

19<sup>th</sup> International Forum on Knowledge Asset Dynamics

# PROCEEDINGS

Translating Knowledge into  
Innovation Dynamics

IFKAD 2024



12-14 June 2024  
UPM - Madrid, Spain

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### *Translating Knowledge into Innovation Dynamics*



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## **From Performance Measurement to Performance Management in the National Outcomes Programme: A National Health Service**

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### **Abstract**

Performance measurement and management represents a strategic system employed by public sectors to assess outcomes for public organisations and aid decision-making processes. Despite the contributions of numerous management scholars to the scientific literature on healthcare, there remains a notable gap in understanding how the healthcare sector develops these systems for outcome management.

Through an exploratory case study conducted within a leading health service, this paper endeavors to shed light on the development of performance measurement and management systems for outcome management. Initial findings reveal a sophisticated

performance measurement and management system tailored to support decision-makers, facilitating the monitoring of healthcare services delivered by Italian public and accredited private hospitals. It assists in programmatic, organisational, and at times clinical decision-making processes, while also promoting audit activities and timely corrective measures. This paper enhances understanding of these key systems, however, it should be viewed as a first foundation for future research in this area. Future research may compare the design, implementation, and use of different national outcome programs.

**Keywords** – Performance measurement, Performance management, Public sector, National outcomes program

**Paper type** – Academic Research Paper

## 1 Introduction

The concept of performance within a company involves optimizing the development of available resources to achieve the firm's objectives (Georgopoulos and Tannenbaum, 1957). Initially, this concept was formulated for the private sector. However, in the 1990s, the international public management reform, known as New Public Management (Brignall and Modell, 2000; Hood, 1991, 1995; Modell, 2001), introduced the performance measurement and management system (PMMS) used in the private sector to enhance efficiency and effectiveness (Betto *et al.*, 2022; Garengo and Sardi, 2021). One of the primary sectors targeted for enhancing public performance was public healthcare. Starting in 1997, clinical governance was implemented in the British National Health Services to elevate the quality of care (Sally and Donaldson, 1998). As outlined, the international public management reform introduced the performance measurement system into the public sector. Subsequently, several researchers have developed performance measurement systems to enhance healthcare service delivery (Betto *et al.*, 2022), with the Balanced Scorecard, elaborated by Kaplan and Norton (1992), emerging as one of the most widely used models.

The health organisation generates a substantial amount of data, which serves as crucial indicators for describing information within the healthcare sector, such as healthcare efficacy, healthcare quality, patient safety and population health (Rizzi *et al.*, 2021; Sardi *et al.*, 2020b, 2021, 2024). The development of data is vital for enhancing healthcare service delivery to citizens (Borgonovi and Zangrandi, 2005) and for more effectively managing the care process, considering both medical and economic perspectives, especially following years of public resource cuts and in the aftermath of the Covid-19 pandemic. In this context, healthcare facilities must monitor healthcare outcomes to enhance decision-making, especially in value creation (Nutti *et al.*, 2018; Vainieri *et al.*, 2019).

Data can thus be considered a source for enhancing both care and social impact for all individuals in need of health services. To accomplish this objective,

healthcare organisations require PMMSs to oversee the quality and effectiveness of care, thereby generating value for the community.

PMMS includes performance measurement and performance management processes. The performance measurement process delineates what to measure, while the performance management process identifies how to utilise these measures to manage the organisation's performance (Bititci *et al.*, 2012). Through the collection, analysis, and interpretation of data, performance measurement supports the monitoring of efficiency and effectiveness (Bianchi *et al.*, 2015; Kaplan and Norton, 2001; Melnyk *et al.*, 2014). Performance management explains how performance measures are used for managing organisations, e.g., behavior and culture routines (Bititci, 2015). Its purpose is to analyse the disparities between the achieved results and the planned ones to identify the management actions necessary to enhance the organisation's performance-related strategies (Melnyk *et al.*, 2014). Performance measurement and performance management should be viewed as two interrelated dimensions of organisational control (Smith and Bititci, 2017).

Although numerous management scholars have contributed to the scientific literature through research in the public sector (Arnaboldi and Azzone, 2005; Jääskeläinen and Laihonon, 2014; Rajala *et al.*, 2018; Sardi *et al.*, 2020a), there remains a dearth of in-depth studies on how healthcare sectors utilise PMMS for outcome management. By employing a case study within a major health service, this paper aims to identify the design of PMMS for outcome management. The paper delves into the following research question: "What does the National Health Service design PMMS for outcome management?"

This document elucidates the transition from performance measurement to performance management for effectively managing outcomes within a health service. The paper is structured as follows: Section 2 highlights the research methods used. Section 3 presents the main results of this study. The last section discusses and summarises the contributions, implications, and limitations of this research.

## **2 Methodology**

An investigative case-study approach was embraced in the empirical inquiry (Yin, 2018). Many studies have utilised this method to delve into intricate scenarios within their authentic and dynamic settings (Easterby-Smith *et al.*, 2002; Eisenhardt, 1989). It favors a thorough exploration of a phenomenon, facilitating a deeper understanding of it (Yin, 2018). Such a case study is conducted when the subject of investigation is notably complex or, when there is a dearth of literature or theory on the research topic (Yin, 2018). The primary steps of explorative case studies include sample selection, data collection, and data analysis.

Initially, the sample is delineated. As highlighted recently by Sardi *et al.* 2024, the Italian NHS was chosen for analysis due to its recognition as one of the

leading NHSs. In 2022, Italian public (€131 billion) and private (€40 billion) health expenditure totalled €171 billion, equivalent to 9.5% of the country's gross domestic product, with Italian public health spending alone constituting 6.9%. The Italian NHS stands out for the variety of health services offered, expenditures, and life expectancy (Italian National Institute of Statistics, 2023). For instance, it provides approximately 5,700 health services, including three levels of essential care: collective prevention and public health, district assistance, and hospital care (Ministry of Health, 2024).

Next, data were gathered from official institutional websites, reports, and regulations (Yin, 2018). The primary aim of data collection was to comprehend the development of PMMS for outcome measurement and management features. Data collection took place from December 2023 to April 2024. The following information was collected information about the activities included in the performance measurement and management processes. As described by Smith and Bititci (2017), performance measurement includes setting goals, developing a set of performance measures, collecting, analysing, reporting, interpreting, reviewing and acting on performance data (Melnik *et al.*, 2014; Neely *et al.*, 1995) and performance management includes behaviour, and culture routine of performance management.

Documentary data collection is a common and valuable research method for systematically gathering existing documents and extracting pertinent data (Yin, 2018). To aid in addressing the research inquiries, data were initially sourced from the primary national legislative sources. The following official government websites were used to find these two sources:

- <https://www.agenas.gov.it/> (last accessed on April 1, 2024), in specific:
- [https://pne.agenas.it/assets/documentation/report/agenas\\_pne\\_report\\_2023.pdf](https://pne.agenas.it/assets/documentation/report/agenas_pne_report_2023.pdf)
- [https://pne.agenas.it/assets/documentation/fonti\\_metodi/fonti\\_informative.pdf](https://pne.agenas.it/assets/documentation/fonti_metodi/fonti_informative.pdf)
- <https://www.salute.gov.it/> (last accessed on April 1, 2024).

Ultimately, the analysis of data emerges as a pivotal stage in the research endeavour, entailing the scrutiny, interpretation, and refinement of raw data into meaningful insights (Yin, 2018). The analysis took the form of a within-case study, characterised by an exhaustive exploration of a singular case as an individual entity. This within-case study, grounded in qualitative analysis, facilitated an enhanced comprehension of the development of performance measurement and management. It analyses the activities included in the performance measurement and performance management processes (Melnik *et al.*, 2014; Neely *et al.*, 1995).

As advocated by numerous scholars, the research employed data triangulation, leveraging multiple sources or methodologies for the collection and analysis of data. This approach bolstered the credibility and reliability of the findings through the corroboration of information across diverse avenues (Yin, 2018). The study

employed two forms of triangulation. Initially, it embraced data source triangulation by tapping into various data sources to attain a comprehensive grasp of the evolution of performance measurement, amalgamating insights from documents gleaned from official websites and regulations. Secondly, three researchers independently gathered and analysed data. This triangulation mitigated the influence of individual biases or preconceptions and safeguarded the integrity of the findings.

### **3 Findings**

The results describe the PMMS of the National Outcomes Program, called Programma Nazionale Esiti (PNE), and, consequently, explain the main steps of PMMS development of the Italian NHS.

The PNE focuses on assessing the outcomes of the Italian National Health Service and was developed by Agenas on behalf of the Ministry of Health. Agenas, also known as the National Agency for Regional Health Services, was established by Legislative Decree 266/1993. Under the oversight of the Ministry of Health, Agenas annually releases the National Outcomes Programme report, detailing the primary indicators of NHS outcomes on its official website. The PNE is a collaborative effort involving Agenas, the Department of Epidemiology of the Lazio Regional Health Service, the Istituto Superiore di Sanità, Regions and Autonomous Provinces, central institutions, the scientific community, and civil society.

Since 2012, the PNE has facilitated the monitoring of healthcare services provided by Italian public and accredited private hospitals. It also functions as an ongoing observatory for healthcare processes and outcomes. By analysing the interactions between organisational structures, delivery methods, and care performance, the PNE aims to identify any critical issues for targeted audit activities and timely corrective measures. As per Agenas, the PNE serves as a crucial information source for establishing qualitative, structural, technological, and quantitative standards for hospital care, as stipulated by Ministerial Decree No. 70 of 2015. Additionally, it supports Regions and Autonomous Provinces in selecting accredited private facilities based on their adherence to quality standards, as the Ministerial Decree dated 19 December 2022. The PNE supports decision-makers involved in healthcare provision, assisting in programmatic, organisational, and occasionally clinical decision-making.

In order to understand the PMMS of the Italian National Health Service, the paper explains the main steps of PMMS development thus as suggested by Smith and Bititci (2017).

The last edition of the PNE provides insights into healthcare activities carried out in 2022 by approximately 1,400 public and private hospitals, along with data from 2015-2022 for temporal trends analysis. The report encompasses 195 indicators, of which 170 are related to hospital care (including 66 outcome and



process, 88 volume, and 16 hospitalisation indicators), and 25 pertain to community care. Community care indicators are indirectly assessed in terms of avoidable hospitalisation (14 indicators), long-term outcomes (7 indicators), and improper access to the emergency room (4 indicators). The latest edition also features expanded indicators that cover various levels of detail, including country-wide, regional, structural, departmental, team-based, and individual professional aspects.

The collection of data to define indicators involves the four following sources: Hospital Information System, Tax Registry Information System, Information system for monitoring emergency assistance, and Record Linkage.

The Hospital Information System: it, also known as the Hospital Information System, compiles data on all hospital admissions, including acute and post-acute cases, recorded across Italy. The hospital discharge form, called Scheda di Dimissione Ospedaliera (SDO), serves as the instrument for gathering information on each patient discharged from both public and private hospitalisation facilities nationwide. Established by the Decree of the Ministry of Health dated 28 December 1991, with subsequent amendments outlined in the decree of 26 July 1993, the Ministerial Decree of 27 October 2000, No. 380, updated the SDO's contents and information flow. It also established general coding rules for clinical information (diagnoses, surgical interventions, and diagnostic-therapeutic procedures). The data collected via the SDO encompasses various aspects, including demographic information (e.g. patient identifier, gender, date, and place of birth), health information pertaining to hospitalisation (e.g. date of admission, institution identification code, specialty, and department of admission), intra-hospital transfers (dates and departments involved), discharge information (e.g. date, discharge type), clinical details at discharge (primary diagnosis, up to 5 secondary diagnoses, main operation, up to 5 secondary procedures with corresponding execution dates), and Diagnosis Related Groups.

For specific indicator analyses, only SDOs from patients with valid anonymous identifiers were utilised. However, the calculation of activity volumes incorporated all SDOs, including those from patients with missing or invalid anonymous identifiers.

Tax Registry Information System: The Tax Registry, governed by the Decree of the President of the Republic of 29 September 1973, n. 605, is a mandatory computerised system managing taxpayer information for interactions with tax authorities. The Personal Data Archive, often referred to as the Archive of tax codes and VAT numbers, serves as a comprehensive database within the Archive of tax information system. Municipalities serve as the primary source for certifying personal data of individuals, maintaining Civil Status registers, resident population registers, and registers of Italians residing abroad. The Agency collaborates with Municipalities to synchronise data in municipal registers with those in the Tax Registry. Timely notification of deaths is crucial for accurate fiscal

management and Health Card administration. In a broader context, immediate communication of these events allows for the prompt deactivation of citizen online identification tools. The registry circularity system ensures the reliable acquisition of death data in the Tax Registry, transmitted by Municipalities upon registration of the event.

Information system for monitoring emergency assistance: Established by the Ministerial Decree of 17 December 2008 and subsequently modified by the Ministry of Health's Decree of 6 August 2012, this system has been mandatory for Regions since 1 January 2012, as part of accessing supplementary financing from the State. Data collected by the Emergency Urgency include operations at the 118 Operations Centre, 118 telephone calls, rescue missions activated by the 118 Operations Centre, assisted individuals (without direct identifying elements), services provided during emergency missions, and intervention outcomes. For Emergency Departments, Emergency Urgency collects data regarding the providing structure, access and discharge, patient information (without direct identifying elements), diagnosis, services provided, and economic valuation of access.

Record Linkage: Record linkage techniques are crucial for constructing integrated archives while safeguarding data confidentiality, especially in epidemiological analyses and healthcare. Connecting information from the same or different archives is essential for describing, measuring, and evaluating care or services in terms of effectiveness, appropriateness, and equity. Two primary methods of record linkage, deterministic and probabilistic, are used. Deterministic linkage connects statistical units agreeing on a specific identifier, while probabilistic linkage uses probabilities to assess whether statistical units refer to the same individual or healthcare service. This report employs deterministic record linkage for reconstructing patient care paths or clinical histories within the same archive or between the Hospital Information System and the Tax Registry Information System. This method allows for various analyses, including counting people with a specific diagnosis in a given period, reconstructing treatment episodes, identifying incident cases of pathology, characterising patients within a cohort, and identifying patient outcomes within a specified time interval following hospitalisation.

The development of indicators for assessing and comparing healthcare processes and outcomes serves several outcomes:

- Examining the variability in care processes and outcomes among different providers (such as hospitals, operating units, or individual practitioners) and population groups.
- Analysing instances of avoidable hospitalisation and high-risk hospitalisation due to clinical and organisational factors, categorised by geographical area of residence.

- Tracking temporal trends in volume, process, and outcome indicators (broken down by provider and area of residence) and hospitalisation rates among the resident population.
- Investigating disparities related to gender, citizenship, and socio-economic status.
- Generating epidemiological evidence to understand the relationships between organisational structures, case volumes, service delivery methods, and treatment effectiveness, with the aim of identifying thresholds and reference values.
- Creating indicators to assist regional systems in monitoring and verifying the quality of care and meeting obligations outlined within the Essential Levels of Assistance.

The analysis builds upon previous editions, guided by the directives outlined in Ministerial Decree 70/2015, which serves as the primary regulatory framework for hospital care quality standards. Across various medical areas, evaluations focus on highly complex surgical activity volumes, timely access to procedures, clinical-organisational appropriateness, and treatment outcomes. Minimum activity thresholds for individual hospitalisation institutions or complex operational units have been established by Ministerial Decree 70/2015 for specific surgical procedures, reflecting the documented correlation between caseloads and treatment outcomes. While some areas show signs of improvement, such as operations for malignant breast cancer and laparoscopic cholecystectomy, there remains a degree of caseload fragmentation compared to these thresholds, albeit with efforts by Regions/ Autonomous Provinces to rationalise hospital offerings.

A significant aspect concerns the examination of disparities in healthcare access. This analysis did not entail the creation of specific measures but rather utilised existing indicators focused on equity. It uncovered notable discrepancies in service developed based on gender and citizenship, particularly among the immigrant population in Italy.

The National Outcomes Program (PNE) offers two display formats: tabular and treemap.

The tabular format is organised as follows.

List Indicator is described as below:

- Clinical area: Cardiovascular, Cerebrovascular, Digestive, Endocrine/metabolic, Infectious diseases, Skeletal muscle, Oncology, Pediatrics, Perinatal, Surgical procedures, Emergency room, Psychiatry, Respiratory, and Urogenital;
- Condition: <https://pne.agenas.it/indicatori>;
- Indicator: <https://pne.agenas.it/indicatori>;
- Evaluation Area: Hospitaller, Experimentation, and Territory;
- Typology: Hospitalisation, Volumes, Process/Outcome, Mortality, and Waiting time.

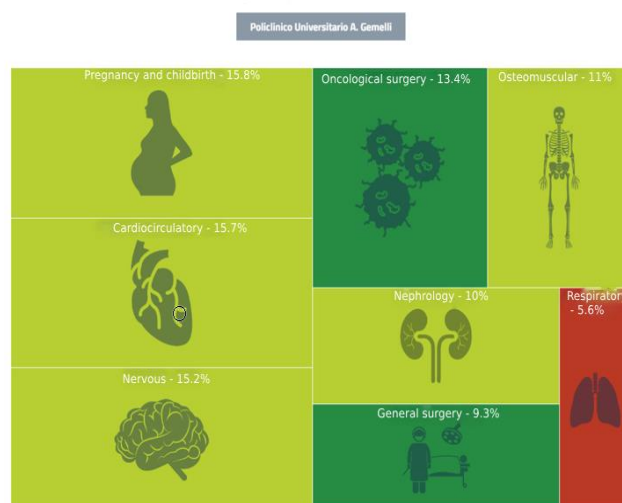
After the selection of an option, the PNE illustrates a Table with the following indicator details.

Level	Indicator	Evaluation Area	Typology
Italy	No. of cases per Region % No. of cases per Region	Hospital Testing Territory	Hospitalisation Volumes Process/Outcome Mortality Waiting times
Individual facilities - with indication of Province and Region	No. of cases % No. of cases Relative risk P-value	Hospital Testing Territory	Hospitalisation Volumes Process/Outcome Mortality Waiting times
Areas of residence - with indication of individual local health authorities	No. of cases % No. of cases Relative risk P-value	Hospital Testing Territory	Hospitalisation Volumes Process/Outcome Mortality Waiting times

After that, some indicators present the following options in order to evaluate equity: gender, educational qualification, and citizenship.

The treemap, on the other hand, provides a visual representation that succinctly presents outcomes for each individual institution. It consolidates a range of volume, process, and outcome indicators. The clinical areas evaluated include the following areas: cardiocircular, nervous, respiratory, general surgery, oncology surgery pregnancy and birth, osteomuscular and nephrology. Each area presents some indicators, weight, risk, constraints, and reference thresholds.

Below is shown a treemap example of a healthcare facility (Policlinico Universario A: Gemelli) and its quality standards.



Very high	high	medium	low	Very low

**Standard of quality**

			Very high	high	medium	low	Very low
Area clinic	Indicator	Weight (%)	1	2	3	4	5
CARDIOCIRCULAR	Heart attack Myocardial Acute: mortality' to 30 days	30%	≤ 6 8	6 - L 8	8 - L 12	12 - L 14	> 14
	Heart attack Myocardial Acute: % treated with PTCA within 90 minutes	15%	≥ 60 60	50 L- 60	40 L- 50	20 L- 40	< 20
	Compensation cardiac congestive: mortality' to 30 days	10%	≤ 6 9	6 - L 9	9 - L 14	14 - L 18	> 18
	Bypass Aortocoronary: mortality' to 30 days (NV)	20%	≤ 1.5	1.5	1.5 - L 4		> 4
	Valvuloplasty or replacement Of valves cardiac: mortality' to 30 days	15%	≤ 1.5	1.5	1.5 - L 4		> 4
	Repair Of aneurysm Not broken of the aorta abdominal: mortality' to 30 days	10%	≤ 1	1	1 - L 3		> 3
NERVOUS	Stroke ischemic: mortality' to 30 days	75%	≤ 8 10	8 - L 10	10 - L 14	14 - L 16	> 16
	Intervention surgical for T cerebral: mortality' to 30 days from the intervention Of craniotomy	25%	≤ 1.5	1.5	1.5 - L 3.5	3.5 - L 5	> 5
RESPIRATORY	COPD flared up: mortality' to 30 days	100%	≤ 5 7	5 - L 7	7 - L 12	12 - L 16	> 16
GENERAL SURGERY	Cholecystectomy laparoscopic: % hospitalisations with hospitalisation post-surgery < 3 days	100%	≥ 80 80	70 L- 80	60 L- 70	50 L- 60	< 50
ONCOLOGICAL SURGERY	Proportion of new interventions Of resection within 120 days from an intervention surgical conservative For cancer malignant	34%	≤ 5 8	5 - L 8	8 - L 12	12 - L 18	> 18
	Intervention surgical For TM lung: mortality' to 30 days	33%	≤ 0.5	0.5	0.5 - L 3		> 3
	Intervention surgical For TM colon: mortality' to 30 days	33%	≤ 1 3	1 - L 3	3 - L 6	6 - L 8	> 8
PREGNANCY AND I'M GIVING BIRTH	Proportion Of set off with cut cesarean section primary (500 ≤ vol < 1000)	70%	≤ 10 L 20	10 - L 20	20 - L 30	30 - L 35	> 35

	Proportion Of set off with cut cesarean section primary (vol≥1000)	%	≤ 20 L 25	20 - 25	-L 30	30 - L 35	> 35
	Proportion Of set off vaginal in women with previous cut cesarean section	15 %	≥40 40	25-I	13-I 25	5-I 13	≤ 5
	Proportion Of episiotomies in set off vaginal	15 %	≤ 5 10	5 -L	10 -L 15	15 - L 20	> 20
OSTEOMUSCULAR	Fracture of the neck of the femur: intervention surgical within 48h	60 %	≥ 70 L- 70	60	40 L- 60	30 L- 40	< 30
	Intervention Of prosthesis Of hip: readmissions to 30 days	20 %	≤ 3	3 -L	9		> 9
	Intervention Of prosthesis Of knee: readmissions to 30 days	20 %	≤ 3	3 -L	9		> 9
NEPHROLOGY	Insufficiency renal chronic: mortality to 30 days from the recovery	100 %	≤ 8 10	8 -L	10 -L 20	20 - L 30	> 30

Source: [https://pne.agenas.it/assets/documentation/doc\\_treemap/valori\\_soglia\\_treemap.pdf](https://pne.agenas.it/assets/documentation/doc_treemap/valori_soglia_treemap.pdf)

The latest edition introduces noteworthy changes, such as the addition of nephrology as a new clinical area for evaluation to broaden the scope of internal medicine. Furthermore, adjustments have been made to the list of treemap indicators, and additional criteria have been defined regarding minimum activity volumes per institution and per practitioner.

The development of indicators enables us to pinpoint healthcare scenarios with existing challenges in outcomes or processes. It verifies data within information systems and facilitates potential clinical-organisational audits. These audits are designed to address current issues and enhance the quality of care.

The National Outcomes Program fosters the correlation between structures and organisational models with health outcomes. This correlation allows for the assessment of care quality across various medical areas and ensures equitable access to care based on citizenship and gender. The PNE advocates for clinical-organisational auditing through a service-oriented approach. This approach aims to provide support and expertise to individual facilities, enabling them to implement improvement initiatives tailored to their specific contexts.

The resolution issued by the General Director of AGENAS, No. 40 dated 27 January 2021, outlined the revamped structure of the PNE. It delineated the program's objectives and operational methods, along with the responsible bodies for its execution. To sum up, the goals of the PNE can be summarised as follows:

- Evaluating the effectiveness, clinical-organisational appropriateness, safety, and equity of access to care within the scope of LEAs through comparative analysis of healthcare processes and outcomes.
- Supporting clinical-organisational audit programs aimed at enhancing the quality and equity of care within the NHS.

Through the engagement of all stakeholders in thematic working groups, the analyses produced serve as a foundation for synergy among various levels of system governance. This synergy is imperative to meet upcoming challenges, particularly the reprogramming and reorganisation of healthcare delivery outlined in the context of PNRR actions. The overarching objective is to advance overall care quality and safeguard public health.

#### **4 Conclusions**

Since the 1990s, the implementation of performance measurement and management systems has been crucial in the strategic planning of public healthcare sectors, serving to evaluate outcomes for public organisations and facilitate decision-making processes. Despite the significant contributions of numerous management scholars to the scientific literature on healthcare, there remains a noticeable gap in understanding how healthcare sectors develop these systems for outcomes management.

Through an exploratory case study conducted within a leading health service, this paper sheds light on the performance measurement and management systems used for outcome management in a prominent national health service. The outcome measurement and management system described is developed annually by the Italian National Agency for Regional Health Services and encompasses a comprehensive set of indicators reflecting various aspects of NHS outcomes.

The National Outcomes Program collects data from national health information flows, categorizing them into various branches of healthcare such as cardiology, oncology, and surgery. It analyses the healthcare service delivery provided by Italian hospitals, generating a set of indicators that represent the results and quality of healthcare in Italy. The PMMS plays a crucial role in highlighting the efficiency, effectiveness, safety, and quality of care provided by the Italian National Health Service, supporting clinical and organisational auditing programs aimed at enhancing quality and effectiveness.

The findings reveal a sophisticated PMMS tailored to support decision-makers, facilitating the monitoring of healthcare services delivered by Italian public and accredited private hospitals. It assists in programmatic, organisational, and sometimes clinical decision-making processes, while also promoting audit activities and timely corrective measures.

While this paper contributes to a better understanding of these key systems, it should be considered a preliminary step for future research in this area. Subsequent studies may focus on comparing the design, implementation, and utilization of different national outcome programs to further enhance our knowledge in this field.

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