculations, such as: […] *pay attention to the calculation of the SUS system indicator (Institutional mortality rate), which does not disregard deaths occurring before 24 hours of hospitalization, which may overestimate the indicator* […] (ANS, 2021b).

[13] Mainly *Cesarean rate*, *Occupancy proportion of existing public beds*, *Occupancy proportion of contracted private beds*, *Average waiting time in medium-complexity hospital care*, and *average waiting time in highly complex hospital care* (CONASS, 2011).

private health plan operators — including information on hospitals — comprising assessments, accreditation programs, and actions aimed at patient safety and quality in health services (Machado, 2013). These publications occur mainly through publicly available newsletters, such as the *Boletim Segurança do Paciente e Qualidade em Serviços de Saúde,* which is available at the *Brazilian Health Regulatory Agency* (*Agência Nacional de Vigilância Sanitária* – Anvisa) webpage (ANVISA, 2020).

Regarding hospital care, the ANS has established and recently updated its ***Qualification Program for Health Service Providers*** (*Programa de Qualificação dos Prestadores de Serviços de Saúde* – QUALISS). QUALISS aims to promote the assessment of health service providers, including hospitals, and increase the availability and dissemination of information on the quality of services provided through health plans (ANS, 2023b).

In 2021, as part of the ***Hospital Quality Monitoring Program*** (*Programa de Monitoramento da Qualidade da Assistência Hospitalar*) within the QUALISS, the ANS launched the *Hospital Indicators System* (SIHOSP), designed to collect data for monitoring the quality and performance of hospitals operating within the private health plans sector (ANS, 2021a). The program includes a total of 14 general indicators and 49 indicators for five specific lines of care, developed by the *Hospital Quality Indicators Consortium Project* (*Projeto Consórcio de Indicadores de Qualidade Hospitalar*), in partnership with the *Moinhos de Vento* Hospital (MVH) and through the PROADI/SUS alliance[14] (ANS, 2021b; PROADI-SUS, 2023). This initiative followed a specific framework, which included a literature review and selection by a committee (see **Section 5.1.2**). Only 10 of the general indicators are considered mandatory for data collection, while the four remaining and those included in the five specific lines of care are optional (ANS, 2021a).

The project aims to create a unique system for assessing the quality of private hospitals that allows for comparability, identification of good practices, and areas of improvement, as it simultaneously enables greater decision-making power to consumers through availability of information (ANS, 2021c).

The pilot program consists of three evaluation stages (ANS, 2021b):

- **1st stage**: Selection of private hospitals with accreditation (approximately 376 hospitals). These hospitals were chosen due to their considerable level of organization in internal processes and experience with data (ANS, 2021b).
- **2nd stage**: System testing, hospital registration, data collection, and analysis of results of the 14 general indicators (ANS, 2021b).
- **3rd stage**: Expansion of the indicator set to include the evaluation of 49 indicators related to the five lines of care that reflect the most frequent causes of hospital morbidity and mortality: stroke, acute coronary heart disease, sepsis care, hip arthroplasty, and breast and prostate cancers (see **Annex 4** for the list of 49 line-of-care specific indicators; ANS, 2021b).

[14] The SUS *Institutional Development Support Program* (*Programa de Apoio ao Desenvolvimento Institucional do Sistema Único de Saúde* - PROADI-SUS) is an alliance between six reference private hospitals in Brazil and the Ministry of Health. Its aim is to support and improve the SUS through human resource training projects, research, evaluation, adoption of technologies, and other specialized assistance required by the Ministry of Health (PROADI-SUS, 2023).

Brazil also has a widespread focus on hospital accreditation in both the public and private sectors. Since 1999, the ***National Accreditation Organization*** (*Organização Nacional de Acreditação* – ONA), a non-profit NGO and probably the most widely recognized accreditation entity in Brazil, has concentrated on developing quality and safety standards in the Brazilian health sector for accreditation and certification purposes (ONA, 2023). For a hospital to be accredited in one of the three progressive accreditation levels, it must demonstrate meeting ONA's standards. This process is voluntary, and the accreditation methodology does not provide specific recommendations on tools, processes, indicators, or methodologies to organizations undergoing evaluation (ONA, 2023).

The *Brazilian Accreditation Manual for Health Service Providers* (*Manual Brasileiro de Acreditação das Organizações Prestadoras de Serviços de Saúde*) provides guidelines set up by the Ministry of Health and ONA for hospital accreditation. However, as mentioned above, it does not identify specific hospital quality and performance indicators, but clearly asserts the importance of using indicators to analyze performance (Ministério de Saúde, 2002).

Another non-profit organization initiative is the ***Commitment to Hospital Quality Program*** (*Compromisso com a Qualidade Hospitalar* – CQH), a social responsibility project of the *Paulista Association of Medicine* (*Associação Paulista de Medicina* – APM). It is a voluntary membership program which aims to contribute to the continuous improvement of hospital quality by promoting self-assessment (APM – CQH, 2021) and encouraging the use of indicators to support decision-making processes and hospital management (CQH, 2009). In 2009, CQH produced the ***3rd CQH Indicators Notebook***, presenting the main indicators, along with the most relevant historical series available in the Program's collection (CQH, 2009). The notebook includes 44 indicators, most of them related to hospital quality and performance, though with limited methodological background regarding their construction.

Furthermore, in 2022 the *Brazilian Institute of Social Health Organizations* (*Instituto Brasileiro das Organizações Sociais de Saúde* – IBROSS), in partnership with the *Pan American Health Organization* (PAHO), the *Institute for Health Ethics* (*Instituto Ética Saúde* – IES) and the ONA, conducted a widely publicized ranking of public hospitals (that are entirely financed by the SUS). Participating hospitals included those with level 3 accreditation issued by the ONA or with full international quality certifications (IBROSS, 2022; CONASS, 2022). Among the main criteria used for the ranking were: i) user evaluations available on Google Business, ii) certification time for each institution, and iii) an efficiency measurement undertaken by the Federal University of Minas Gerais (hospital output relative to financial resources employed) (IBROSS, 2022; CONASS, 2022; CNN, 2022). However, no specific indicator set or methodology for comparing hospitals to create the ranking was made publicly available, and it remains unclear whether the exercise will be periodically reproduced.

Previously, a study had performed a data envelopment analysis (DEA) to assess hospital efficiency in Brazilian general hospitals (public or private) receiving SUS funding (de Almeida, 2020). It used SUS-related human resources and infrastructure as inputs, while outputs were measured by the number of hospitalizations according to five ICD-10 groups (circulatory, respiratory, pregnancy, childbirth/puerperium procedures, and others) and two age cohorts (younger than 60 and over 60 years old) (de Almeida, 2020). The main findings pointed to a high level of inefficiency in inpatient care provision, distributed across all Brazilian states (not a regional phenomenon) (de Almeida 2020).

Table 6 summarizes the main hospital quality and accreditation programs and initiatives, both from the public and the private sector.

Table 6. Summary of initiatives: Brazil

Public sector hospital quality programs and initiatives
• SUS legally obligated indicator reporting (Portaria Nº 3.410) • SIH – DATASUS – reporting of hospital admissions • SUS Evaluation Program for Qualification • National Health Services Assessment Program – PNASS
Private sector hospital quality and hospital accreditation programs and initiatives
• Qualification Program for Health Service Provider – QUALISS • Hospital Quality Monitoring Program • National Accreditation Organization • Commitment to Hospital Quality Program – CQH
Other programs and initiatives
• Ranking of public hospitals – conducted by IBROSS, PAHO, IES, ONA and the Federal University of Minas Gerais

5.1.2 Underlying conceptual framework

SUS Evaluation Program for Qualification

The *SUS Evaluation Program for Qualification* proposal is based on the *Project for the Development of a Performance Assessment Methodology for Brazilian Health System* (*Projeto Desenvolvimento de Metodologia de Avaliação do Desempenho do Sistema de Saúde Brasileiro* – PRO-ADESS) of the *Institute of Communication and Scientific Information and Technology in Health* (ICICT), from the *Oswaldo Cruz Foundation* (FIOCRUZ) (CONASS, 2011). This evaluation model identifies four consecutive dimensions of health systems (not hospital care specific) (CONASS, 2011):

- **1st dimension:** Environmental, sociodemographic, behavioral, and biological determinants provide the conditions for population health (CONASS, 2011).
- **2nd dimension:** In turn, these determinants are expressed by well-being, functional status, morbidity, and mortality. Health conditions should be identified prioritizing health problems that are avoidable and subject to intervention and seeking to differentiate their impacts across different geographic regions and social groups (CONASS, 2011).
- **3rd dimension:** This morbidity and mortality profile, when measuring the magnitude of the problems, indicates health needs, that can be confronted with the adequacy of the existing health system's structure. This structure is characterized by conduction, financing, and resources (CONASS, 2011).

- **4th dimension:** In turn, the structure can be evaluated on its performance with a view to positively altering the health conditions and their determinants, considering factors such as access, acceptability, respect for people's rights, continuity, adequacy, security, efficiency, and effectiveness (CONASS, 2011).

All dimensions must be evaluated from the perspective of equity (CONASS, 2011).

Qualification Program for Health Service Providers – QUALISS

The indicators used in this program were selected following a literature review, conducted by the *Hospital Quality Indicators Consortium Project*, in partnership with the *Moinhos de Vento* Hospital (MVH), which included both academic productions and compilations from relevant government agencies (ANS, 2023c). Based on this review, a list of quality indicators was prepared for discussion. A Steering Committee, composed of specialists from MVH, representatives of ANS and other renowned hospitals and medical societies, was established to carry out the final selection of indicators, which were subdivided into three quality domains: effectiveness, efficiency, and security/safety. The RAND method[15] was used to guide this selection process (ANS, 2023c).

Furthermore, the program's methodology allows for the publication of results by hospital and grouped through a classification by performance tiers to facilitate its interpretation (ANS, 2021a). The methodology classifies hospitals into five scoring tiers, represented by colors: *Tier 1 Green* and *Tier 2 Blue* (for the best performing hospitals); *Tier 3 Yellow* and *Tier 4 Orange* (for those with intermediate performance); and *Tier 5 Red* (for lower performing hospitals) (ANS, 2021a).

5.1.3 Scope

For the purpose of this technical note, and given the broad spectrum of hospital quality and performance programs and initiatives within the Brazilian health system, as well as the limited publicly available methodology information, a subset of overlapping indicators has been extracted from both the public and private sector measures for further analysis (see next section).

These measures are at a hospital level, allowing for comparison between hospitals at the municipal, state, and national levels. In most cases, the intended use is to have fully comparable hospital-specific measures between different care providers in a consistent and standardized manner, but keeping them relatively simple to understand. This approach aims to empower consumer choice, at least in the case of the private sector.

Most indicators include explicit targets or benchmarks, defined by the corresponding government agency and/or group which developed the indicator and backed by literature reviews and/or international best practices.

[15] The *RAND/UCLA Appropriateness Method*, developed in collaboration between the University of California at Los Angeles (UCLA) and RAND Health, is used to synthesize scientific literature and expert opinion on health care issues and topics. It establishes rules for determining best practices and reaching a formal agreement on the interpretation of scientific information (RAND, 2023).

5.1.4 Domains/subdomains, number of indicators (periodicity)

As mentioned earlier, the indicators reviewed (15) reflect an overlap between different hospital quality and performance programs and initiatives in Brazil, for which sufficient methodological information was identified (or obtained from other programs initiatives) (see **Table 7**). Indicators are classified into three domains: effectiveness, safety, and efficiency, and are fully described in **Annex 2**.

It is important to note that some indicators have been *grouped* for ease of analysis and should be further disaggregated upon construction. Some examples of this are the following:

- **Occupancy**: This can be further disaggregated into general inpatient and ICU beds, and among different age cohorts.
- **Average length of stay**: A general average length of stay indicator is provided, but it can be further stratified for hospitalization and surgical beds, for different medical specialties (“clinics”), and among different age cohorts.

Table 7. List of key indicators: Brazil

Indicator name	Source program or initiative				
	Required by Law (*Portaria Nº 3.410*)	SIH-DATASUS (recurrent)	SUS Evaluation Program for Qualification	CQH – *3rd Indicators Notebook*	QUALISS (only obligatory indicators)*
Inpatient Bed occupancy rate (general and ICU)	✓		✓	✓	
Average length of stay (inpatient beds and surgical beds)	✓	✓		✓	✓
Institutional mortality rate	✓	✓		✓	✓
Proportion of vaginal births** / Caesarean rate			✓	✓	✓
Bed turnover rate				✓	
Bed substitution Interval Index				✓	
Surgical Mortality Rate				✓	
Mortality Rate for Acute Myocardial Infarction				✓	
In-Hospital Neonatal Mortality Rate				✓	
Nosocomial Infection Rate				✓	
Proportion of readmissions within 30 days of hospital discharge***				✓	✓
Rate of cardiopulmonary arrest in in-patient units					✓
Rate of bloodstream infection associated	✓				✓

Indicator name	Source program or initiative				
	Required by Law (*Portaria Nº 3.410*)	SIH-DATASUS (recurrent)	SUS Evaluation Program for Qualification	CQH – *3rd Indicators Notebook*	QUALISS (only obligatory indicators)*
with central venous catheter					
Incidence of falls resulting in injury				✓	✓
Sentinel event					✓

Notes:
SIH-DATASUS – Hospital Information System (SIH) SUS Department of Informatics (DATASUS)
CQH – Commitment to Hospital Quality Program
QUALISS – Qualification Program for Health Service Providers
* Note that out of the 10 QUALISS obligatory indicators, 2 relate to emergency care and are, hence, not included in this technical note.
** QUALISS reports *Proportion of vaginal births*, which is the opposite to *Caesarean rate*, as reported by the SUS Evaluation Program for Qualification.
*** CQH measures within 15 days of hospital discharge.

5.1.5 Selection, review, and dissemination

The quality measures identified herein originate from different programs and initiatives within the Brazilian hospital sector — both public and private— thus they vary in terms of hospital coverage. Some of them have undergone extensive testing for validity and reliability and have been measured for decades across the health system. The indicators described in the previous section are in line with international efforts to measure hospital care quality and provide a relatively compact set of indicators covering various aspects of hospital care.

Financial incentives/disincentives are used to promote hospital quality improvement, accreditation, and data reporting, but quality measures themselves do not seem to affect payment rates in the public sector. For example, the *Quality Factor*[16] (*Fator de Qualidade*) — a percentage applied to an annual adjustment index used by ANS — applies to contracts between private hospitals and private health plans, as part of a new remuneration model established in 2014 (ANS, 2016). It benefits private hospitals that have top accreditation levels and patient safety standards regularly reviewed by the *Brazilian Health Regulatory Agency* (*Agência Nacional de Vigilância Sanitária* – Anvisa), and submit formats electronically (ANS, 2016).

As previously mentioned, efficiency has been mainly explored through academic studies documenting a high level of hospital inefficiency in Brazil. This inefficiency is even more pronounced in smaller and public hospitals and is widespread across the entire country — it is not a regional phenomenon. This illustrates the limited practical use of more sophisticated methods to assess efficiency.

[16] The *Quality Factor* has three levels: 105%, 100% and 85% of the value of the *Extended National Consumer Price Index* (IPCA) (ANS, 2016).

5.1.6 Strengths and limitations

The selected indicators are robust, standardized, and comparable. There is a significant overlap between indicators, regardless of their origin (public or private sector, quality monitoring, or accreditation initiatives), and they have been developed through years of testing and validation from various experts.

The calculation of these measures is straightforward (involving minimal statistical management of variables) and could be implemented in settings with moderate data availability. Finally, selected indicators are consistent with international measurement efforts, particularly those promoted by the OECD.

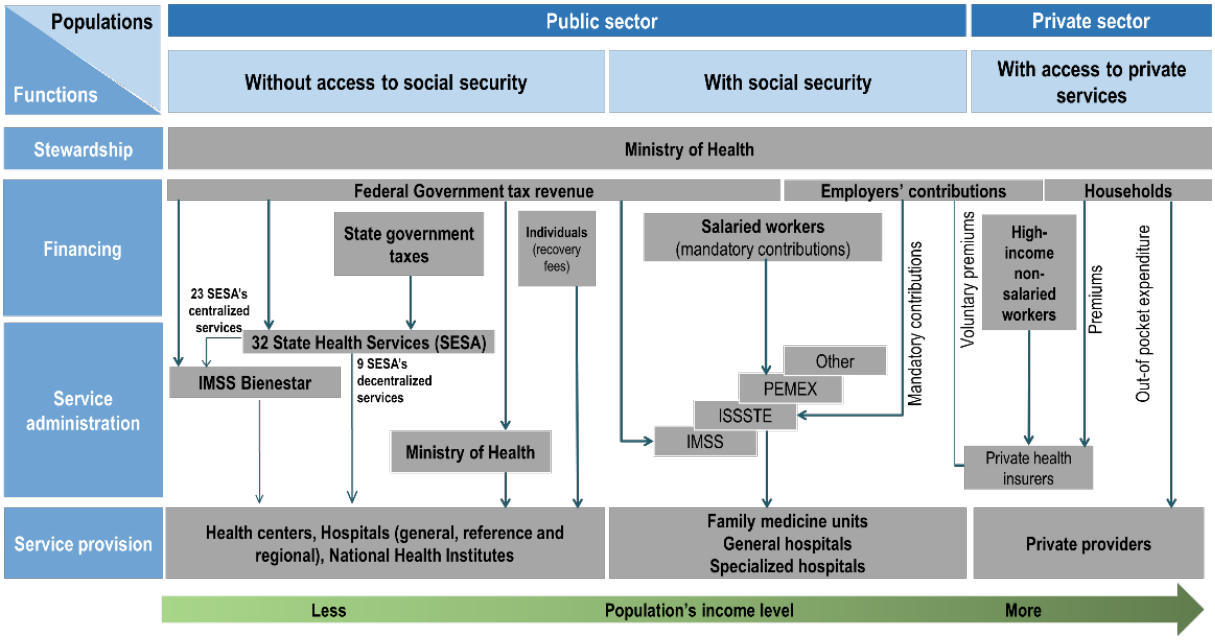
Nonetheless, overall the hospital quality and performance measurement area in Brazil could benefit from more cohesive and transparent mechanisms to incorporate indicators and ensure they cover all public and private hospitals. This could also be reinforced by simplified public reporting to enhance accountability.

5.2. Mexico

5.2.1 Initiatives' context and motivation

Mexico's health system is fragmented and comprises three main subsystems: i) employment-based social insurance schemes, ii) publicly funded health care services for the uninsured, provided by decentralized state health services and/or other federal health care providers, and iii) the private sector. Health care is delivered through public institutions operating in parallel, with limited coordination between them. Each one operates based on their corresponding rules, target populations, budgets, benefit packages and infrastructure. The private sector mostly operates independently and delivers health care mainly through out-of-pocket payments from anyone who can afford care, or to a lesser extent, through private health insurance. **Figure 5** details Mexico's health system structure, illustrating its populations and functions, including the most relevant health care providers.

Figure 5. Mexico's health system structure



See list of acronyms for: IMSS-Bienestar, IMSS, ISSSTE, Pemex.
Source: Adapted from Giedion et al. (2014).
*On April 29, 2023, an initiative was approved by the Mexican Congress to enable IMSS-Bienestar to centralize functions and resources previously held by INSABI and those State Health Services signing an agreement for IMSS-Bienestar to run services and deliver care on their behalf.

Within the public sector, the most important players/providers in the Mexican health system are:[17]

- **Ministry of Health** (MoH): The MoH is the steward of the system, responsible for planning, oversight and coordination, regulation, evaluation, and public health, including prevention and promotion. It is also in charge for health care provision through the **National Institutes of Health** and other **Federal and High-Specialty Regional Hospitals**.
- **Mexican Institute of Social Security** (*Instituto Mexicano del Seguro Social* – IMSS): IMSS is the largest health care and social protection provider in Mexico. Founded in 1943, it provides services to formal private sector workers and their families, either directly through its own facilities or, to a lesser extent, through subrogated services. It is funded through payroll contributions from employers and employees, as well as from the federal government.
- **Institute for Social Security and Services for State Workers** (*Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado* – ISSSTE): ISSSTE is the second largest social security institution in Mexico, covering federal government employees

[17] Other social security schemes include PEMEX (Petróleos Mexicanos): social security scheme for the national oil-company workers, as well as the Army and Navy, and state schemes for local government employees and their families.

and their families. Through specific agreements, state governments and other decentralized public entities can also use ISSSTE's services to enroll their workers.

- **IMSS-Bienestar:** Originally created in 1979, this federally funded program provides health services to deprived populations — those without access to social security — across both rural and urban settings. It is run by IMSS.
- **State Health Services** (*Secretarías de Salud de los Estados* – SESA): Comprising 32 local Ministries of Health, these entities provide care through their own facilities to populations without access to social security.

Social security institutions cover different groups of salaried workers and their families. These institutions tend to have greater budget allocations per beneficiary and are vertically integrated. Coordinated at the federal level, they provide care through their own facilities and varied benefits packages. The largest providers are IMSS and ISSSTE. Health care for the population without social security is delivered through the 32 state health services; the *National Institutes of Health* and other *Federal and High-Specialty Regional Hospitals*, which are directly managed by the MoH; and/or *IMSS-Bienestar*, the health program for deprived population in rural and urban settings.

Recently, several legal reforms to the health system have been implemented. One of the most significant involved the creation of INSABI to replace the *Seguro Popular*. Until December 2019, health care funding for the population without social security was channeled to the 32 states through a financial mechanism. A reform to the *General Health Law* (LGS) replaced *Seguro Popular* with an alternative scheme run by INSABI. Nonetheless, more recent modifications in the public sector's provision of health services have favored *IMSS-Bienestar* over INSABI for the direct coverage of the population without social security. INSABI was integrated into *IMSS-Bienestar*, which has become a public decentralized entity (*Organismo Público Descentralizado* – OPD) and will lead public health care coverage for the population without social security, gradually incorporating the State Health Services. By July 2022, *IMSS-Bienestar* was already fully operating health care services in three states: Nayarit, Tlaxcala, and Colima (IMSS, 2022) and, according to IMSS authorities, it was operational in 23 states by the end of 2023.

The performance evaluation of the public hospital sector in Mexico mirrors the characteristics prevailing in the Mexican national health system. While the MoH holds the stewardship for system governance, there are significant variations in performance evaluation between the systems managed by the MoH (comprising approximately 704 hospitals, predominantly overseen by the 32 state governments) and IMSS (around 276 centrally managed hospitals).[18]

Both hospital systems operate under a historical or inertia-based budgeting logic, lacking functional separation in budgeting, purchasing, and delivery. Consequently, hospital performance evaluation has historically focused on accountability, showcasing efficient resource utilization, and meeting the budget goals established by the Ministry of Finance.

For the analysis of hospital performance experiences in Mexico, two cases are presented in this technical note. The first is **IMSS-medical indicators case** (IMSS, 2019), based on the

[18] 35 out of 704 hospitals did not produce discharges in the year analyzed; therefore, 669 hospitals were included in this study.

Medical Indicators Methodological Manual (*Manual Metodológico de Indicadores Médicos* – MMIM), which is a regular performance evaluation system implemented across IMSS' hospital network. The second is the **Ministry of Health's case** (Secretaría de Salud, 2015), which conducted a hospital performance evaluation exercise based on 2014 information for hospitals run by the SESA and the MoH and documented in the *Mejores Hospitales* 2015 (**MH 2015 report**). The MH 2015 report — a stand-alone exercise — was considered groundbreaking, as it was the first to include a more detailed analysis of indicators based on discharge data and to target the general public as its main audience in an effort to promote greater accountability and benchmarking in the health system.

It is important to acknowledge Mexico has a wider national health system performance and quality measurement program in place since 2003, known as the **National Quality Indicators System** (Sistema Nacional de Indicadores de Calidad en Salud – **INDICAS**). Its latest available report is for 2022. INDICAS falls outside the scope of this technical note, but it provides context concerning the broader quality indicators across different levels of care and the existing measurement mechanisms, and how they could be used for hospital accreditation/certification purposes. In principle, INDICAS is intended to cover both the public and private sectors but, in practice, it mostly covers public health care for the uninsured and some hospitals from social security institutions such as ISSSTE, but not IMSS.

In addition, although hospital activity in the Mexican private sector represents only about half of the annual volume of discharges delivered in public hospitals, assessing private sector performance is becoming increasingly relevant. While this technical note focuses on public sector hospitals, a recent experience in ranking private sector hospital performance in Mexico provides insights into alternative approaches (see **Box 3**).

Box 3. "*The best private hospitals in Mexico*": a ranking exercise to induce transparency and benchmarking in the private sector

In recent years, Mexico's private hospital sector has grown substantially. In 2022 alone, there were 2.3 million hospital discharges in the sector — around 30% more than those in 2016. However, information on performance is not widely available to the public and most of the data is scattered in diverse sources within the sector. In this context, evaluating aspects linked to good performance through a ranking, directly supports decision-making and allows patients to compare between hospitals. Rankings can also serve as an incentive for the evaluated institutions, as they support their efforts to promote continuous improvement in the quality of care.

Figure 1. "*The best private hospitals in Mexico*" ranking – 2023 edition

Since 2020, the *Mexican Health Foundation* (*Fundación Mexicana para la Salud - Funsalud*) and the consulting firm *Blutitude*, together with the news outlet *Expansión*, have developed "***The best private hospitals in Mexico***" ranking. In its 2023 edition (see **Figure 1**), the ranking evaluates the 500 most prominent private hospitals, which represent 17.4% of all private hospitals in the country and just over 40% of the private sector's installed bed capacity (18,000 beds). One of the prerequisites for these 500 private hospitals to participate in the ranking is that they have a website and/or are certified by the General Health Council (*Consejo de Salubridad General*). At the national level, the ranking lists the 50 private hospitals that obtained the best performance, based on information from the previous year (2022) and/or the most recent year available.

Methodology

The private hospital sector in Mexico is complex and very diverse. It is not directly comparable with public hospitals, nor can it be comprehensively evaluated based solely on opinion surveys or isolated equipment data. A custom-designed ranking is required, considering the characteristics of the Mexican hospital sector and integrating different aspects that are relevant to the provision of quality hospital services. Different hospital indicators are calculated using both information from external sources and from the hospitals that opt to actively participate in the process. Hospital's participation is crucial, as it allows for more and higher quality data for analysis. In addition to the opinions of certified medical specialists and nursing staff, those of patients and insurance experts are also considered. Furthermore, a *Committee of Experts,* made up of 9 recognized independent professionals from the health and hospital sectors, validates the methodology and provides feedback on the different weights, variables, and results, included in the ranking.

The evaluation assesses five domains: **talent**, **technology**, **processes**, **results**, and **perception**, each with different variables and sources of information:

1. **Talent**: The human resources available, considering the different types of health professionals — certified specialist doctors, residents, nursing staff, undergraduate interns, nutritionists, and psychologists, among others. Additionally, the research activities of hospital staff and their participation in national health academies is also considered.
2. **Technology**: This domain assesses the basic and specialized medical equipment essential to ensure a good level of care, the utilization of an electronic clinical record system certified by the corresponding sector regulations, and the existence of telemedicine services.
3. **Processes:** Various processes to evaluate hospital compliance with standards and good practices to ensure patient safety and quality care. It considers observance of health regulations, adherence to essential patient safety actions, accreditations/certifications, the presence of operating committees, the transparency of the information provided on their websites, and the existence of a code of ethics.
4. **Results:** Health outcomes for the patient. This domain mainly focuses on infections associated with health care and complaints. For the first time, in the 2023 evaluation, a third component was included, analyzing discharge data to estimate lengths of stay, appropriateness (share of caesarean sections, laparoscopic appendectomies and laparoscopic cholecystectomies), and hospital mortality rates (for pneumonia and COVID-19).
5. **Perception:** This considers the viewpoints of key players — doctors, nursing staff and insurance companies — about the best hospitals in the country, their region, and/or their specialty.

In the national analysis, each hospital obtains an overall score equal to the weighted sum of the scores obtained in each of the domains. Scores are presented on a scale where 100 represents the best performance. The regional analysis breaks down the best hospitals based on their global scores. Moreover, a specific analysis of small and medium-sized hospitals (with 40 beds or less) allows to recognize the best performances that do may not appear among the top 50 in the national ranking.

In addition, 15 medical specialties are also evaluated. The analysis by specialty considers only those hospitals that demonstrate to have the basic conditions to offer a quality service, based on their **talent** (certified doctors and resident doctors), **technology** (specialized medical equipment), and **perception** (opinions of specialist doctors). It also incorporates the **outcomes/results** domain based on indicators related to length of stay, appropriateness of procedures, and/or mortality, associated with five specialties.

It is important to highlight the relevance of incorporating **hospital discharge information** in the **outcomes/results** domain. Evaluating hospital performance through hospital discharge information represents the gold standard for the "direct" assessment of performance and provides a powerful summary of the activities carried out by the hospital during the hospitalization of its patients. The ranking has been helpful to increase awareness of the private hospital sector's importance and the need for improved transparency and benchmarking. For hospitals, the ranking seems to be a tool to start internal discussions about quality and identify factors which can strengthen quality of care, such as promoting certification amongst their specialist doctors.

Source: Blutitude. Ranking de Los Mejores Hospitales Privados de México. 2023. https://www.blutitude.com/resultados-ranking-2023/presentacion-2023/

5.2.2 Underlying conceptual framework

The evaluation methodology of IMSS is based on the selection of medical indicators under the "logical framework methodology", which serves as a tool for the conceptualization, design, execution, and evaluation of indicators. The methodological profiles for each indicator are designed following the recommended structure by specialized organizations in health and evaluation, such as the National Council for the Evaluation of Social Development Policy (CONEVAL), the MoH and the Ministry of Finance. The evaluation carried out by the MoH, relies on an internal framework developed through the technical expertise gained within the MoH itself, with the technical support of PAHO, and is based on the WHO Performance Assessment Tool for Quality Improvement in Hospitals" (PATH) program (WHO, 2007).

5.2.3 Scope

The IMSS-medical indicators system is applicable at IMSS' hospital and at subnational levels. IMSS' hospital network is geographically distributed across the 32 states, which are administratively organized into 35 state delegations. Delegations are responsible for the first- and second-level medical units, thus the evaluation of second-level hospitals is conducted at both the hospital and delegation levels, while third-level hospitals are evaluated solely at the hospital level.

Regarding the MH 2015 document, the evaluation was carried out at the hospital level, as the main objective was to identify best-performing hospitals. However, aggregated results at the state level are also provided, based on groupings of similar or comparable hospitals, considering their size (hospital beds) and characteristics, such as their level of resolution or specialization in a particular medical field, such as gynecology-obstetrics or traumatology. The Ministry of Health's MH 2015 exercise focuses specifically on hospital performance in delivering care for the uninsured population.

In the case of IMSS-medical indicators, the evaluation encompasses all aspects of health care provided by IMSS, including prevention, primary health care, outpatient services, rehabilitation, and even health education and research. However, for the purpose of this study, the focus is solely on hospital indicators.

IMSS-medical indicators serve as a managerial, legal, and administrative evaluation tool. Their main use is to inform IMSS authorities and the country's financing entity (the Ministry of Finance) about hospital performance, efficient resource utilization, and the fulfilment of annual goals. Additionally, this evaluation tracks indicators progress towards predetermined goals within a six-year planning framework, following national planning norms. The results of IMSS-medical indicators are not made public. Thus, they are mostly an internal management tool for high level IMSS decision-making.

The MoH's MH 2015 exercise follows a similar approach to IMSS in terms of tracking progress. However, it was the first exercise designed to include the public as part of the audience, as its results were publicly released.

IMSS-medical indicators are designed for assessing hospital performance, efficient resource utilization, and achievement of annual goals. They include specific target values and expected goals for each indicator, which are established based on historical information from the IMSS hospital network.

Conversely, MH 2015 does not include explicit target values since its focus is on measuring variations. However, to compare hospital performance, benchmarks were established based on hospital segments. Reference values are only explicitly mentioned for two indicators, set according to international references: an occupancy rate at a value of 85% is identified as optimal, and the proportion of caesarean sections over natural births is based on WHO recommendations, and ranges between 10% and 15%.

5.2.4 Domains/subdomains, number of indicators (periodicity)

Both IMSS and MH 2015 comprise a series of hospital indicators, mainly sourced from discharge data. However, IMSS is more comprehensive and includes some indicators drawn from ad hoc internal information systems and hospital reports. This enables to capture some outcome indicators or make a follow-up on patients with specific procedures or health conditions. IMSS indicators are measured on a monthly and annual basis. MH 2015 was a one-time exercise based on annual discharge data, although by design it was intended to become a recurrent analysis, with the potential to be extrapolated to all the public sector hospitals.

Table 8 lists indicators related to inpatient care. For IMSS, 18 selected indicators are shown below (and included in **Annex 2**). However, IMSS also includes other indicators relevant to hospital activity encompassing emergency care and consultation indicators, as well as one indicator that may be useful in assessing the efficiency of primary care — but these are beyond the scope of this technical note. These indicators are provided in **Annex 5**. For MH 2015, 9 indicators are listed below (and included in **Annex 2**). Note that while IMSS indicators are part of a system of periodically collected medical care information, MH 2015 is a first public benchmarking exercise focusing on key indicators that are comparable between states and types of hospital.

Table 8. List of key indicators: Mexico

Indicator name	Program or initiative	
	IMSS selected hospital indicators*	MH 2015**
Hospital process indicators	• Percentage of hospital occupancy in secondary and tertiary-level units • Average length of stay in secondary level units (by medical specialty and type of unit) and tertiary-level units • Hospital bed turnover interval in tertiary-level units	• Bed occupancy rate • Average length of stay • Bed turnover interval
Mortality rate	• Hospital mortality rate in secondary and tertiary-level units • Intrahospital maternal mortality rate (per 100,000 live births) • Intrahospital perinatal mortality rate (per 1,000 births) • Intrahospital neonatal mortality rate (per 1,000 live births) • Neonatal mortality related to health care associated infections in secondary-level units (with 20 or more beds) and tertiary-level units	• Standardized intrahospital general mortality rate (without obstetric events) • Intrahospital neonatal mortality rate • Standardized intrahospital mortality rate by acute myocardial infarction (AMI) (45+ years) • Standardized Intrahospital mortality rate by stroke (45+ years)
Surgery	• Surgical opportunity in elective surgeries carried out in secondary level, at 20 or less days from the treating doctor request • Percentage of surgical rooms occupancy in secondary-level units	• Percentage of hernioplasties resolved as short stay surgery • Percentage of caesarean sections
Outcome indicators	• Percentage of patients with successful renal transplantation in tertiary-level units (one year after a renal transplant from a living donor) • Percentage of patients with successful cornea transplant in tertiary-level units after one year • Health care-associated infection rate in secondary-level units (with 20 or more beds) and tertiary-level units (per 1,000 days) • Surgical site infection rate in clean surgeries in secondary-level (with 20 or more beds) and tertiary-level units • Pneumonia rate associated with mechanical ventilation in secondary-level (with 20 or more beds) and tertiary-level units (per 1,000 ventilator-days) • Bloodstream infection rate associated with central venous catheter (per 1,000 catheter days) in secondary-level (with 20 or more beds) and tertiary-level units • Urinary tract infection rate associated with indwelling bladder catheter (per 1,000 catheter-days) in secondary-level (with 20 or more beds) and tertiary-level units • Health care-associated infection rate in ICU in secondary-level (with 20 or more beds) and tertiary-level units (per 1,000 days)	

* Most IMSS indicators are reported at the hospital level through information systems that enable tracking patients' outcomes for key health conditions. These hospital discharge data-based indicators derive from the Medical Operational Information System (*Sistema de Información Médico Operativo* – SIMO), available in all IMSS hospitals. Meanwhile, data on hospital resources comes from the Health Units Physical Inventory (*Inventario Físico de Unidades* – IFU).

** MH 2015 indicators are also based on hospital discharge data and hospital resource information. The hospital discharges data system (*Subsistema Automatizado de Egresos Hospitalarios, SAEH*) corresponds to hospitals providing care for the uninsured population. Hospital-level data include information on each discharge, such as admission date, discharge date, primary and secondary diagnoses, etc., as well as more detailed information on obstetric events and their outcomes (i.e., the number of delivered babies and neonatal mortality rates). Data on hospital resources, such as beds, is obtained from the Information Subsystem on Health Care Equipment, Human Resources and Infrastructure (*Subsistema de Información de Equipamiento, Recursos Humanos e Infraestructura para la Atención de la Salud – SINERHIAS*). The latter allowed grouping hospitals by size (number of beds) and type. Sources: IMSS (2019), Secretaría de Salud (2015).

5.2.5 Selection, review, and dissemination

Regarding IMSS-medical indicators, the calculation criteria and standards are contained in technical fact profiles, which include the measurement objective, calculation details, internal data sources, measurement frequency, unit of measurement, and comparison standards or benchmarks.

Hospital indicators analyzed for this technical note are part of a broader set of medical indicators selected by IMSS using the “logical framework methodology”. The national and institutional planning objectives are reviewed to guide the evaluation towards fulfilling major sectoral and institutional actions, as well as specific targets. Indicators were selected for five subprocesses of medical hospital care: outpatient consultations, surgeries, hospitalizations, auxiliary diagnostics, and emergencies.

Within IMSS, the relevant medical-technical areas (such as second-level hospitals, high-specialty hospitals, and epidemiological surveillance) review the objectives of the National Development Plan, the Health Sector Program, the IMSS Institutional Program (PIIMSS), and the Strategic Objectives of the Medical Director Office to strengthen and align the evaluation process with the main national, sectoral, and institutional policy strategies.

The selection of indicators is consensus-based with the medical-technical areas, considering inputs provided by the hospitals, the 35 state level authorities (35 delegations across the 32 states), and high-specialty hospitals (tertiary care hospitals). This consensus is reached through working sessions with representatives from the medical-technical and the health information systems areas, as well as leading IMSS clinical experts in each of the specific health topics (e.g. diabetes, cardiovascular disease). Initially, this process took place on a yearly basis, which required year-round meetings and discussions among the involved areas. In 2019, it was decided to maintain unmodified the same set of indicators for the entire duration of the current federal administration (6 years), with pending changes and improvements to be compiled towards the end of 2023-2024 in preparation for a 2025-2030 edition of the MMIM.

The reference and expected value/thresholds for the indicators are determined based on historical information and trends. This approach allows for a clearer visualization of achievements in the processes monitored by each indicator, enabling management actions to improve results. Nonetheless, all indicators and their respective reference value/thresholds are previously vetted for approval by the heads of the medical areas involved (in this specific case, the Secondary and Tertiary level hospital care Coordinations), as they are responsible for monitoring the indicator and achieving the expected results.

In the final phase of data processing and monitoring by the medical-technical areas, the results of the medical services performance indicators are published on the Institute's intranet portal, where they are accessible to institutional staff for consultation. The current evaluation covers the period from 2019 to 2024, aligned with the federal administration’s term. The evaluation is

collectively updated by the medical-technical professionals at the beginning of each federal administration.

On the other hand, the main objective of MH 2015 was to showcase hospital units with the best overall performance. To achieve this, objective evaluation parameters were defined, calculating indicators with the same methodology and assessing them under the same criteria. The publication includes aggregate indicators by hospital groupings or at the state level as well as specific values and results for the top five hospitals in each hospital group category. For mortality indicators, results for the top ten are also shown. The MH 2015 evaluation used official data sources published by the Ministry of Health, based on discharge reported by hospitals and compiled at the federal level, along with a Ministry of Health database containing hospital characteristics.

To develop MH 2015, meetings were held with hospital managers to promote ownership of the exercise. However, there was some resistance from several hospital directors who were reluctant to accept the results. Although ownership was not fully achieved, several hospitals used the results to conduct internal reviews of their processes and to improve their overall level of care. Furthermore, the MH 2015 report left an important legacy for enhancing INDICAS and promoting other initiatives. For example, the results from AMI mortality rates triggered subsequent policy work by the Ministry of Health around the "*Infarction Code*" program (*Código Infarto* in Spanish), though resources were limited for strengthening intervention in hospitals. In addition, the caesarean sections indicator has also made the issue more visible and allowed for specific policy interventions within the Ministry of Health.

5.2.6 Strengths and limitations

Both IMSS and MH 2015 reflect relatively mature health information systems in Mexico, with potential to evolve into more sophisticated hospital performance analysis, as observed in other countries reviewed in this technical note. The main weakness of the indicators presented in this section is the need for improved quality and sufficiency in the registration process, and better medical coding within the information sources.

As mentioned earlier, the primary purpose of IMSS evaluations is to serve as an internal management tool for high-level decision-making and goal tracking within the organization. However, it also plays a crucial role in assessing the effectiveness of IMSS programs and informing policy development. At the operational level, the evaluation results are used by the organization to monitor medical care, assess program effectiveness, and overlook efficient utilization of medical and human resources. MH 2015 is technically very robust and was a first step toward promoting this type of analysis. However, it was not replicated in subsequent years. The MoH compiles and makes available the annual discharge database and regularly updates data on hospital features. Annual figures on overall hospital activity including volume of discharges by type and lengths of stay at both the national and state levels are published in the MoH website (http://sinaiscap.salud.gob.mx:8080/DGIS/). However, no comprehensive benchmarking analysis has been conducted since MH 2015.

5.3. OECD HCQI

5.3.1 Initiatives' context and motivation

The Health Care Quality Indicators (HCQI) project is led by the OECD, an international organization consisting of 38 member countries. The HCQI project is an ongoing initiative launched in 2001 in the context of *"rising costs, aging populations, market failures, poor quality, medical errors, lack of accountability, and inequalities. In all these, there are widespread perceptions of poor value for the money and effort spent on health care"* (Arah et al., 2006). It builds upon previous national and international efforts in measuring health system performance and health care quality and leverages the expertise and resources of OECD member countries (Mattke et al., 2006).

The OECD HCQI project is motivated by the understanding that improving health care quality is central for achieving better health outcomes, enhancing patient satisfaction, and optimizing health care expenditures. The primary aim of the OECD HCQI project is to develop a set of standardized indicators that measure and compare health care quality across countries. International benchmarking is at the core of the OECD work. This project is considered a first step toward further research into why differences in health care quality exist between countries, exploring policy alternatives and share best practices to reduce them, thus improving care in all countries (Mattke et al., 2006).

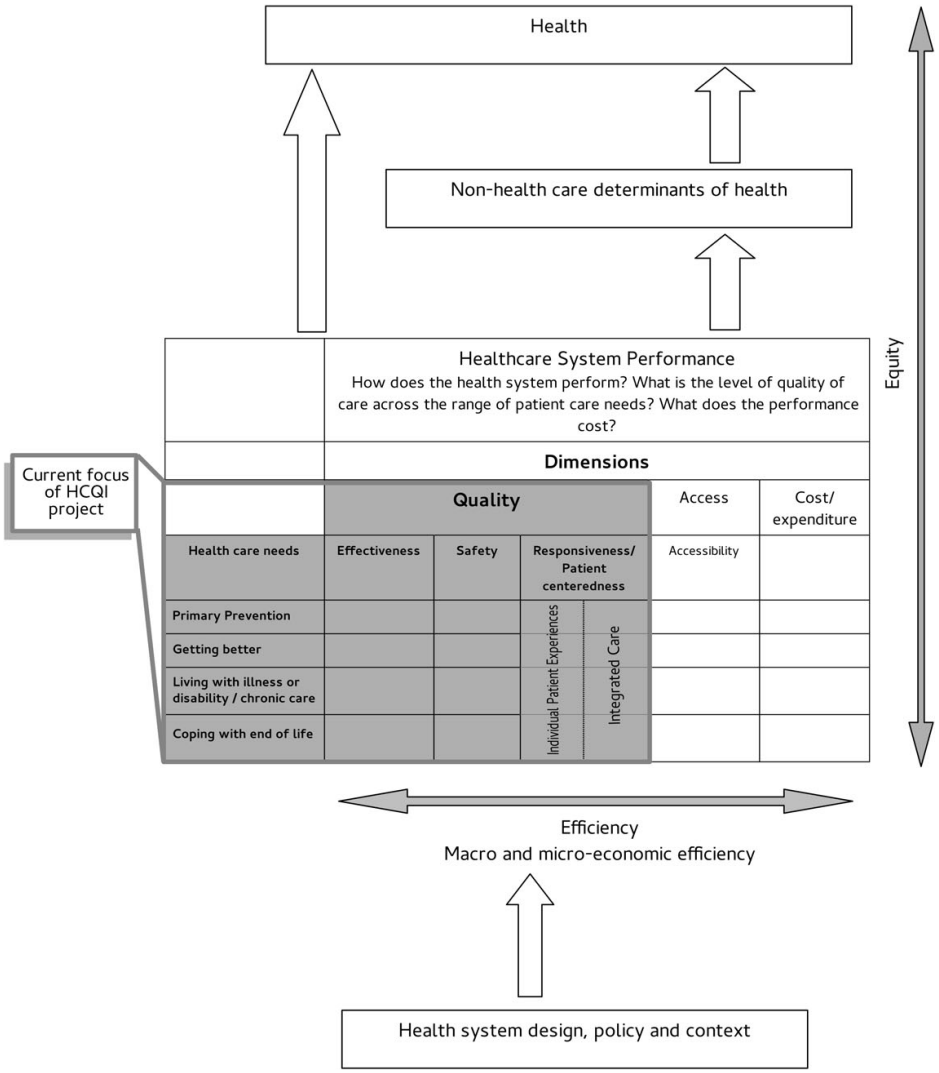
5.3.2 Underlying conceptual framework

The conceptual framework of the OECD HCQI project provides a structured approach to measuring and assessing health care quality and efficiency. The framework was developed through literature reviews and consultation with country experts. It draws on performance framework experiences from the US Institute of Medicine's national health care quality indicator framework, and experiences of the UK, Canada, Australia, the European Community Health Indicators Project, the Commonwealth Fund's International Quality Indicator Project, and the WHO (Arah et al., 2006).

The framework places health care quality within a broader health system performance context, acknowledging that health is influenced by both health care and non-health care determinants, such as environment, lifestyle, and biology (**Figure 6**). This broader perspective is also consistent with health system goals adopted by the OECD and its member countries, namely, to improve health, efficiency, and equity (Arah et al., 2006).

While keeping this broader perspective, the measurement of health care performance is assessed through various dimensions to capture different aspects in relation to health needs across the life cycle (Arah et al., 2006). Such needs are structured as levels of care, including: i) primary and secondary prevention for healthy individuals; ii) health improvement/restoration (acute care); iii) continuous and integrated health management for people living with illness/disability (chronic care), and iv) care at the end-of-life for terminal patients (Carinci et al., 2015). The framework therefore considers the full spectrum of health care services, with hospital care mainly pertaining to the health improvement/restoration level (acute care).

Figure 6. OECD HCQI framework



Source: Extracted from Carinci et al. (2015).

The framework uses three overarching dimensions to assess health care performance: quality, access, and cost/expenditure. Within quality, which is the central focus of the HCQI project, the core domains are effectiveness, safety, and responsiveness/patient centeredness (Arah et al., 2006; Carinci et al., 2015).[19]

[19] Access relates to how easily services can be reached and requires that health services are available. Efficiency is a measure involving macro-economic efficiency (ensuring the appropriate level of resources for the system) and micro-efficiency (maximizing outcomes or results for a given level of resources), but it is not included, as such, in the HCQI project. Some quality indicators or underlying data can potentially be used as inputs to assess efficiency, alongside cost or resource information. Equity relates to the fairness in the distribution/financing of health care across populations (Arah et al., 2006).

Effectiveness relates to the extent to which health care interventions and treatments achieve desired outcomes and prevent avoidable complications. Safety assesses the prevention of errors, adverse events, and health care-associated infections. Responsiveness refers to whether care delivery meets patients' legitimate non-health expectations. In turn, patient-centeredness measures the extent to which patients/users are placed at the center of health care delivery. Often, responsiveness and patient-centeredness are considered the same concept and are measured through patient experience surveys (Arah et al., 2006). In 2015, the framework was revised and the notion of "integrated care" was included within patient centeredness/responsiveness to capture the extent to which health care enables patients to move swiftly across levels of care, and how these levels act coordinately to better meet patient needs (Carinci et al., 2015).[20]

5.3.3 Scope

The scope of the OECD HCQI project is international in nature, encompassing multiple OECD member countries. The project aims to facilitate learning, benchmarking, and policy improvements. Countries report indicators based on aggregate data, which are presented at the national or country level.

It is important to note that while the OECD HCQI project primarily involves member countries, its findings and recommendations can also inform and influence health care quality initiatives and policies beyond the OECD.

The HCQI set of indicators mainly includes process and outcome measures, since structure measures are considered insufficient to assess safety and effectiveness. New indicators have been added subsequently based on data availability and the priorities expressed by member countries. Moreover, the following criteria have been applied at different times of the project development either to add or review existing indicators (Mattke et al., 2006; Carinci et al., 2015) (see **Table 9**).

Table 9. Criteria to assess indicators

Criteria	Underlying concept or definitions intended to be measured or assessed for each indicator
Importance	Relates to health impact associated with the problem measured by the indicator.
Policy importance	Refers to whether the area of measurement is of concern for both policymakers and consumers.
Susceptibility to being influenced by the health care system.	Whether the health care system can meaningfully address this aspect or problem, whether it is able to have an impact independent of confounders like patient risk, and whether changes in the indicator will provide information about the success or failure of policy changes.
Scientific soundness	i) Face validity: if the measure is logically and clinically sound. ii) Content validity: if the indicator reflects meaningful aspects of care quality. iii) Reliability: if the measure provides stable results across various populations and circumstances.
Feasibility	Data availability in OECD countries.

[20] More details on the broader scope of the framework and these domains are captured as part of the proposed framework (see **Section 1**).

Source: extracted from Mattke et al. (2006).

5.3.4 Domains/subdomains, number of indicators (periodicity)

The OECD HCQI project employs a wide range of indicators to measure quality and efficiency across different levels of care. **Table 10** only lists those indicators relating to hospital care for the three core quality domains and efficiency (i.e., access indicators, including waiting times and other, are not listed[21]). These are further specified in **Annex 2**.

Table 10. List of key indicators: OECD

Domain	HCQI indicators related to acute care/hospital care
Effectiveness	• Thirty-day mortality after admission to hospital for acute myocardial infarction (under two options: patient linked data and unlinked data) • Thirty-day mortality after admission to hospital for hemorrhagic and for ischemic stroke (under two options: patient linked data and unlinked data) • Caesarean sections per 1,000 live births* • Laparoscopic procedures: appendectomy, cholecystectomy, laparoscopic repair of inguinal hernia, laparoscopic hysterectomy*
Safety	• Foreign body left in during procedure • Adverse events in hip and knee surgeries: postoperative pulmonary embolism or deep vein thrombosis • Post-operative sepsis – abdominal discharges • Obstetric trauma, vaginal delivery with and without instruments
Responsiveness /patient centeredness	• Hip fracture surgery initiation within two days of admission for patients aged 65 and over • Adjusted mean change between pre- and postoperative Oxford Hip Score and HOOS-PS (Scales: Oxford 0-48; HOOS-PS 0-100) • Adjusted mean change between pre- and postoperative Oxford Knee Score and KOOS-PS (Scales: Oxford 0-48; HOOS-PS 0-100) • Health worker perceptions of patient safety culture domains, handoffs and transitions and overall perceptions of safety • Patients reporting that a medical mistake was made during treatment or care**
Efficiency	• Average length of stay, all causes* • Bed occupancy rates*

* These indicators are reported as part of the set of health care utilization indicators routinely collected through OECD health data.

** OECD Pilot Data Collection on Patient-Reported Experience of Safety, 2020-2021. Indicator only available in Health at a Glance, Europe 2022. It is reported for the general population, but for some countries (Latvia, Estonia, and Poland), and based on national sources specifically for hospitalized patients.

Information is collected biannually, through a routinely established process run by the OECD Secretariat and country health data correspondents.

[21] Other indicators related to other levels of care include, for example: routine vaccinations, five-year net survival for specific types of cancer, patients readmitted or dying from any cause within one year of discharge after stroke and congestive heart failure, and avoidable hospital admissions for specific conditions (i.e., asthma and chronic obstructive pulmonary disease).

The number of indicators has expanded over time. In a first phase, an initial set of 17 indicators were included to test technical issues, including countries' reporting. These indicators met criteria for importance in informing policy, scientific soundness, in addition to feasibility. In a second phase, the project reviewed a broader list of indicators.

5.3.5 Selection, review, and dissemination

The process for selecting and implementing the OECD HCQI project indicators involves several key steps and considerations:

i) Selection of Indicators

The selection of indicators involves a collaborative process among participating OECD member countries. Indicators approved for inclusion in routine OECD data collection need to be scientifically sound, important at both clinical and policy level, feasible to collect — in terms of data being available in as many countries as possible — and amenable for comparison across countries (Mattke et al., 2006). The selection of indicators and conditions or areas of care results from the review, discussion and voting within a HCQI Expert Group comprising experts and country representatives (Mattke et al., 2006). Technical dialogue is also held with cooperating international organizations (including the WHO and the European Commission), experts in the field, and research institutions.

ii) Periodic review

The OECD HCQI project recognizes the need for regular review and refinement of indicators to ensure their relevance and accuracy. Indicators undergo periodic review to assess their continued suitability, consider updates based on emerging evidence and changes in health care practices, and address any identified limitations or gaps.

The review process involves input from experts, feedback from country representatives, and consideration of international standards and best practices in health care quality measurement. Since 2015, the OECD has been promoting the exploration and potential use of patient-reported experience measures (PREMs) and patient-reported outcome measures (PROMs) (OECD, 2017b).

iii) Calculation

Once the indicators are selected, the project establishes standardized methodologies and guidelines for their calculation to ensure consistency across participating countries.

Calculation methods consider variations in data availability, data sources and health care systems while aiming for comparability. Key issues in the calculation process include addressing data quality and reliability, dealing with data gaps and establishing risk adjustment methods when appropriate. Different features of data sources are also considered. For example, when data sources use a patient single identifier that allows the linking of data from more than one hospital, mortality indicators are calculated in two versions. The version based on patient linked data measures deaths occurring either in the hospital where the first admission took place, or in another one. The version based on unlinked patient data only measures deaths occurring in the same hospital where the first admission took place.

Some of the initial technical challenges faced during the selection of mortality indicators, along with the proposed solutions, are illustrated in **Table 11**. They are relevant to highlight how the

OECD has used a progressive approach to start reporting indicators while working with countries to continually improve them.

Table 11. Criteria used to enable calculation of selected indicators

Indicator	Original data concerns	Solutions implemented
Acute myocardial infarction (AMI) 30-day case fatality rate	1. Data are not yet age standardized. 2. Some countries use unique patient IDs; others do not. 3. Some countries can track patient after hospital discharge; others cannot.	1. Report the results of the analysis showing minimal effect of unique identifiers on data and country rankings. 2. Agree to report data based on admissions versus unique identifiers to accommodate most countries. 3. Finalize age standardization using the 1980 OECD population. 4. Report in-hospital mortality for all countries to allow comparability until most countries can calculate the true 30-day case-fatality rate.
Stroke 30-day case fatality rate	1. Different ICD-9 codes are used for the denominator. 2. Data are not yet age standardized. 3. Some countries use unique patient IDs; others do not. 4. Some countries can track patient after hospital discharge; others cannot.	1. Report the results of the analysis showing minimal effect of unique identifiers on data and country rankings. 2. Agree to report data based on admissions versus unique identifiers to accommodate most countries. 3. Footnotes can indicate whether ICD-9 or ICD-10 codes were used, and the same ICD-9 definition should be applied for all countries. 4. Report in-hospital mortality for all countries to allow comparability until most countries can calculate the true 30-day case-fatality rate.

Source: extracted from Mattke et al. (2006).

The OECD undertakes a biannual data collection process, sharing guidelines with member countries (and non-member countries also participating in the process). Countries report back to the OECD the results using standardized templates provided by the OECD, which include all data relevant for the calculations (i.e., numerator and denominator values, year, and other elements). In addition, for some indicators, the OECD provides SAS programs that countries can run using their hospital datasets once these are converted into a standardized format. Using these programs and a standardized dataset has enabled over time to reinforce comparability and obtain more complex indicators, such as mortality rates or age-sex-co-morbidity adjusted mortality rates based on patient-linked discharge data (OECD, 2018; OECD 2023b).

iv) Reporting and dissemination

The OECD HCQI project prepares reports and disseminates the findings to member countries, policymakers, health care providers, researchers, and the public. In addition to specific reports, the periodic publication *Health at a Glance* presents the indicators. These reports provide comparative data and trend analysis to facilitate benchmarking and the identification of areas for improvement.

v) Implementation and use

Member countries are responsible for implementing and using the OECD HCQI indicators within their health care systems. Evidence from a survey on 15 countries, including the UK and the USA, suggests that countries use at least some HCQI indicators as part of national and regional monitoring (Rotar et al., 2016). Experience on implementation and use may vary across countries, depending on their specific contexts, data availability, and policy priorities. Countries may integrate the indicators into their national health care quality improvement initiatives, policy development, and performance monitoring. For example, Mexico included acute myocardial infarction and stroke mortality rates as part of the benchmarking exercise MH 2015. Also, indicators published by the OECD in their annual *Health at a Glance* report are increasingly used to document international variations and make the case for improving health care performance.

The OECD HCQI indicators can be valuable tools in conducting hospital efficiency analysis. As they are defined, they can be used to:

- **Benchmarking through cross-country comparisons.** Primarily, OECD indicators enable countries to benchmark their performance against other countries. More recently, the OECD has also worked with some countries to report hospital-level indicators, allowing for benchmarking at the hospital level, mainly to document variations beyond national level estimates. In principle, these indicators can help hospitals identify areas of strength and areas that need improvement by comparing their performance on specific quality indicators with that of other hospitals or health care systems.
- **Identifying best practices.** The indicators provide a standardized framework for assessing health care quality. By analyzing hospitals that perform well on specific indicators, researchers and policymakers can identify best practices and strategies that contribute to higher efficiency.
- **Performance monitoring over time.** The indicators facilitate tracking performance over time.

It is important to note that the OECD HCQI project indicators are just one component of a comprehensive hospital performance analysis. Other data sources and methodologies may be necessary to conduct a more comprehensive assessment. However, the indicators can be leveraged in further measurements and estimates of hospital efficiency analysis.

5.3.6 Strengths and limitations

The OECD HCQI project indicators offer several strengths that enhance their usefulness in assessing health care quality across countries. Yet, within a few strengths also lie some limitations.

Standardization: The indicators provide a standardized framework for measuring health care quality, enabling comparisons across countries and health care systems. This standardization promotes consistency and allows for meaningful benchmarking and identification of best practices. However, the indicators may not fully capture the contextual factors influencing health care quality. Variation in health care system structures, financing mechanisms, cultural factors, and socioeconomic disparities may affect the interpretation and comparability of the indicators.

Policy relevance: The indicators are designed to align with policy priorities and address key dimensions of health care quality. This policy relevance enhances their practical utility for policymakers.

International collaboration: The OECD HCQI project involves collaboration among member countries, facilitating the exchange of knowledge, experiences, and best practices. This collaboration enhances the indicators' robustness and ensures a broader perspective on health care quality measurement.

Data availability: The indicators leverage existing data sources within participating countries, making use of readily available data. This availability enhances the feasibility and efficiency of data collection and minimizes the burden on data providers. However, data availability and quality can vary across countries and health care systems. Differences in data collection methods, definitions, and data completeness may impact the comparability of indicators across countries.

Comprehensive coverage: The indicators cover multiple dimensions of health care quality and provide a more comprehensive picture than individual measures alone. Yet, the pace of incorporating new or more complex indicators may be slower, as part of the aim is to include as many countries as possible.

5.4. United Kingdom – NHS

5.4.1 Initiatives' context and motivation

The ***National Health Service (NHS)*** is the common "umbrella" name given to the health care services within the United Kingdom — it comprises different independent bodies, including NHS England, NHS Scotland, NHS Wales and Health and Social Care in Northern Ireland. Health care services are almost entirely publicly-funded — "free at the point of delivery" — primarily through general taxes and, to a smaller degree, local taxes and payroll contributions (there are also some minor patient fees). Access to hospital care within the NHS is usually through general practitioners' (GP) referral, except for emergencies. In most cases, the patient will choose the hospital in which to receive treatment, including both private and NHS hospitals, which provide health care services to the NHS (NHS 2023). As in most of Europe, hospital-delivered health care accounts for the largest proportion of health expenditure in the United Kingdom, amounting to 41% of total expenditure in 2021, slightly above the OECD average of 38% (OECD, 2022).

In England, ***NHS England*** leads the health service, setting priorities and direction, while also commissioning most health care services (NHS England, 2014). The ***Department for Health and Social Care*** (DHSC) concentrates the funding for health services in England — £185.1billion in 2022/23. Most of this budget (84% for 2022/23) is then transferred to NHS England to cover day-to-day costs (The Health Foundation, 2023).

Regarding the quality and performance of health services in England — including hospital services — several entities or institutions play diverse roles and are involved in the design, standard setting, implementation, and/or monitoring of different initiatives and measures:[22]

- The ***National Quality Board (NQB)***: Provides guidance and endorsement on quality issues, emphasizing the relevance of quality, and acting as a collective to shape and guarantee system alignment of programs and initiatives (NHS England, 2023a). It has representation of NHS England, NHS Digital[23], the Care Quality Commission, the UK Health Security Agency, the National Institute for Health and Care Excellence, the Office for Health Improvement and Disparities, the Department of Health and Social Care, and Healthwatch England (NHS England, 2023a).
- The ***Care Quality Commission*** (CQC): An independent regulator of health in England that monitors, inspects, and regulates services, making its findings available through publications (CQC, 2023).
- ***NHS Digital***: Formerly in charge of running the national information technology systems, and the collection, analysis, publication, and dissemination of data from health care services (NHS England, 2023b). In February 2023, NHS Digital was absorbed NHS England.
- ***National Institute of Health and Care Excellence*** **(NICE)**: An arms-length entity responsible for driving improvement and excellence in health care. It develops guidance, standards, and information on health care (NICE, 2019). NICE has been involved in indicators' development at the GP and ***Clinical Commissioning Groups*** (CCG) levels (see below for changes related to CCGs), and currently manages the ***Indicator Methodology Assurance Service*** (IMAS) (see **Section 5.4.2**) on behalf of the whole system, which was formerly managed by NHS Digital (NHS Digital, 2023a).

It is important to note that the NHS has undergone significant changes in recent years. For example, in 2022, ***Clinical Commissioning Groups*** (CCGs) — groups of GP practices formerly responsible for commissioning most health care services, including hospital care services — were replaced by ***Integrated Care Systems*** (ICSs). ICSs are made up of local partnerships of organizations which include providers and payers, that similarly commission services locally with national and regional oversight from NHS England (NHS England, 2023c).[24] Nonetheless, this transformation is still underway. For example, in the case of data, codes that formerly identified CCGs are still temporarily being used while names are changed to identify the "Sub ICB Location" (NHS Digital, 2022). Furthermore, in February 2023 **NHS Digital** and **NHS England** merged, making the latter responsible for designing and operating national data systems (NHS England, 2023b). Even before the merger, since 2020, NICE began working with NHS Digital to take over and maintain the ***National Indicator Library*** (NICE, 2019). This effectively means that there is a recent and, in some cases, still ongoing

[22] These are the most salient ones, but there may be other instances also playing a role in this subject.
[23] In February 2023, NHS England absorbed NHS Digital.
[24] Each ICS is comprised by an integrated care partnership (ICP) and an integrated care board (ICB). ICBs are responsible for planning and funding most NHS services in a given area, while ICPs bring together various partners to develop a health and care strategy for that area.

restructuring of the responsibility for data generation, measurement design, monitoring and reporting within the NHS.

The NHS has developed a long-stablished and extensive approach to measuring and assessing hospital performance, including multiple clinical indicators across different hospital care quality and performance improvement and measurement initiatives. The data is used by clinical staff, commissioners, researchers, and others to inform decision-making in health and care, and as most of this data is publicly available, it also benefits consumers in general. Some of the most relevant initiatives and measures are described below:

NHS Outcomes Framework

The ***NHS Outcomes Framework*** (NHS OF) defines the national outcome goals to monitor the progress of NHS England. However, it does not present the strategies to deliver or achieve these outcomes (NHS, 2022b). Indicators included in the NHS OF are decided annually, based on consultations with relevant internal and external stakeholders. Until recently, NHS Digital oversaw the publication of these indicators (NHS, 2022b).

CCG Outcomes Indicator Set

The ***CCG Outcomes Indicator Set*** focuses on providing easily understandable information for comparison purposes about the quality of health services commissioned by Clinical Commissioning Groups (CCGs) and the related health outcomes (NHS Digital, 2022). As noted above, the obligations previously managed by CCGs are now responsibility of ICBs (NHS Digital, 2022).

NHS Oversight Framework

The ***NHS Oversight Framework*** was developed by NHS England to guide the oversight of the operation of integrated care boards (ICBs) and trusts. A set of indicators to accompany and support the implementation of the framework has been developed (NHS England, 2023d).

Clinical Outcomes Publication

The Health Care Quality Improvement Partnership (HQIP)[25] manages the ***Clinical Outcomes Publication*** (COP), an NHS England initiative to use National Clinical Audit and administrative data to measure and publish quality indicators. Distinctively from other frameworks and initiatives, the COP publishes measures at the individual consultant doctor, team, and unit levels, as well as other levels (HQIP, 2016). At the consultant-level, COP outcomes measures included: i) the number of procedures carried out by a consultant; ii) risk-adjusted or crude mortality rate/numbers by consultant; and iii) additional quality measures as appropriate to each specialty/audit (HQIP, 2016). The results of these measures are publicly available. Since there is substantial overlap with the frameworks described above, the COP is not reviewed in detail in this report.

5.4.2 Underlying conceptual framework

[25] HQIP includes the Academy of Medical Royal Colleges, the Royal College of Nursing and National Voices, among others, and aims to *promote quality improvement and to increase the impact that clinical audit has on healthcare quality in England and Wales* (HQIP, 2016). It also holds the contract to manage and develop the National Clinical Audit Programme.

Two conceptual frameworks for the development of hospital quality and efficiency measures have been identified:

- ***Indicator Methodology Assurance Service*** (IMAS): Formerly managed by NHS Digital, IMAS was the basis for quality-assured measures in the National Library of Indicators. The process established by IMAS assessed several components of the indicators, including the statistical methodology, the objective of the measure and the quality of the data source (NHS Digital, 2023a).

  IMAS established a robust set of assessment criteria for indicators. If the criteria were not met, the measure would be further investigated, and if problems could not be resolved, the indicator would not be published (NHS Digital, 2023a). These criteria are reviewed as part of the *Indicator Supporting Documentation*.[26] Once indicators were assured and published, they were periodically reviewed to ensure their continued accuracy and appropriateness (NHS Digital, 2023a).

- ***NICE Process for developing indicators:*** This process encompasses reviews from expert independent committees and may involve contracting the specialized *National Collaborating Centre for Indicator Development* (NCCID) to support specific aspects of indicator development[27], among other robust components. The process is briefly outlined in the following steps (NICE, 2019):

  1. **Prioritizing areas for indicator development:** Priorities are agreed with NHS England, Public Health England (PHE)[28], the Department of Health and Social Care, and other stakeholders.
  2. **Indicator Advisory Committee (IAC)[29] consideration:** Prioritized areas are presented to the IAC for expert opinion and appraisal.
  3. **Indicator development stages**: This includes *indicator drafting*, *testing*, *consultation with stakeholders and respondents* (together with patient organizations and professional groups), *and cost-effectiveness analysis*.
  4. **IAC review:** The IAC performs testing and consultation review, resource impact analysis, and threshold setting.
  5. **NICE Guidance Executive:** Directly assesses whether measures are consistent with NICE quality standards, NICE guidance, and other relevant evidence.
  6. **Publication of indicators:** Indicators are publicly available.
  7. **Review of NICE indicators:** Indicators are reviewed when the scheduled review date approaches or underlying evidence is updated.

[26] With respect to IMAS, the *Indicator Supporting Documentation* includes specific quality checks pertaining to coverage, completeness, validity, default, integrity, and timeliness. These checks respond to specific questions regarding the used data, such as: *How accurate and complete is the data? Are there any known constraints? Is there evidence that data is* available with sufficient frequency and timeliness, and robust enough (NHS, Digital 2020).

[27] The NCCID supports NICE in *drafting indicator wording*, *assessing potential data sources*, and *testing potential indicators*, among other tasks (NICE, 2019).

[28] As part of recent changes within the NHS, in 2021, PHE was replaced by the UK Health Security Agency and the Office for Health Improvement and Disparities.

[29] The IAC is made up of *primary and secondary care professionals*, *commissioners*, *public health and social care professionals*, *patients or service users and their carers*, and *academics* (NICE, 2019).

All new indicators or those which require updating or renewal will be evaluated using NICE processes (NICE, 2019).

5.4.3 Scope

The NHS utilizes a wide range and high volume of clinical quality and performance indicators to assess hospital care. Furthermore, within these indicator sets, initiatives, and programs, there may be overlap in the measurements. For this technical note, and due to the large number of quality measures designed and reported within NHS, only a selection of hospital/inpatient related measures[30] included in the **NHS Outcomes Framework**[31], the **CCG Outcomes Indicator Set**, and the **NHS Oversight Framework**[32] — in their most recent available editions — has been incorporated for further analysis (see **Section 5.4.4**).

Furthermore, due to their relevance, certain hospital-related indicators from the **Compendium of Population Health Indicators** and the **Summary Hospital-level Mortality Indicator** have also been included for analysis.

Additionally, although the ***Seven-day Services***[33] indicators are no longer being published (as the DHSC has ceased commissioning NHS Digital to produce these indicators and no further publications in this series are planned), the *Length of stay following an emergency admission by day of admission* measure is included due to its relevance.

In general, the measures are at a national or CCG-ICB level, allowing for national-level comparison between individual hospitals and regions. The intended goal is to have fully comparable measures between different care providers in a consistent and standardized manner, but simple enough to understand as they are meant for use at the consumer level (among other users). Most indicators reviewed do not include explicit targets or benchmarks, as their primary purpose is to compare and reflect significant deviations among hospitals.

Furthermore, multiple measure sets are used by think thanks/charities/non-government organizations to independently evaluate performance in the NHS — such as the **Nuffield Trust**, **The Health Foundation** and **The King's Fund.** There are also regional initiatives such the **Advancing Quality** (AQ) program in the NHS Northwest regional team. Nonetheless, there is a significant overlap with the indicators already considered.

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30 There are several other measures relating to A&E (accident and emergency), outpatient and other services that are not included as part of this technical note.

31 Ten indicators related to inpatient hospital care from the March 2022 edition are included. The March 2023 annual publication has been delayed due to the merger between NHS Digital and NHS England. The *Patient experience of hospital care* and *Responsiveness to Inpatients' personal needs* indicators (also included in the CCG Outcomes Indicator Set) were not considered as they have "*been removed from the portal pending a methodological review and will be updated as soon as possible*". The release dates for these indicators are yet to be confirmed.

32 Indicators from the NHS Oversight Framework are those inpatient measures overlapping with other framework or indicator sets included in this technical note, as no specific methodology information related to inpatient could be obtained. The *Proportion of patients spending more than 12 hours in an emergency department* and *E. coli bloodstream infection rate* indicators could not be included, as there was no overlap and no available specifications.

33 The *Seven-day Services initiative* focused on improving hospital care on Saturdays and Sundays to ensure patients would receive the same high-quality services as on weekdays. The *Seven-day Services* indicators provide information on both improvements and variations in care provision throughout the week (NHS Digital, 2023b).

5.4.4 Domains/subdomains, number of indicators (periodicity)

As mentioned earlier, the indicators reviewed (15 in total) are a selection of measures from the **CCG Outcomes Indicator Set**, the **NHS Outcomes Framework,** the **NHS Oversight Framework,** the **Compendium of Population Health Indicators** and other indicators for which sufficient methodological information was found or could be obtained from other programs/initiatives (see **Table 12**). Indicators are grouped into domains: effectiveness, safety, response/patient centeredness, and efficiency, and are fully described in **Annex 2**.

It is important to note that some indicators have been *grouped* in **Annex 2** for ease of analysis and should be further disaggregated upon construction. For example, *Deaths within 30 days of emergency admission to hospital* should be disaggregated into five condition- or procedure-specific measures relating to stroke, fractured proximal femur, myocardial infarction, patients undergoing a procedure following a non-elective admission, and patients undergoing a coronary artery bypass graft procedure.

Table 12. List of key indicators: United Kingdom (NHS)

Indicator name	Program/initiative				
	CCG Outcomes Indicator Set	Compendium of Population Health Indicators	NHS Outcomes Framework Indicators	Summary Hospital-level Mortality	NHS Oversight Framework
Mortality within 30 days of hospital admission for stroke	✓				
All-cause mortality – 12 months following a first emergency admission to hospital for heart failure in people aged 16 and over	✓				
Emergency readmissions within 30 days of discharge from hospital	✓	✓	✓		
Patient reported outcome measures (PROMs) for elective procedures (4 procedures)	✓				
Patients admitted to an acute stroke unit within 4 hours of arriving at hospital	✓				
Hip fracture: proportion of patients recovering to their previous levels of mobility/walking ability (produced at 30 or 120 days – 2 separate indicators)	✓		✓		
Hip fracture: timely surgery	✓				

Indicator name	Program/initiative				
	CCG Outcomes Indicator Set	Compendium of Population Health Indicators	NHS Outcomes Framework Indicators	Summary Hospital-level Mortality	NHS Oversight Framework
Patient safety incidents	✓		✓		
Incidence of Health Care Associated Infection (HCAI) – Methicillin-resistant Staphylococcus aureus (MRSA)	✓		✓		✓
Incidence of Health Care Associated Infection (HCAI) – C. difficile	✓		✓		✓
Deaths within 30 days of a hospital procedure or emergency admission (5 conditions/procedures)		✓			
Emergency hospital admissions and timely surgery (fractured proximal femur)		✓			
Deaths from venous thromboembolism (VTE)-related events within 90 days post-discharge from hospital			✓		
Summary Hospital-level Mortality Indicator				✓	✓
Length of stay following an emergency admission to hospital, by day of admission*					

Sources: NHS Digital, 2022, 2023a, 2023b, 2023c and 2023d.
* Part of the *Seven-day Services* indicators; however, the DHSC has ceased commissioning NHS Digital to produce these indicators and no further publications in this series are planned.

Within the NHS and other health-related organisms in the UK, performance measurement is constantly evolving. An example of this is work around the *Days alive and out of the hospital* (DAOH) indicator, which is not yet included in any of the frameworks mentioned above. This indicator has been reviewed in different settings and, although further studies are needed, it is considered promising for assessing quality or performance in surgery, as it provides additional insight compared to traditional indicators — such as time-to-first-event analyses — and a more patient-centered perspective by measuring time spent in good health (Jerath et al., 2019 and Spurling et al., 2022). DAOH subtracts all days spent by the patient in hospital (length of stay) from a total defined length of period (30, 60 or 90 days), Since the inpatient days subtracted include initial or subsequent hospital stays within the period, the indicator automatically includes readmissions (for example for re-interventions), hence reflecting more closely patient

experience instead of merely recording the end points. By also including mortality (DAOH = zero), it provides an indirect indicator of the severity of the event. Furthermore, DAOH can be constructed using currently available data sources, at least in the UK (Oh, A.R. et al., 2023).

5.4.5 Selection, review, and dissemination

The indicators used by the NHS undergo extensive testing for validity and reliability by experts within the institution and independent organized groups. As stated in **Section 5.4.2**, indicators that undergo the IMAS are firstly appraised, assuring quality and methodology, before publication. Moreover, each indicator is subject to ongoing review, considering user feedback and emerging needs. The NICE process includes further validation by independent expert groups. In the case of NHS Digital, calculation of these measures was made through automatized processes, enhancing efficiency and reliability. Furthermore, all figures in the indicator data files were produced and verified independently by two different analysts (NHS Digital, 2023a).

Regarding dissemination, the NHS also publishes regular reports on hospital performance and quality, providing transparency and accountability to the public. A related system-wise mechanism to promote quality and performance improvement are Quality Accounts. A ***Quality Account*** is an annual report that provides an overview of the quality of services and improvements offered by an NHS health care provider. Quality is measured by looking at patient safety, effectiveness of treatments, and patient feedback (NHS, 2022a).

5.4.6 Strengths and limitations

The NHS approach to hospital care quality and performance measurement is complex and continuously evolving. The outcome measures reported by the NHS are robust and comparable and have been developed through years of testing and validation.

Nonetheless, the calculus of some of these measures varies from low to high complexity: while some indicators offer just a count (i.e., no standardization or statistical treatment applied), others involve more complex methods (i.e., require construction of the logistic regression models). The development of robust information systems — which has taken place over years — and the widespread availability of detailed data also underpin the complexity and diversity of these indicators.

5.5. United States – Medicare

5.5.1 Initiatives' context and motivation

Medicare is the United States (US) federal health insurance program for people ages 65 and over, and certain individuals under 65 with long-term disabilities, regardless of income, medical history, or health status (KFF, 2019). As of September 2022, over 65 million older adults and younger people with disabilities were enrolled in Medicare (CMA, 2023). Medicare assists by covering several medical care services, including hospitalizations, physician visits, prescription drugs, preventive services, among other (KFF, 2019). In 2021, Medicare spending amounted $900.8 billion USD, or 21% of total national health expenditure in the US (CMS, 2023a).

Medicare is administered by the ***Centers for Medicare & Medicaid Services*** (CMS), a federal agency within the ***Department of Health and Human Services*** (HHS). Within CMS, the ***Center for Clinical Standards and Quality*** (CCSQ) stands out as the leading instance coordinating the development and implementation of an integral approach to measuring and promoting quality (CMS, 2022c). Additionally, within the HHS, the ***Agency for Healthcare Research and Quality*** (AHRQ) is relevant as it conducts research and produces reports and analysis to improve quality within the health system. A noteworthy example is the annual *National Healthcare Quality and Disparities Report,* mandated by Congress, which provides a comprehensive overview of the quality of health care in US (AHRQ, 2023a). The AHRQ has also developed quality indicators including inpatient indicators that focus primarily on condition- or procedure-specific mortality rates and procedures rates, such as laparoscopic interventions. The AHRQ provides a series of definitions and resources for individuals and organizations interested in using these indicators (AHRQ, 2023b). There is a wide range of users, from researchers, quality managers and hospital administrators, to state-level hospital associations, insurers, and CMS, utilize these indicators. Some of these are also included in the Care Compare platform, described further below. While tthe rest of this section primarily focuses on CMS indicators and performance measurement initiatives, **Annex 6** lists AHRQ's inpatient quality indicators.

CMS, as the largest payer of health care services in the US, has implemented various programs and initiatives aimed at improving the quality of health care across several areas of service provision. These programs seek to enhance quality improvement either through payment incentives and reductions, or by public reporting of health care quality information on government-run platforms (CMS, 2022a).

Furthermore, over the years, Medicare has pioneered testing several health care improvement models, including some that offer financial incentives to providers to reduce spending and improve care for patients – hence making performance on spending and quality targets highly relevant, as they become tied to funding and payments (KFF, 2019). The HHS can authorize the expansion of delivery models that demonstrate quality improvements without increasing spending, or vice versa — reductions in spending without affecting quality (KFF, 2019).

Hospital Inpatient Quality Reporting (IQR) Program

The ***Hospital Inpatient Quality Reporting (IQR) Program*** was implemented by CMS to improve hospital care by measuring and publicly displaying quality information to consumers and providers. As part of this initiative, and to further push towards transparency and accountability in hospital quality measurement, the *Hospital Compare – Care Compare* website was created. Furthermore, as part of the legislation mandating the IQR Program, CMS was authorized to offer hospitals that successfully report designated quality measures a higher annual update to their payment rates. Hospitals that did not successfully report or comply with requirements of the IQR Program face a reduction in their annual market basket[34] (CMS, 2021). The IQR Program is one of various quality initiatives within CMS and Medicare.

Hospital Compare – Care Compare and QualityNet CMS websites

[34] The measure of inflation in costs of goods and services used by hospitals in treating Medicare patients (CMS 2021).

CMS and the ***Hospital Quality Alliance*** (HQA)[35] — a public-private collaboration focused on improving the quality of care provided by US hospitals through measurement and public reporting (HQA, 2006) — began publicly reporting quality indicators in a website called ***Hospital Compare*** in April 2005. In 2020, *Hospital Compare* was consolidated with other CMS "Compare" websites into the ***Care Compare*** website (www.medicare.gov/care-compare/) (CMS, 2023d).

The website has progressively expanded to include more measures on different conditions and procedures — initially starting with the "*Ten measure starter set*" (process of care measures primarily focusing on heart attack, heart failure, pneumonia and surgical care) — to now encompass over 150 hospital quality measures, including process of care, outcomes, and patient experience of care[36] measures, among others (CMS, 2023d). The measures are chosen mainly because they are related to serious medical conditions and patient safety and are also easily submittable for public reporting by hospitals (HQA, 2006).

Only data from Medicare-certified hospitals is included on the website, and most of the participants are short-term acute care hospitals, which would face a reduction in the annual update of their Medicare fee-for-service payment rate if they do not participate (by submitting data or meeting other requirements). This is mandated through the ***Hospital Inpatient Quality Reporting (IQR) Program,*** as mentioned earlier (CMS, 2023d). However, the website and many of the quality measures included also apply and are helpful for individuals who may not have Medicare financial coverage (Medicare, 2023).

Providing hospital performance information through the *Care Compare* website allows for consistent, unified, and credible information about the care delivered in hospitals. This **enables consumers to compare performance between providers** in their state and nationwide, and make informed health care decisions (CMS, 2023d). Furthermore, beyond increasing transparency and providing quality information to consumers and others, publicly reporting these measures supports overall efforts to improve the quality of care provided by hospitals (CMS, 2023c). The goal is for this set of measures to be reported by all hospitals, and accepted by all purchasers, oversight and accrediting entities, payers, and providers (HQA, 2006).

On the other hand, ***QualityNet*** (https://qualitynet.cms.gov/) was established by CMS to provide health care quality improvement news, resources and data reporting tools and applications **mainly meant for health care providers** (CMS, 2023f). It is the only CMS-approved website for communications and data exchange between quality improvement organizations (QIOs), hospitals, physician offices, nursing homes, among others (CMS, 2023f). The goal of *QualityNet* is to provide a safe and efficient exchange for information platform (CMS 2023f).

Hospital-Acquired Condition (HAC) Reduction Program

The ***Hospital-Acquired Condition (HAC) Reduction Program*** was implemented by CMS to improve hospital care by encouraging best practices to decrease health care-associated

[35] HQA consists of organizations that represent consumers, hospitals, providers, employers, accrediting organizations, and federal agencies.

[36] HCAHPS (Hospital Consumer Assessment of Healthcare Providers and Systems) or patient experience of care is measured by a national, standardized survey of hospital patients about their experiences during a recent inpatient hospital stay (CMS, 2023d).

infections (HAI) rates (Data CMS, 2023; CMS, 2023f). Hospitals regularly submit patient safety information to the *Centers for Disease Control and Prevention* (CDC) via the *National Healthcare Safety Network* (NHSN) application. Subsequently, this data is shared with CMS and used to calculate performance scores for hospitals (Data CMS, 2023). A poor performance on the measures included in the HAC Reduction Program can have a negative effect on hospital's payments (see **Section 5.5.5**).

5.5.2 Underlying conceptual framework

CMS has developed the ***Measures Management System*** (MMS) — a standardized approach for developing and maintaining quality measures used in several quality initiatives and programs — to manage an increasing demand for quality measures in its public reporting, quality programs, and value-based purchasing initiatives (CMS, 2023b). The system consists of processes and decision criteria that CMS-funded measure developers follow to set up, implement and maintain quality measures (CMS, 2023b; CMS, 2022b). These measures must meet the standards required by the ***National Quality Forum*** (NQF) — a non-profit organization dedicated to improving health care in the US through measures and standards development — for consensus endorsement (CMS, 2023b).

A high-level overview of the major steps involved in developing measures, known as the ***Blueprint Measure Lifecycle***, includes five stages (CMS, 2023b):

- **Measure conceptualization:** Identifying relevant ideas/topics and/or gaps in measurement.
- **Measure specification:** Establishing the basic elements of the indicators and their calculation, and gathering inputs on initial measure selections (through stakeholders' engagement via public comment and technical expert panels).
- **Measure testing:** Collecting data to evaluate whether the measure meets the evaluation criteria.
- **Measure implementation:** Establishing a rulemaking process and gathering input and feedback from users on measure specifications.
- **Measure use, continuing evaluation, and maintenance:** Annual update and a comprehensive reevaluation every three years.

5.5.3 Scope

As stated previously, there is a high volume of hospital quality and performance indicators reported under Medicare. Even within the spectrum of **inpatient hospital quality information** available in *QualityNet* (excluding outpatient, rural emergency, ambulatory surgical centers, certain cancer hospitals, renal and psychiatric disease facilities, for example), the myriad of measures is extensive and vary significantly. These include from established hospital inpatient measure sets and quality program measures to differences in measures based on their data sources, such as claims-based data, electronic health records (EHR), or hybrid-measures. Furthermore, there can be overlaps in the measures across different sets and programs.

For this technical note, only a selection of measures from the vast ecosystem of quality measures designed and reported within Medicare's ***Hospital Inpatient Quality Reporting (IQR) Program*** has been incorporated for further analysis (see **Section 5.5.4**). These measures include ***inpatient quality claims-based outcome measures,*** specifically those

relating to **complications, excess days spent in acute care, mortality,** and **readmissions.** In particular, these measures have been prioritized not only for public reporting but also because CMS analyzes hospital outcome data to provide greater insight into trends and variation — as compiled in the ***Chartbook* —** and include the claims-based outcome measures listed in **Section 5.5.4** (CMS, 2023c)**.**

Additionally, the ***Hospital Inpatient Quality Reporting (IQR) Program*** has incorporated, for further review, other measures such as ***Electronic Clinical Quality Measures*** (eCQMs)[37] and ***Hybrid Measures***, which merge EHR elements with claims data to calculate risk-standardized readmission and mortality rates (see **Section 5.5.4**).

Furthermore, five of the six[38] ***Hospital-Acquired Condition (HAC) Reduction Program*** measures have been included for analysis due to this program's relevant role in promoting patient safety. Moreover, and in view of its innovative characteristics, a ***Patient-Reported Outcome-based Performance Measure*** (PRO-PM) for Total Hip Arthroplasty/Total Knee Arthroplasty (THA/TKA) has been considered and added to **Annex 2** for further review.

CMS also calculates annual ***Payment measures*** for AMI, HF, THA/TKA, and PN[39], encompassing payments made by both patients and insurers. **These payment measures are not included in this analysis.** As CMS explicitly acknowledges: "[…] *these results alone do not reflect the quality of care provided or coordinated by hospitals. The payment measures' results are more meaningful when presented in the context of quality measures to facilitate profiling hospital value (payments and quality)"* (CMS, 2023f). These measures are more intended to reflect overall payment differences due to hospital decisions and are better understood alongside outcome measures such as mortality and readmissions (CMS, 2023f).

In general, the measures are assessed at the hospital level, allowing for state and national comparison between hospitals. The intended use is to have fully comparable hospital-specific measures between different care providers in a consistent and standardized manner, but keeping them relatively simple to understand, especially for consumers using *Care Compare* to make health care decisions.

Most indicators do not include explicit targets or benchmarks, as their main purpose is to highlight significant deviations between hospitals through comparison. However, according to the Code of Federal Regulations (CFR) – Title 42 Part 482 – *Conditions of Participation for Hospitals*, hospitals must meet minimal health and safety requirements to participate in Medicare and Medicaid (CFR, 2023). Among these, hospitals must develop and implement a *Quality assessment and performance improvement* (QAPI) program that should incorporate indicators related to improved health outcomes and the prevention and reduction of medical errors — including adverse patient events, and other care performance aspects. Evidence of the QAPI program must be available for review by CMS (CFR, 2023).

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[37] Reporting on some of these measures is also required by hospitals to participate in the Medicare *Promoting Interoperability Program*. The selected eCQMs require the use of *certified electronic health record technology* (CEHRT).

[38] The *Patient Safety and Adverse Events Composite* (CMS PSI 90) is **not** included in this report as it encompasses multiple independent measures. It is a composite measure of a subset of the AHRQ *Patient Safety Indicators* – made up by 10 separate patient safety indicators.

[39] AMI: Acute Myocardial Infarction, HF: Heart Failure, THA/TKA: Total Hip Arthroplasty and/or Total Knee Arthroplasty, PN: Pneumonia.

5.5.4 Domains/subdomains, number of indicators (periodicity)

As mentioned earlier, the indicators reviewed (24 in total) are a selection of measures from the ***Hospital Inpatient Quality Reporting (IQR) Program***, the ***Hospital-Acquired Condition (HAC) Reduction Program,*** and other indicators for which there was sufficient methodological information found (see **Tables below**). These indicators are grouped into four domains: effectiveness, safety, patient centeredness and efficiency, and are fully described in **Annex 2**.

It is important to note that some indicators have been *grouped* in **Annex 2** for ease of analysis and should be further disaggregated upon construction. For example, the *30-day risk-standardized mortality measure* should be disaggregated into condition-specific measures relating to AMI, CABG, COPD, HF, PN and stroke (see **Tables below**).

Table 13. List of key indicators: US IQR Program (claims-based outcome measures)

Outcome Measure	30-day risk-standardized mortality (RSM) measures	30-day risk-standardized readmission (RSR) measures	90-day risk-standardized complications (RSC) measures	30-day excess days in acute care (EDAC) measures
AMI	✓	✓		✓
CABG	✓	✓		
COPD	✓	✓		
HF	✓	✓		✓
THA/TKA		✓		
PN	✓	✓		✓
Stroke	✓		✓	
HW		✓		

Acronyms: AMI: Acute myocardial infarction, CABG: Coronary artery bypass graft, COPD: Chronic obstructive pulmonary diseases, HF: Heart failure, THA/TKA: Total hip arthroplasty and/or total knee arthroplasty, PN: Pneumonia, HW: Hospital wide.
Source: Centers for Medicare & Medicaid Services (CMS). Outcome and Payment Measures. Page Last Modified: 03/16/2023. (2023c) https://www.cms.gov/medicare/quality-initiatives-patient-assessment-instruments/hospitalqualityinits/outcomeandpaymentmeasures

Table 14. Other measures included in the IQR Program

Indicator name	Data source
Exclusive Breast Milk Feeding	EHR
Discharged on Antithrombotic Therapy	
Anticoagulation Therapy for Atrial Fibrillation/Flutter	
Antithrombotic Therapy by the End of Hospital Day Two	
Discharged on Statin Medication	
Venous Thromboembolism Prophylaxis	
Intensive Care Unit Venous Thromboembolism Prophylaxis	
Hospital Harm – Severe Hypoglycemia	
Hospital Harm – Severe Hyperglycemia	
Cesarean Birth	
Severe Obstetric Complications	
Safe Use of Opioids – Concurrent Prescribing	
Hybrid Hospital-Wide All-Cause Readmission	Hybrid – EHR and claims-based
Hybrid Hospital-Wide All-Cause Risk Standardized Mortality	

Note: Medicare covers certain services related to pregnancy and delivery as beneficiaries include those younger than age 65 who qualify because of disability.

Table 15. Other innovative measures - *Patient-Reported Outcomes*

Indicator name	Data source
Patient-Reported Outcome-based Performance Measure (PRO-PM) for Total Hip Arthroplasty/Total Knee Arthroplasty (THA/TKA)	Patient-Reported

Table 16. Hospital-Acquired Condition (HAC) Reduction Program (measure selection)

Indicator name	Data source
Central Line-Associated Bloodstream Infection (CLABSI)	Chart-abstracted measures of health care-associated infections submitted to CDC
Catheter-Associated Urinary Tract Infection (CAUTI)	
Surgical Site Infection (SSI) for abdominal hysterectomy and colon procedures	
Methicillin-resistant Staphylococcus aureus (MRSA) bacteremia	
Clostridium difficile Infection (CDI)	

5.5.5 Selection, review, and dissemination

The quality measures considered by CMS undergo extensive testing for validity and reliability, both by CMS and Quality Improvement Organizations (QIO) — groups of health quality experts, clinicians, and consumers created under the QIO Program of the HHS. Other participants include the Joint Commission on Accreditation of Healthcare Organizations, a non-profit organization that accredits health care organizations and programs, and the HQA, among others, with endorsement by the NQF (HQA, 2006). As part of its adherence to the transparent policy, CMS makes its measurement methodology available on its website (CMS, 2023e). Furthermore, CMS contracts third parties for periodic reviews of the measures. Recently, CMS contracted the *Yale New Haven Health Services Corporation – Center for Outcomes Research and Evaluation* (YNHHSC/CORE) to update measures for the 2023 public reporting through a process of measure reevaluation (CMS, 2023f).

Reporting takes place on the *Care Compare* and the *QualityNet* websites, both of which are open to the public. In addition, some indicators are also reported in the AHRQ Annual National Healthcare Quality and Disparities Report.

Medicare uses financial incentives/disincentives to promote hospital data reporting, but also directly adjusts payment rates for providers based on quality measure performance. Two good examples of this are the *Hospital Readmissions Reduction Program (HRRP)* and the *Hospital-Acquired Condition (HAC) Reduction Program*.

Hospital Readmissions Reduction Program (HRRP)

The HRRP is a value-based purchasing program that promotes hospital best practices to reduce avoidable readmissions. It has implemented payment reductions for certain types of hospitals (*Subsection(d)* hospitals)[40] with excess readmissions (Data CMS, 2023). The reductions are determined based on calculating *excess readmission ratios* (ERR) for six condition- or procedure-specific 30-day risk-standardized readmission measures (AMI, COPD, HF, PN, CABG, THA/TKA — included in **Annex 2**). The ERR is calculated by dividing a hospital's *predicted* rate of readmission by the *expected* rate, which is estimated based on the average performance of hospitals with similar patients. (Data CMS, 2023). For the HRRP, CMS payment reduction is capped at 3%, applied to all Medicare fee-for-service base operating diagnosis-related group payments during the fiscal year, and calculated according to each hospital's performance during a rolling performance period (Data CMS, 2023).

Some studies have found that hospitals with greater incentives to avoid readmissions experienced larger decreases in excess readmission, while hospitals with no incentives saw increases in excess readmissions for the conditions targeted by the HRRP (Hoffman and Yakusheva, 2020).

Hospital-Acquired Condition (HAC) Reduction Program

As described above, the HAC Reduction Program is a value-based purchasing program that focuses on decreasing HAI rates (Data CMS, 2023). The program reduces payments to hospitals in the worst-performing quartile based on HACs. This quartile is determined by calculating a *Total HAC Score* using **six quality measures** (five of which are included in

[40] *Subsection (d)* hospitals are acute care inpatient hospitals paid under the hospital Inpatient Prospective Payment System (IPPS).

Annex 2). The worst-performing hospitals are subject to a 1% payment reduction, applied to all Medicare fee-for-service discharges for the fiscal year (Data CMS, 2023).

5.5.6 Strengths and limitations

The outcome measures reported by CMS are highly robust, standardized, and comparable. They have been developed through years of testing and validation by various experts. Furthermore, they also provide easy to understand figures for consumers' use.

Nonetheless, the calculation of these measures is complex, as it involves statistical management of variables through hierarchical generalized linear models (HGLMs) and other models. This complexity requires a robust information system and widespread detailed data availability at both the patient and hospital levels — including electronic patient records for risk standardization and case-mix.

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Annexes

Annex 1. Hospital-level indicators useful to assess broader health system performance

Hospital-level indicators are also valuable for assessing the performance of other types of services or levels of care. Two clear examples are OECD indicators on **avoidable hospitalizations for primary care sensitive conditions** and **integrated care** indicators (OECD, 2023b).

Avoidable hospitalizations for primary care sensitive conditions reflect the effectiveness of primary care. These indicators include various conditions, with the rationale being that a patient whose underlying condition — typically a non-communicable disease — is under adequate control in primary care should rarely need hospitalization for that specific condition. A high rate of admissions for these conditions may indicate poor performance in primary care. The OECD uses the following indicators to measure avoidable hospital admissions in primary care:

1. Asthma hospital admission
2. Chronic obstructive pulmonary disease (COPD) hospital admission
3. Congestive heart failure (CHF) hospital admission
4. Hypertension hospital admission
5. Diabetes hospital admission
6. Diabetes lower extremity amputation (indicator using unlinked data or linked data)

Integrated care indicators reflect the extent to which different levels of care or health care settings are not fragmented and ensure a smooth and continued care as patients move back and forth across levels of care. The OECD uses the following indicators, focusing on two conditions: ischemic stroke and congestive heart failure. These reflect the extent to which patients discharged from hospital receive adequate care once they return to their usual care settings or upon referral to other health service:

1. Ischemic stroke – All-cause hospital readmissions within 365 days after discharge
2. Ischemic stroke – Disease-specific hospital readmissions within 365 days after discharge
3. Ischemic stroke – All-cause mortality within 365 days after discharge
4. Ischemic stroke – All-cause mortality or all-cause readmission within 365 days after discharge
5. Ischemic stroke – All-cause mortality or disease-specific readmission within 365 days after discharge
6. Congestive heart failure (CHF) - All-cause hospital readmissions within 365 days after discharge
7. Congestive heart failure (CHF) – Disease-specific hospital readmissions within 365 days after discharge
8. Congestive heart failure (CHF) - All-cause mortality within 365 days after discharge
9. Congestive heart failure (CHF) - All-cause mortality or all-cause readmission within 365 days after discharge
10. Congestive heart failure (CHF) - All-cause mortality or disease-specific readmission within 365 days after discharge
11. Congestive heart failure (CHF) – Case fatality within 30 days of the admission date

Annex 2. Full indicator matrix (Excel file)

Annex 3. Proposed indicator profiles

These profiles synthesize the various measures used by countries, as described in the technical note and other annexes. Whenever possible, they are primarily based on OECD indicators but are supported with examples and variations from other contexts. For more methodological details by country/experience, see **Annex 2,** and for full references see the specific country/international experience section in the list of references.

Average length of stay (ALoS) (based primarily on OECD definitions)

Concept	Definition
Objective / relevance of the indicator	This is one of the most fundamental and relevant measures for assessing hospital performance and health care variations among hospitals, regions, or countries (OECD). The average length of stay in hospital is also an indicator of efficiency in health service delivery. All else being equal, a shorter stay reduces the cost per discharge and shifts care from inpatient to less expensive settings (OECD). This indicator is very helpful for measuring variations in health care and exploring the extent to which these differences are unwarranted or unjustified. Compared to a standard or average, longer stays can be a sign of poor care coordination, resulting in some patients waiting unnecessarily in hospital until rehabilitation or long-term care arrangements. Conversely, some patients may be discharged too early, when a longer stay in hospital might have improved their health outcomes or reduced the chances of readmission (OECD).
Domain / Subdomain	Efficiency
Numerator	Total number of hospital (inpatient) bed-days (or inpatient days) during a period (month/year)
Denominator	Total number of admissions or discharges during a year
Methodology specifications (calculus)	**Average length of stay (ALOS) is calculated by dividing the number of bed-days by the total number of discharges during the year** (x 100 – depending on the calculation method). A patient's length of stay should be counted as the discharge date minus the admission date (for example, a patient admitted on the 25th and discharged on the 26th should be counted as 1 day) (OECD).
Key definitions & criteria (e.g., inclusions and exclusions)	**Inclusion** • Bed-days in all hospitals, including general hospitals, mental health hospitals, and other specialized hospitals (OECD). • Bed-days of healthy newborns (OECD). **Exclusion** • Day cases (OECD).
Indicator variants	• This indicator can be calculated for all causes but also for specific conditions (primary diagnosis or diagnostic categories) or combinations of primary diagnosis and specific procedures (OECD). The list of diagnostic categories is based on *the International Shortlist for Hospital Morbidity Tabulation* (ISHMT). The complete shortlist with ICD-10 and ICD-9 codes can be found here: http://stats.oecd.org/wbos/fileview2.aspx?IDFile=e477970b-3024-4188-8dc6-13f3db201846) (OECD). • Indicator can also be calculated for types of hospitals and services/medical division or specialty (e.g., surgery, internal medicine, pediatrics, and gynecology and obstetrics). They include gynecologic/obstetric and psychiatric hospitals — but calculated independently (IMSS). • Obstetric and psychiatric discharges are excluded altogether (MH, 2015). • Indicator can be calculated for types of beds — inpatient or surgical (Brazil ANS-SUS).

Relevant notes	The average hospital stay can be influenced by the hospital's complexity and by individual patient characteristics, such as age, clinical condition, and comorbidities (Brazil ANS-SUS). A high average length of stay does not necessarily represent problems in the quality of hospital care, as it does not account for the reason for leaving, which could be due to discharge, transfer, or death (Brazil ANS-SUS). Availability of primary diagnosis (ICD-10), and/or types of hospitals or services is required for cause-specific/department or specialty service-specific calculation. For cause-specific: conditions with small size should be excluded (also an issue for small hospitals). Thus, consider only major causes. 97lso is commonly standardized. One quick method for standardization is to select a specific condition to limit the case-mix effect. Another approach is to use an age or age-sex standardization (in some cases, the reference population could be the pooled set of discharges and their distribution by age or age-sex). Direct standardization allows for comparisons and ranking among countries. If age is a reliable variable age-specific LoS can be calculated (using 5-year age groups is recommended). OECD used the 2013 OECD population as a reference population to standardize, but more recently published 97lso figures are not indicated as standardized.

Percentage of caesarean deliveries (based primarily on OECD and MH 2015 definitions)

Concept	Definition
Objective / relevance of the indicator	While caesarean delivery is necessary in some circumstances, the benefits of caesarean versus vaginal delivery for normal uncomplicated deliveries remains a topic of debate. Cesarean delivery continues to result in increased maternal mortality, maternal and infant morbidity, greater complications in subsequent deliveries, and higher financial costs This raises questions about the appropriateness of some caesarean delivery that may not be medically required (OECD)
Domain / Subdomain	Quality / Effectiveness
Numerator	Births attended by caesarean section in a period of time (year)
Denominator	Total number of births in a period of time (year)
Methodology specifications (calculus)	**Percentage of caesarean deliveries is calculated by dividing the number of births attended by caesarean section by the number of the total number of births during the year** (x 100)
Key definitions & criteria (e.g., inclusions and exclusions)	**Inclusion** • Caesarean section ICD-9-CM (1996): 74.0—74.2; 74.4, 74.99 74.0 Classical caesarean section 74.1 Low cervical caesarean section 74.2 Extraperitoneal caesarean section 74.4 Caesarean section of other specified type 74.99 Other caesarean section of unspecified type Codes mapped with ICD-9-CM (1996), which is used in some countries. Only consider Inpatient procedures (OECD). • Live births or deliveries, but **some countries do include deliveries without specifying if they only consider live births** (OECD). **Exclusion** • Births that occurred outside the hospital (Brazil) • Abortions (Brazil)
Indicator variants	• OECD indicator calculates Caesarean sections per 1,000 live births (OECD)

	• In Brazil, QUALISS reports *Proportion of vaginal births*, which is the opposite to *Caesarean rate*, as reported by the SUS Evaluation Program for Qualification (Brazil). • The recommendation of the World Health Organization is that the proportion of caesarean sections is between 10 to 15% (MH 2015; OECD; Brazil). • Acceptable Caesarean Birth rates for Medicare indicator are 30% or lower; however there is not an established threshold for what rate may be too low (US Medicare). • Reference value: ≥ 55% vaginal births/deliveries (ANS-SUS)
Relevant notes	Variations in caesarean section rates across countries have been attributed to several factors, including financial incentives, malpractice liability concerns, differences in the availability and training of midwives and nurses, and the proportion of women who access private maternity care. For example, there is evidence that private hospitals tend to perform more caesarean sections than public hospitals (OECD). Furthermore, women's preferences for caesarean sections for a healthy birth vary among countries, which can be linked to institutional arrangements in the maternal health system and cultural attitudes towards labor and birth (OECD).

Laparoscopic surgeries (based on OECD definitions)

Concept	Definition
Objective / relevance of the indicator	Laparoscopic procedures (appendectomy, cholecystectomy, repair of inguinal hernia, hysterectomy). For the listed procedures, the OECD collects data on both the total number of procedures, including open surgeries and laparoscopies. Therefore, either the rate of laparoscopic procedures per population or the share of laparoscopic procedures out of the total number of procedures for a specific type can be calculated (OECD). Laparoscopic procedures are less invasive and thus entail lower risks, shorter recovery times, and reduced length of stay, thus improving health outcomes and efficiency. This type of indicator can reflect appropriateness (OECD).
Domain / Subdomain	Quality/Effectiveness
Numerator	Count of the number of laparoscopic procedures (OECD): 1) Laparoscopic appendectomy 2) Laparoscopic cholecystectomy 3) Laparoscopic repair of inguinal hernia 4) Laparoscopic hysterectomy
Denominator	1) To calculate the rate of laparoscopic procedures per population, the denominator is the general population. For procedures performed only on females, such as hysterectomy, use the female population as denominator (OECD). 2) To calculate the percentage of laparoscopic procedures of type "x" relative to the total number of type "x" procedures, the denominator is the total number of type "x" procedures. Multiply the result by 100 (OECD).
Methodology specifications (calculus)	**Percentage of laparoscopic surgeries is calculated by dividing the number laparoscopic procedures of type "x" by the total number of type "x" procedures** (percentage or share out of total procedures) It can also be calculated as a rate (per 100,000 population/females, depending on the indicator or type of procedure being applied). Counting of procedures should be based on either the number of patients who have received a given procedure or on a single code per procedure category for each patient, to avoid double-counting in cases where more than one code may be used in certain national classification systems (OECD).
Key definitions & criteria (e.g., inclusions and exclusions)	**Inclusion** **Laparoscopic appendectomy**: Excludes conversion from laparoscopic to open surgery. ICD-9-CM (1996): 47.01, 47.11 47.01 Laparoscopic appendectomy 47.11 Laparoscopic incidental appendectomy **Laparoscopic cholecystectomy**: Excludes conversion from laparoscopic to open surgery. ICD-9-CM (1996): 51.23

	51.23 Laparoscopic cholecystectomy **Laparoscopic repair of inguinal hernia:** Excludes conversion from laparoscopic to open surgery. ICD-9-CM (1996, 2006): Not possible. Note: No specific codes in ICD-9-CM (1996, 2006) for laparoscopic repair of inguinal hernia, but specified in later versions: ICD-9-CM (2013): 17.1, 17.2 17.1 Laparoscopic unilateral repair of inguinal hernia 17.2 Laparoscopic bilateral repair of inguinal hernia **Laparoscopic hysterectomy:** Includes combination of laparoscopic and open techniques (laparoscopic assisted). Excludes conversion from laparoscopic to open surgery. ICD-9-CM (1996): Not possible Note: No specific codes in ICD-9-CM (1996) for laparoscopic hysterectomy, but specified in later versions: ICD-9-CM (2006): 68.31, 68.41, 68.51, 68.61, 68.71 68.31 Laparoscopic supracervical hysterectomy [LSH] 68.41 Laparoscopic total abdominal hysterectomy 68.51 Laparoscopically assisted vaginal hysterectomy (LAVH) 68.61 Laparoscopic radical abdominal hysterectomy 68.71 Laparoscopic radical vaginal hysterectomy [LRVH]
Indicator variants	• Rate of laparoscopic procedures per number of population or the share of laparoscopic procedures out of the total number of procedures of a certain type (OECD).
Relevant notes	Higher rates or percentages, especially when compared to open surgery rates or percentages, are deemed better since they can reflect a higher uptake of less invasive, safer, and more efficient procedures (OECD).

Mortality rates (based primarily MH 2015 definitions)

Concept	Definition
Objective / relevance of the indicator	**Intrahospital general mortality rate (MH 2015)** Measures the relationship between the number of deaths and total hospital discharges over a given period. This indicator is used to measure the global performance of health services. Under similar conditions, good hospital care should result in lower mortality rates than those produced by care of poorer quality. For interpretation, it is recommended to account for the factors and characteristics inherent to the patient that could influence mortality outcomes (MH 2015). This indicator has multiple variants and progressions, according to data availability and specific area of interest to measure: progression usually occurs from *general intrahospital*, to *intrahospital population group-specific* (e.g., neonatal or maternal), then to *condition-specific mortality,* and finally to *condition and time-specific mortality* (e.g., acute myocardial infarction [AMI] or stroke mortality at 30-days after admission and/or isolated coronary artery bypass grafting [CABG] surgery) – with the possibility of standardization (direct or indirect).
Domain / Subdomain	Quality/Effectiveness
Numerator	Number of deaths recorded in a certain period (MH, 2015).
Denominator	Total number of discharges in the same period (MH, 2015).
Methodology specifications (calculus)	**Number of deaths recorded in a certain period/Total number of discharges in the same period (**x 100)
Key definitions & criteria (e.g., inclusions and exclusions)	**Inclusion** **Exclusion** • Outpatient care units are excluded (IMSS)

	• Obstetric events (MH 2015)
Indicator variants	• MH 2015 measures mortality without obstetric events (MH 2015) • Stratification by type of hospital and size (number of beds) (MH 2015, IMSS) • Specific modifications for small hospitals: OECD background analysis: "[…] due to the unreliability of mortality rates among small hospitals (agreed by experts as those with fewer than 50 AMI admissions during the observations period), only hospitals with 50 or more admissions are included in this analysis". **Standardization:** • OECD uses direct standardization with specific-disease populations for AMI and stroke 30-day mortality. They use the 2015 OECD population. • MH 2015 used direct standardization with a reference population = aggregate discharges rather than population as such.
Relevant notes	It is important to emphasize that mortality is an indicator that can be influenced by certain individual characteristics, such as patient age and clinical condition. Additionally, mortality measures do not necessarily reflect problems in the quality of hospital care, as they depend on the complexity of the services provided by the institution and the condition of the patients treated. For instance, health institutions that offer palliative care services may have higher mortality rates, which does indicate lower quality of care (Brazil). **Hence, the importance of more complex calculation methods, including standardization (direct or indirect) and case-mix or service-mix, which consider these characteristics.**

Readmissions (based primarily on Brazil ANS-SUS)

	Definition
Objective / relevance of the indicator	High proportions of readmissions may reflect non-resolutive actions in patient care. Reducing the readmission rate is believed to offer an opportunity to improve health care quality while reducing costs (Brazil). This indicator has multiple variants and progressions according to data availability and the specific area of interest to be measured: intrahospital service/specialty/department, condition, procedure specific (e.g., surgical, AMI, stroke).
Domain / Subdomain	Quality / Effectiveness
Numerator	Total hospitalizations that occurred within 30 days (≤ 30 days) of patients who had discharges included in the denominator (discharges in the month prior to the accrual month) (Brazil).
Denominator	Total hospital discharges in the month prior to the accrual month (Brazil).
Methodology specifications (calculus)	**Total hospitalizations that occurred within 30 days from the discharge that appear in the denominator / total discharges in the month prior to the accrual month** (x 100) (Brazil). For example, in January there were 1,000 admissions. Of these, 50 were readmitted within 30 days after discharge. Thus, the indicator for February will be (50/1,000) x 100, that is, 5 readmissions per 100 admissions for January (Brazil).
Key definitions & criteria (e.g., inclusions and exclusions)	**Inclusion** • Patients who were discharged (previous hospitalization) in the month prior to the accrual month and who were readmitted within a period equal to or less than 30 days (≤ 30 days) (Brazil). **Exclusion** • Oncology, obstetrics, and psychiatric patients (Brazil).

Indicator variants	• Brazil ANS-SUS excludes oncology, obstetrics, and psychiatric patients (Brazil). • UK NHS measures indicator specifically for emergency readmissions (UK NHS). • Both Condition/Procedure-Specific Readmission (CSR) and Hospital-Wide Readmission Measures for Medicare use risk-standardization (US Medicare).
Relevant notes	Many factors leading to readmission are beyond hospitals' reach — high readmissions rates may be associated with low mortality or good access to hospital services. When analyzing this indicator, some important points must be considered, such as (Brazil): • The conditions that led to rehospitalization, confirm if there is a relationship with the previous hospitalization (causal link). • The complexity of the hospital, as institutions treating patients with more complex pathologies may present higher readmission values. • The socioeconomic conditions of patients, as there are factors beyond hospital's reach, among other considerations. **Hence, the importance of more complex calculation methods, including standardization (direct or indirect) and case-mix or service-mix, which consider these characteristics.**

Bed occupancy rates (based primarily on OECD definitions)

Concept	Definition
Objective / relevance of the indicator	The occupancy rate for curative (acute) care beds is one of the most basic and relevant measures for evaluating hospital performance. Bed occupancy rates are central to identify underused or overused capacity. They offer complementary information to assess hospital capacity (OECD).
Domain / Subdomain	Efficiency
Numerator	Number of hospital beds effectively occupied (bed-days) for curative care during a year (OECD).
Denominator	Number of beds available for curative care multiplied by 365 days (OECD).
Methodology specifications (calculus)	**Total number of bed-days during the year / (Number of beds available * 365 days) * 100** (OECD).
Key definitions & criteria (e.g., inclusions and exclusions)	A bed-day (or inpatient day) is a day during which a person admitted as an inpatient is confined to a bed and stays overnight in a hospital (OECD). The number of bed-days should be counted as the date of discharge minus the date of admission (e.g., a patient admitted on the 25th and discharged on the 26th should be counted as 1 day) (OECD). **Inclusion** • Bed-days in all hospitals, including general hospitals, mental health hospitals, and other specialized hospitals. All components of curative care for illness (both physical and mental/psychiatric illnesses) or injury treatment, as well as diagnostic, therapeutic and surgical procedures, and obstetric services (OECD). • Bed-days of healthy newborns (OECD). **Exclusion** • Day cases (OECD). • Other functions of care (such as rehabilitative care, long-term care, and palliative care) (OECD).
Indicator variants	• The indicator can be calculated at the hospital-aggregate level or by diagnostic category (OECD).

	• Can also be calculated for general beds, ICU and/or surgical beds (MH 2015, IMSS, Brazil)
Relevant notes	High occupancy rates of curative (acute) care beds may be symptomatic of a health system under pressure (OECD). Although there is no consensus on the "optimal" occupancy rate, a rate of about 85% is often considered a maximum to reduce the risk of bed shortages (OECD). For international comparisons, it is important to ensure consistent definitions of the types of beds and bed-days included (OECD).

Annex 4. List of Brazil's 49 QUALISS line-of-care specific indicators

Stroke

1. Door-to-needle time (DTNT)
2. Percentage of stroke patients undergoing reperfusion therapy
3. Percentage of patients screened for dysphagia
4. Percentage of patients with suspected stroke who underwent computed tomography (CT) and/or magnetic resonance imaging (MRI)
5. Percentage of stroke patients prescribed antiplatelet agents at discharge
6. Percentage of patients with stroke and atrial fibrillation/flutter with an anticoagulant prescription at discharge
7. Percentage of patients treated at a stroke unit/vascular unit or Neuro-ICU
8. Length of hospital stay in stroke patients
9. Mortality in stroke patients
10. Modified Rankin Score (mRS) 0-2 at 90 days

Acute Coronary Syndrome (ACS)

1. Door-to-electrocardiogram time
2. Door-to-balloon time
3. Time to fibrinolytic therapy in ACS patients
4. Percentage of patients with assessment of left ventricular ejection fraction (LVEF)
5. Length of hospital stay of ACS patients
6. Percentage of ACS patients with a statin prescription at discharge
7. Percentage of ACS patients prescribed beta-blockers at discharge
8. Percentage of ACS patients with left ventricular dysfunction with an angiotensin-converting enzyme inhibitors (ACEIs) / angiotensin II receptor antagonists (ARBs) prescription at discharge
9. Proportion of ACS patients who were readmitted within 30 days
10. Mortality in ACS patients

Sepsis and septic shock

1. Time of organ dysfunction (time between the first organ dysfunction and the suspected diagnosis of sepsis or septic shock)
2. Percentage of patients with lactate collection within 1h.
3. Percentage of patients with a blood culture collected within 1h.
4. Percentage of patients with antimicrobial administration within 1h.
5. Percentage of patients with sepsis or septic shock and adequate volume replacement within 1h. of hypotension or hypoperfusion
6. Percentage of patients with sepsis or septic shock using vasopressors within 1h. of refractory hypotension

7. Percentage of patients with second lactate collection within 4h.
8. Percentage of patients with review of antimicrobial therapy within 48 hours
9. Mortality in patients with sepsis or septic shock

Hip arthropathy

1. Door-to-surgical room time
2. Percentage of patients undergoing total hip arthroplasty (THA) who received antibiotic prophylaxis
3. Percentage of patients undergoing THA who received venous thromboembolism (VTE) prophylaxis
4. Percentage of patients undergoing THA who underwent systematic pain assessment
5. Surgical site infection rate in patients undergoing THA
6. Time to sit up after surgery
7. Time to walk after surgery
8. Length of hospital stay of patients undergoing THA
9. Proportion of patients undergoing THA who were readmitted within 30 days
10. Mortality in patients submitted to THA in 1 year

Prostate cancer

1. Percentage of patients with complete pathological report of prostatectomy
2. Percentage of patients whose pathological report of prostatectomy with pelvic lymphadenectomy includes the number of resected lymph nodes
3. Percentage of patients with records of clinical and pathological staging of tumor, nodes, and metastases (TNM) in the medical records
4. Rate of acute surgical complications in patients undergoing prostatectomy
5. Length of hospital stay in patients who underwent prostatectomy

Breast cancer

1. Percentage of patients with preoperative histological diagnosis by core biopsy
2. Percentage of patients who underwent sentinel lymph node research
3. Percentage of patients undergoing breast surgery with a complete anatomopathological report
4. Percentage of patients undergoing total mastectomy with immediate breast reconstruction
5. Percentage of patients with a pathological (postoperative) TNM staging record in their medical records

Annex 5. Other Mexico's IMSS hospital indicators

Emergency service

1. Percentage of patients with prolonged stay (more than 12 hours) in the adult observation area of the emergency service in second-level medical services units.
2. Percentage of patients with prolonged stay (more than 12 hours) in pediatric observation of the emergency service in second-level medical services units.
3. Percentage of occupation in the adult observation area of the Emergency Department in Second-Level Medical Services Units.
4. Percentage of occupation in the Pediatric Observation Area of the Emergency Service in Second-Level Medical Services Units.
5. Emergency consultation index for 1,000 right holders in second-level medical services units.

Hospitalization-based measures of primary care effectiveness

1. Percentage of hospital discharges with diagnosis of hypertensive diseases (HD) with complications, cerebrovascular disease (CVD) and ischemic heart disease (IHD).

Medical consultation

1. Timeliness of scheduling specialty consultations in second-level medical services units: at 20 business days or less from request.
2. Average number of daily consultations per specialty office in second-level medical services units.
3. Average number of specialty consultation per hour/doctor in second-level medical services units.

Annex 6. Other United States hospital indicators

The Agency for Health Research and Quality (AHRQ) has also developed hospital quality indicators. These are mostly mortality indicators related to specific conditions or procedures, as well as rates of procedures to monitor utilization in cases where there are "questions of overuse, underuse and misuse". In terms of the conceptual framework, the latter can be considered part of the 'appropriateness' notion within the effectiveness domain.

Inpatient indicators[41]

Mortality rates

1. Esophageal resection mortality rate
2. Pancreatic resection mortality rate
3. Abdominal aortic aneurysm (AAA) repair mortality rate
4. Coronary artery bypass graft (CABG) mortality rate
5. Acute myocardial infarction (AMI) mortality rate
6. Heart failure mortality rate
7. Acute stroke mortality rate
8. Gastrointestinal hemorrhage mortality rate
9. Hip fracture mortality rate
10. Pneumonia mortality rate
11. Carotid endarterectomy mortality rate
12. Mortality for selected inpatient procedures
13. Mortality for selected inpatient conditions

Procedure appropriateness

1. Caesarean delivery rate, uncomplicated*
2. Vaginal birth after caesarean (VBAC) delivery rate, uncomplicated*
3. Percutaneous coronary intervention (PCI)
4. Primary caesarean delivery rate, uncomplicated (first-time caesarean delivery)*

* Cases of patients with complications can justify the procedure. The intention of selecting only uncomplicated cases is to identify potentially unjustified overutilization of certain procedures.

The AHRQ has also developed patient safety indicators at the provider level. Those relevant to hospital care include the following:

Patient safety

1. Death rate among surgical inpatients with serious treatable complications
2. Retained surgical item or unretrieved device fragment count
3. Iatrogenic pneumothorax rate
4. Central venous catheter-related blood stream infection rate
5. In-hospital fall-associated fracture rate
6. Postoperative hemorrhage or hematoma rate
7. Postoperative acute kidney injury requiring dialysis rate
8. Postoperative respiratory failure rate
9. Perioperative pulmonary embolism or deep
10. Vein thrombosis (PE/DVT) rate postoperative sepsis rate
11. Postoperative wound dehiscence rate

[41] Full details of indicators available at: https://qualityindicators.ahrq.gov/measures/iqi_resources