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«HEALTH SERVICE EVALUATION AND MONITORING FRAMEWORK»

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Δηλώνω επίσης υπεύθυνα ότι οι πηγές στις οποίες ανέτρεξα για την εκπόνηση της συγκεκριμένης εργασίας, αναφέρονται στο σύνολό τους, κάνοντας πλήρη αναφορά στους συγγραφείς, τον εκδοτικό οίκο ή το περιοδικό, συμπεριλαμβανομένων και των πηγών που ενδεχομένως χρησιμοποιήθηκαν από το διαδίκτυο. Παράβαση της ανωτέρω ακαδημαϊκής μου ευθύνης αποτελεί ουσιώδη λόγο για την ανάκληση του πτυχίου μου».

«Δηλώνω υπεύθυνα ότι η διπλωματική εργασία για τη λήψη του μεταπτυχιακού τίτλου σπουδών, του Πανεπιστημίου Πειραιώς, στη Διοίκηση Επιχειρήσεων για Στελέχη : Ε-MBA» με τίτλο

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Υπογραφή Μεταπτυχιακού Φοιτητή.....

Όνοματεπώνυμο Άρης Κάζος

Ημερομηνία. 07/02/2022.

To my lovely wife Anastasia
and my two wonderful sons, Odysseas and Achilleas,
with my unlimited love and gratitude.

ABSTRACT

“HEALTH SERVICE EVALUATION AND MONITORING FRAMEWORK”

Keywords: Health service, healthcare, framework, indicators

The present study investigates how it can be assessed and checked at any time the quality of the health services provided. With the utilization, KPIs identified in the literature and frameworks that operate worldwide, it is tried to create a multidimensional but easy-to-use evaluation and control framework.

Its approach is mainly patient centered, but it is not overlooked the need for the sustainability of health service structures, as well as the importance of giving to policy makers the correct feedback in order to take the proper decisions.

As far as the methodology applied is concerned, this is a bibliographical search in international scientific databases, with emphasis on scientific journals dealing with issues of health service provision and quality in health. In addition, relevant writings and material from the internet are also used, mainly from websites of bodies dealing with such issues.

We are going to create a multidimensional framework, consisted of a combination of 151 KPIs, which we can control by 6 division, per each subcategory of each model. Thus, every Customer/Patient, or Health Service Structure Manager, or the one who makes political decisions about the functioning of the health system, has a plethora of options, in tool form, and depending on where he wants to focus on, can make the appropriate decisions.

The creation of this useful tool is the purpose of this study.

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1. INTRODUCTION

1.1 Historical retrospect.

All begins back in the middle of 1800s, when the pioneer, Ms. Florence Nightingale, introduced, even if she had no idea about it, the first attempt of a **Health System Performance Assessment (HSPA)**. Above nursing patients, Ms. Nightingale managed to develop inspiring and exciting ways to measure the performance of health services and to express and transmit it in clear and effective ways. The most typical example of this, is the graph which she produced in the middle of the nineteenth century in order to illustrate mortality rates in the army at the period of the Crimean war. From this start, during the next centuries, a long path has been walked from statisticians and scientists from medical field and others. As a result, today we are in the position where the Health Service Evaluation is in a very satisfying point and the monitoring frameworks as tools, can provide a multi-dimensional variety to the observer, depending on what he desires to study and to focus on.

The Health Care structures, must prove that their fundamental aim is "delivering value for money". Especially the public ones, which are refunded through the tax payment system, evidencing both efficiency and effectiveness. This need becomes more crucial, even critical in such times of fiscal constraint.

So, the main nowadays question is: How much extra health, an extra euro spent on a Health Care System can buy? Improving productivity is not just about producing more of everything for each extra euro, but doing the right things, in the right way as efficiently as possible. And this will be the passport for a more effective and efficient patient centered health care system. The health structures will be able to provide health services in the highest desired level, both from patients/users and managers/providers.

1.2 Health Care Key Performance Indicators and Frameworks.

Key Performance Indicators (KPIs) and evaluation frameworks are among the foremost useful tools within the analysis of health services provided. Throughout the multidimensional process of health services, they assist to spot those areas that require to be improved but also those who function properly and wish to be communicated to other structures and become a typical mode of operation.

In this paper, all KPIs used worldwide, from various structures of health, primary and secondary health care providers, public or private ones, are collected from literature and placed in a framework, that divides and examines them into the five main evaluation frameworks. Thus, they are presented in a framework, all key performance indicators concerning the actors of the health system, despite the point of view they observe them. So, first we must recognize the structure and the utilization of a framework, and then the content of it, which are the Key Performance Indicators. Which is the best way of selection and how we can use them in the most profitable way.

As it is aptly stated by the Organization for **Economic Cooperation and Development (OECD)** at the *Health at a Glance, 2019, OECD Indicators*, the primary objective of any health system, service providers or organization, is to maximize the health of the individuals and populations they serve, in an equitable way within budgetary parameters. Life expectancy is a very important outcome for example, but it is silent on a range of other things valued by patients, such as pain, function, and **Quality of Life (QoL)**, as well as the experience of care itself. This suggests that the picture of health care and health system performance is missing an essential part, which is: people-centered approach to both policy and practice. Within the work, therefore, there is a holistic presentation of indicators that covers not only the needs of managers and therefore the necessities of policy makers, but also the wants of the patients and their relatives.

In addition to the KPIs categories we have chosen to present in this paper, which strives to be as personal centered as it can be, in accordance with the modern requirements of the **Patient Reported Indicator Surveys (PARIS) of the OECD** framework, which are as follows 3: **(i)Individual, (ii)Organizational and (iii)Political**, there are several other categorizations depending on the visual focus of each researcher or the requested results of each Health Care System.

The rest of the models that follows, will extensively described on chapter "Investigation and Presentation of Frameworks" and "Indicators" respectively. The evaluation of KPIs based on this work will be grounded on the following models:

The Donabedian Conceptual Model which provide framework for evaluating healthcare services and quality of care, considering: i) Structures, ii) Processes, iii) Outcomes.

The Bersimis and Sachlas unified hierarchical framework for public health based on SPM and MSPM, consisted of 3 layers:

i) the patient/citizen layer with chronic and emergency patients and healthy citizens as well, ii) the health organization layer, with SHC and PHC providers and iii) the community layer, means the government.

The 3Es approach framework: Effectiveness, Efficiency, Equity, and many more such us: i) Operational, ii) Tactical, iii) Strategic indicators.

The Performance Assessment Framework (PAF's) 6 Dimensions which encompass: a) Clinical efficacy, b) Efficiency, c) Staff orientation, d) Responsiveness, e) Safety, and f) Patient-centeredness.

The Parasuraman Model that refers to i) core benefits of the delivered service, and b) tangible or c) intangible benefits of the service.

In general, a framework ought to be attractive, understandable, and adjusted to the various audience who will make use of. So, the framework of the work tries to be analytical, simple, and easy to use at the same time. Very easily, the reader can filter out those indicators he wants to focus on or correspondingly those dimensions he wants to improve and see which indicators are related and must be affected.

Health Care Systems mission, should be to assess that Essential Levels of Health Care, are homogeneously provided under appropriateness and efficiency conditions and also to verify consistency between provided services and economic resources.

Quality combined with sustainability and affordability, are the 3 basic columns on which are based, all Government policies. To accomplish the desired efficacy of quality improvements, it is crucial that the outcomes can be evaluated and compared gradually for the different health care providers. Very important is the ability of evaluating the complex correlations that provide good quality, according to the OECD's 3 types of quality indicators, which are: structure, process, and outcome indicators.

Two main questions are very high on the agenda for most healthcare systems in the world. Firstly, the way that process, costs, and results of health care, can be monitored and secondly, the objectives and criteria that should be served as guidelines? These answers are hopefully to be given by this thesis.

1.3 Value in Health Care.

Before start explaining the importance of a framework and therefore the KPIs, it'd be useful, to define Value in Health Care as Porter defines it, at (*Porter ME. What is value in health care?*)

«In health care, value is defined as the patient health outcomes achieved per dollar spent. Value should be the preeminent goal within the health care system because it's what ultimately matters for purchasers (patients) and unites the interests of all system actors. If value improves, patients, payers, providers, and suppliers can all benefit while the economic sustainability of the health care system improves. Value encompasses many of the other goals already embraced in health care, like quality, safety, patient centeredness, and cost containment, and integrates them. It is also fundamental to achieving other important goals such as improving equity and expanding access at reasonable cost». [*Porter 2010*].

Instead of value, health care stakeholders have myriad, often conflicting goals, including access to services, profitability, high quality, cost containment, safety, convenience, and patient satisfaction. The Institute of Medicine's own definition of goals for the healthcare delivery system includes no less than six disparate elements: safety, effectiveness, patient centeredness, timeliness, efficiency, and equity, as Mohamed Khalifa and Mowafa Househ point out in "Chapter 3 Utilizing Health Analytics in Improving the Performance of Hospitals and Healthcare Services: Promises and Challenges", Springer Science and Business Media LLC, 2021.

As a conclusion, we could say, that value should define the framework for performance improvement in health care. (*Porter ME. What is value in health care?*) The improvement of the quality of the health services provided will therefore be the guideline and compass of this work. Through the evaluation of provided health care services and also the creation of the framework, will be tried, considering all aspects of the parties involved, to optimize the quality and performance of health services. This will be fulfilled only with the wise use of the proper indicators.

1.4 Personal data conflict.

In order to monitor health care performance, is unavoidable to use some data linkages and personal information of the patients, such: name, age, address, economic status, habits, education, medical history.... The safety of the patient, as well as the quality of the service he derives, is not always in accordance with the protection of his personal data. It becomes more obvious, through the following figure as J.Odekirk describes at *J.Oderkirk et al. / Health Policy 112 (2013). Fig. 1.*

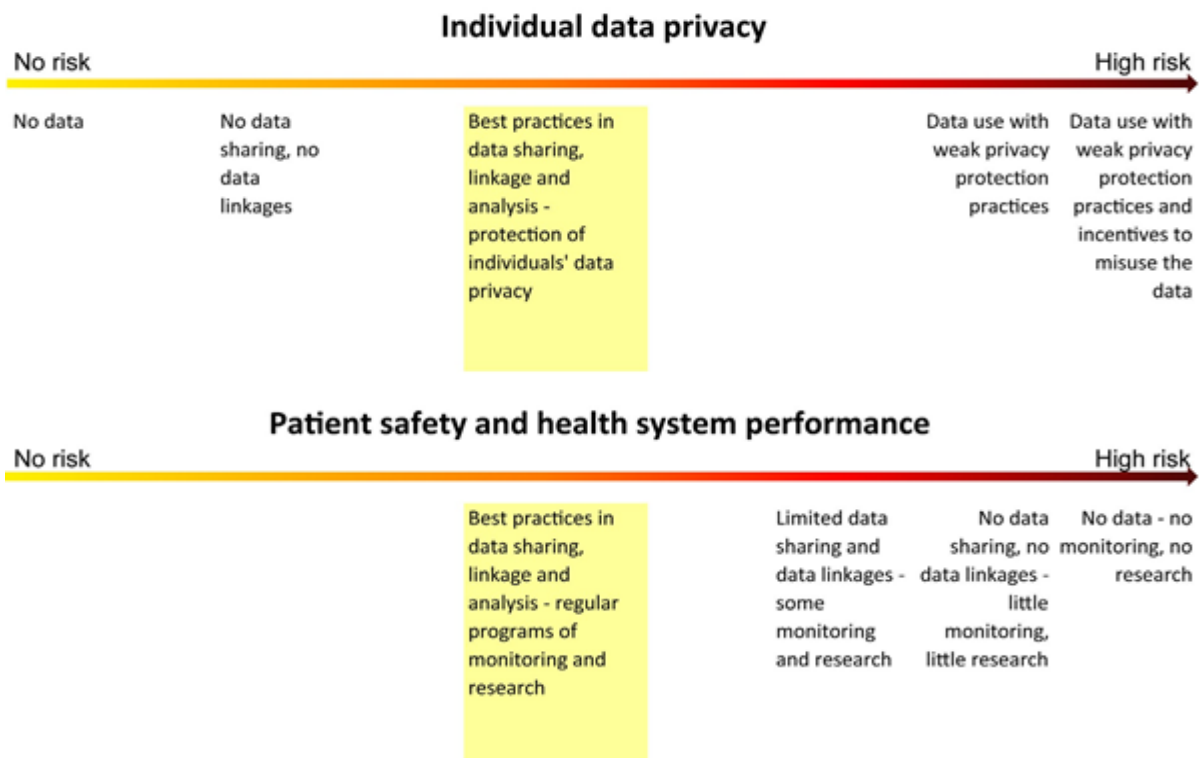


fig.1 Personal data privacy vs Health system performance.

From the figure above, it becomes clear that in order to get the best possible results in terms of providing health services, in order to have continuous improvement of structures but also personalized service to the patient, the more personal information we need to provide to health service providers and other structures and bodies, who analyze them, combine them and after research and statistical studies use them, the best quality of the provided health services we get.

1.5 Method.

Advances in the methods of designing studies and statistical analysis and the ever-increasing availability and validity of health information systems and databases have highlighted the role of comparative efficiency research, which means benchmarking observation services and interventions in the health sector. In the case that are used composite indicators, in order to calculate the weights of the different components, we must focus deeply, in the methodology is used. Benchmarking the results, in a global level with foreign, international systems is another very important aspect.

Resources of the used data in the previous work comes from: National Data, National Registries (Cancer registry), Private Health Insurance Companies, Surveys, Published Literature Review. There is the need for the use of multi-Dimensional performance measurement systems. E.g., Balanced Scorecard. For that reason, there has been deep research through literature review.

The complexity of the investigated subject, but also the fact that we wanted to capture as globalized as possible a perception of what is happening in health systems globally, bibliographical research was the most appropriate solution. More than 50 scientific articles and analyses were studied, published research and studies by international organizations and more than 15 related Links and 6 books as well. An attempt was made to gather the most representative sections of the subject and on them to analyze and build the evaluation framework under presentation. To reflect the range of different perceptions and priorities internationally on the quality of health services provided and all these, to be included in a handy framework, was the difficult, competitive, and demanding part of the work, which we hope has been successfully overcome.

2. PURPOSE

2.1 Main Benefits to Three Levels.

The ultimate and fundamental goal of this work is to improve people's health and patient's quality of life. This may come true through the creation of a multidimensional and useful framework, which contains the most representative and characteristic key performance indicators, concerning the health care.

Additionally, another aim of the present assignment, is to help,

a) Policy makers, by having better information on where to focus quality improvement efforts and prioritize spending,

b) Providers, by better understanding how to improve the quality of the care they provide in the most 3Es way, and

c) Patients, by having their say on what treatment work best for them under which conditions.

In a few words, the attempt of this thesis, is to help the Health Systems, to improve the health of the general public and providing better care and health outcomes for the people who use their services by providing higher management with information and support evidence based strategic decision making.

Many international organizations and public health care systems, walk this manner and their efforts are towards this direction. For example, one amongst the foremost important health care systems worldwide, The **National Health System (NHS)** of the United Kingdom, introduce a 6-dimensional performance measurement system, which is extensively described in a next chapter, named *Performance Assessment Framework*.

The aim of this dissertation is to process the utilization of a guidebook, for the patients, citizens, stakeholders. While citizen's role as service users become stronger, patients must have an even central and important role in decision making. So, through this framework, including of course the proper information, the user will have the opportunity, selecting the KPIs that match better to his needs and priorities, to enable comparisons and evaluations of services, in the dimensions that he interested in, most. More details will be stated in next chapter. The aim of this framework is not to grade hospitals and providers, but to identify potential crucial points in quality of health care provided by health structures. Benchmarking!

Moreover, this work will come to fill the lack of international comparisons among different health care systems. Even because of the dissimilar hospital structures, the limitations in shared data, or even due to differences in patient and treatment classification. It is obvious that the needs and priorities of each country, state, or even cities of different territories, variates. So, it must be merged and consolidated all these different needs in one table, in one framework.

Performance Frameworks lends support to the globally growing recognition of the need for conceptual clarity in performance measurement. As Onyebuchi Arah et al refers at “*A conceptual framework for the OECD Health Care Quality Indicators Project, at 2006*”, «a good conceptual framework is essential when there are societal requirements for fairness, transparency, accountability, performance attribution and rewarding of excellence».

To provide health care professionals with a focused perspective towards classifying KPIs into functional categories and specific measurement groups. The main and more important question is: *why we measure?* than just: *how we measure?* This Evaluation and Monitoring Framework, is very essential not only to report performance, highlight deficiencies and suggest improvements, but also to provoke more new ideas and suggestions on monitoring health care services, though indicators are endless. All these will be analyzed in detail in chapter “Investigation and Presentation of Frameworks”.

2.2 Additional Attempts.

As *Barliba Ioan, Andrei Stefan Nestian and Silviu-Mihail Tiță*, pointed in their work, “*Relevance of Key Performance Indicators (KPIs) in a Hospital Performance Management Model*”: Very important is the use of PIMAR Model: Planning - Implementing - Measuring - Analyzing – Readjusting, which is the reason that the proper use of the KPIs, makes sense. The mission of any health care system is to provide specific health services which can solve the patients’ health problems (efficacy) in the best manner (quality) and in the most economical possible way (efficiency). The KPIs must relate to managerial actions, which are correlated with strategic priorities.

There is, as well, the model of *G.Langley and T.Nolan* consisted of two parts: 1st consists of three basic questions (what, when, which) and the 2nd part, consists of improvement circle, known as Deming cycle, or PDSA cycle (Plan, Do, Study, Act).

Deming Cycle can be used for improvement at political, administrative, and service level in the healthcare sector.

In order to shape this framework, it is essential and fundamental the correct choice of the proper indicators, KPIs. The two main categories of indicators are those which make international comparison and on the other hand those which are tailored to each national health system. Choosing the correct indicators is an international debate. With this dissertation, this work will try to walk towards the first path.

Where there is no comprehensive national/common system of disease-specific quality registers, and the work is done in individual units, hospitals/districts/countries separately, resulting in a situation where the indicators and monitoring mechanisms for several diseases or practices, vary across the units, this work comes to enhance/reinforce the efforts for comparing treatment practices between these units.

These KPIs in the table that is shown below, describe structures, outcomes and processes. Combined they can describe the overall level of quality in the healthcare services. In order to give a more holistic view of the quality in the healthcare services, it is tried to be established clusters, bunches of indicators, which combined will show, availability of healthcare services and resources, the outcome of treatment, user experiences and anything else an observer / manager / stakeholder would like to focus on.

It comes to ensure, that the improvement of the patient's quality of life, will be delivered by measuring, through a routine system, the main key goal itself! The improvement of patient's quality of life!

This framework will health managers and professionals worldwide, as well as policy makers, to develop the care system as well as to track the achievement of better health outcomes and positive patient experiences. Also allow the users to check and control their activities through time and benchmark and validate their performance.

The attempt is to have a holistic view, of the whole system. Looking at commissioners and providers of health care. From the point of view of all stakeholders and all participants. Patients and their relatives, healthy people / customers, managers of the providing health care structures, till the top of the hierarchy, the politicians, the policy makers, people who have the authority to rule the Health Care System as a whole.

3. INVESTIGATION & PRESENTATION OF FRAMEWORKS

3.1 General informations about frameworks

3.1.1. Designing a framework

It is commonly belief, that health care and also the services that a health system provides, can be improved constantly. This potentiality will be secured by a Monitoring framework. The framework must be understandable, attractive, and adjusted to the various sorts of audience who will make use of.

This framework, among others, will help policy makers, health managers and professionals worldwide, to develop the care system as well as to track the achievement of higher health outcomes and positive patient experiences. Also allow the users to trace their activities through time and assess their performance.

Some challenges remain within the application of the proposed framework. - Some definitions and proposed measures may need further revisions and adaptation to the local contexts. – As it is mentioned in the Health System Performance Assessment – Integrated Care Assessment (20157303 HSPA) of the European Commission, the results from different areas may not be comparable because of not standardized measures and scales in numerous countries. – There could also be some challenges within the availability of data. As a result of the above, it is obvious that this framework is in a constant state of improvement and adaptation.

For instance, allow us to see in practice, a framework which is developed, in order to distinguish inputs (e.g., funding mechanisms), intermediate goals (e.g., quality of services) and also the ultimate goals of the health system (e.g., health outcomes). The model is tested employing a discussion panel of local and foreign experts.

The next stage consisted of the selection and screening of key performance indicators, according to the: *“So What?” Strategies across Europe to access quality of care*, reported by the Expert group on HSPA”. To put in summary form, the example of “So What?” report, we will see that the first task is to extract indicators from existing national policies and techniques. The extracted indicators (n=350) were then mapped onto the draft framework to obtain an idea of the ‘spread’ of these indicators across the different dimensions of the model. This initial list of indicators was cleaned and filtered for duplication and clarity in definitions and an inventory of candidate indicators was produced (n=50). These candidate indicators were then scored using various tools,

included a criteria matrix and algorithm adapted from OECD. Detailed scoring was initially carried out internally by two independent expert raters, reducing the indicators to 150, the results of which were then compared with the scores of 8 external experts and that of all senior health managers, senior clinicians and health care professionals and academics from the Faculties of Medicine, Dentistry and Health Sciences.

The shortlisted indicators (n=34) were then mapped again onto the HSPA framework and gaps were identified. Additional indicators were drafted to shut these gaps and to match the requirements for reporting by the Social Protection Committee and DG ECFIN. The final set of indicators (n=57) were then measures and reported upon. It is important to filter and check for duplications of the indicators. To readjust them, especially by professionals who have the experience, and that they are whom they use these indicators in daily routine.

3.1.2. The needs that lead to the creation of a framework.

How are the findings of the quality assessment presented?

As it is argued in the *Report by the Expert group on HSPA, Brussels, 2016*, most countries agreed that the findings of the assessment shall be easy to understand. The way data are published, and comparisons are made is critical: it must be attractive, understandable, and adjusted to the different types of audience, as highlighted above. Some countries stated the importance to standardize the presentation, using the same structure over time and across sectors.

The presentation should provide warning signals to facilitate the prioritizing of needed actions and of further studies, when needed. In many cases, summary tables and graphs were developed to allow a quick and easy overview of the results and of their interpretation.

The use of composite indicators often raises controversies. Composite indicators may be interesting to assess progress over time on complex issues and to simplify the communication. However, they should be used carefully, because they can be difficult to understand and increase the difficulty of identifying proper remedial action. For some countries, composite indicators were presented only when other indicators on the same topic were available for a joint interpretation.

From the experiences analyzed in previous mentioned report by the expert group on HSPA, it can be identified a trend towards higher transparency in presenting the results of the assessments. National institutions often publish – totally or partially – these results in a form that is understandable for the public and that allows comparison of regions, individual health professionals, and hospitals, at least in selected clinical areas. (*Report by the Expert group on HSPA, Brussels, 2016*).

Concluding we could say that different needs of the countries worldwide, varied status quo of the health systems internationally, different cultures and priorities of the patients, alternative ways of reading same surveys by different actors of different health systems, are some of the most important reasons, that leads to the need of construction of a, easy to use, framework which is approved and accepted by everyone. A valence issue, we could say.

3.1.3. The progress and evolution that lead us to the use of frameworks.

According to “*HSPA – Integrated Care Assessment (20157303 HSPA)*”, today, integrated care focuses on reducing fragmentation in healthcare by reducing silos and providing patient-centered care. There is a greater need for care coordination, particularly thanks to trends such as: (i) the ageing population, (ii) the increasing number of patients with co-morbidities, (iii) the growing number of medical specialties, (iv) the requirement for changes within the financing mechanisms of hospitals and health and care institutions, (v) technological advancement, and (vi) increased healthcare costs and expenditure. The integration of care is one among the solutions which will enable care systems to address this new landscape, by increasing communication between care providers, reducing the unnecessary costs of duplication of tests and services, and enhancing continuity of look after patients moving from one care setting to a different. (*HSPA – Integrated Care Assessment (20157303 HSPA)*)

The six most significant framework models, which are included in the present evaluation framework proposed by this graduate project, are developed in next paragraphs.

3.2 PARIS – OECD

In this chapter are going to be presented the results of a preliminary data collection on patient-reported outcomes from a sample of OECD countries, and other organizations and structures related to the health care, as these are states at the “Health at Glance 2019” of OECD. These areas of work are a part of a broader OECD initiative – the Patient-Reported Indicator Surveys (PaRIS) – which aims to promote systematic use of these important metrics in health systems and make it as patient centered as it can be. The areas covered by the initial survey, was joint replacement surgery, breast cancer surgery and mental health, but for the needs of the present work, it has enriched with indicators from the whole health care service system. The following section discusses the importance of using patient-reported data, based in **PARIS of OECD** framework. The three layers of which are:

i) Personal, ii) Organic / Systematic and iii) Political.

i) As **personal / individual level** is examined the needs of *the patients and/or their relatives*, people at the core of the provided service, or simply guest and visitors. At the same level is examined the needs and wants of *the doctors* who acts in these structures and at last the requirements *of the scientific and administrative staff* as well.

ii) At the **organizational level** is examined what *the manager of the structure* wants, *the requirements that has to be met* by the structure, and finally the opinion of *the suppliers of the structures*, who compose a very important link in the chain of the health care provider.

iii) At the **political level** is obvious that we control the upper layers of the system, meaning the policy makers and the decisions which at the end of the day, will shape and rule the whole health care system. Firstly, is examined *the legal framework*, then, the right and essential *decisions of the ministries* and competent authorities, and finally *the financing* through taxpayers, insurance, and funds.

This is the one which can be developed in this work. These three levels will be the core backbone of the evaluation framework that is presented. There are way more, different models, depending on the point of view of the observer or in relation with the required or ordered results of each Health Care System. The most important of which will complete and support the PaRIS model and will be presented similarly during this thesis. Are the following:

3.2.1 Bersimis and Sachlas

One of the most relevant models is ***The Bersimis and Sachlas*** unified hierarchical framework for public health based on SPM and MSPM, consisted of three layers, as it is analyzed in Sotiris Bersimis and Athanasios Sachlas, 2019, “A Unified Framework for Surveilling Public Health Based on Statistical Process Monitoring”. It is not involved in the framework of the present work, but it must be presented as it is very similar with PaRIS model and will help to reinforce the core idea of the three prementioned levels.

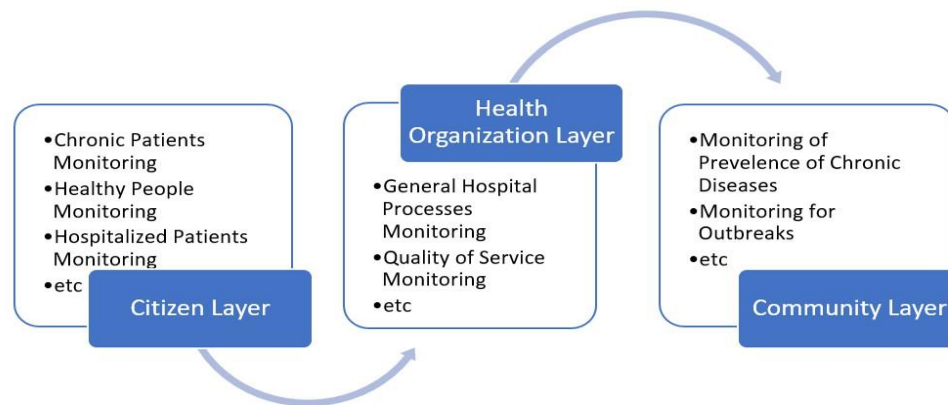


Fig. 2: The three layers of the unified framework in which SPM and MSPM can be used.

The first layer of the framework requires the “Personalized Monitoring of Citizens’ Health” by feeding continuously in time their medical data from their medical records into an appropriate software system that would be able to process the data in real time using SPM and MSPM techniques and giving early alarms in cases of suspect changes in the personalized distribution of these variables appear. This is the Base Layer of the framework.

The second layer of the framework requires the “Hospital’s Processes Monitoring”, i.e. most crucial hospital’s processes will be monitored - mainly medical and secondary managerial in order to boost the quality of hospital’s (or any other healthcare services provider) services. This is the Intermediate Layer of the framework. Except from raw data, the framework at the Intermediate Layer will also use the information produced at the Base Layer.

The third layer of the framework requires the “Community Monitoring” (e.g. virus related events will be continuously captured by the system as well as non-virus related events will be tracked in order to explore possible high prevalence of virus related diseases, blood pressure, of diabetes, etc). This is the Top Layer of the framework. Except from raw data, the system, at the Top Layer, will also use the information produced at the Base and Intermediate Layers, in order to enhance its power to detect outbreaks of infectious diseases or increasing trends in the rates of chronic diseases.

- i) patient/citizen layer with chronic and emergency patients and healthy citizens as well, and
- ii) the health organization layer, with SHC and PHC providers
- iii) the community layer, means the government.

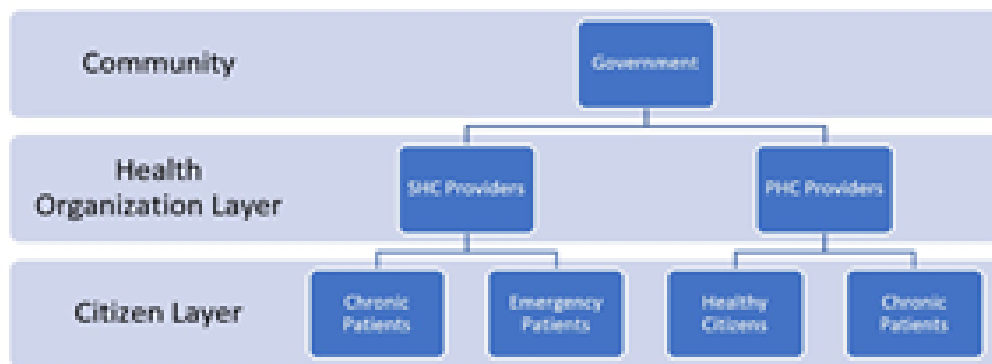


Fig. 3: The unified framework for public health based on SPM and MSPM.

The combined use of SPM and/or MSPM techniques, and especially, control charts, at all three layers will be a significant advance in ensuring the citizens’ good health status, and the provision of high-quality health services. These will lead to a high level of public health. Besides, this is demonstrated by the use of such techniques in individual cases as evidenced by the review presented in this framework.

3.3 PAF 6 Dimensions

The NHS introduce a multi-dimensional performance measurement system. The 6 PAF dimensions, will be one of the next 4 models that will be presented in this work’s framework.

Analyzing the 6 dimensions of PAF, according to *Li-cheng Chang, Stephen W. Lin, Deryl N. Northcott*, described in *The NHS Performance Assessment Framework*.

The PAF has the stated aims of assisting the NHS in working to improve the health of the public and providing better care and health outcomes for the people who use its services (DoH, 1997). More specifically, the PAF would be used to assess how well the NHS was delivering its services and to enhance its accountability to the general public and to Parliament (NHS Executive, 1999; DoH, 2001).

There are six dimensions within the PAF, that consider the requirements of various stakeholders, outcome and process measures, and long-term and short-term targets. The stated purpose of this framework was to improve NHS performance by encouraging managers to concentrate on more comprehensive views of performance (DoH, 1997), rather than concentrating on the “bottom line figures” that had attracted attention under previous internal market-based health sector structures (Bates and Brignall, 1993; Brignall and Modell, 2000).

Dimensions of the PAF

There are six dimensions of performance within the PAF. These six dimensions and their stated aims are summarized in Table I.

The NHS Performance Assessment Framework:

<u>Areas</u>	<u>Aims</u>
Health improvement	To reflect the overarching aim of improving the general health of the population, which is influenced by many factors, reaching well beyond the NHS.
Fair Access	To recognise that the NHS's contribution must begin by offering fair access to health services in relation to people's needs, irrespective of geography, socio-economic group, ethnicity, age or gender.
Effectiveness	To recognise that fair access must be to care that is effective, appropriate and timely, and complies with agreed standards.
Efficiency	The way in which the NHS uses its resources to achieve value for money.
Patient/carer experience	The way in which patients and their carers view the quality of the treatment and care that they receive, ensuring the NHS is sensitive to individual needs.
Health outcomes	Through assessing the direct contribution of NHS care to improvements in overall health, completing the circle back to the overarching goal of improved health

WHO PATH-Performance Assessment Tool for Quality Improvement in Hospitals

The 6 Dimensions for similar use, evaluating Hospitals.

(a) Clinical efficacy (correctness of clinical practices, achievement of care objectives, etc.)

(b) Efficiency (optimal use of resources, productivity, etc.)

(c) Staff orientation (training adequacy, training, satisfaction, etc.)

(d) Responsiveness of the services provided to the needs of the community (equal access, public health, etc.)

(e) Safety (patients, staff, environment) and

(f) Provision of patient-centred services (communication procedures, confidentiality, dignity, etc.).

It becomes obvious, that these 6 dimensions of PAF, can find usability in plenty of cases, related to Health Care System. With slight modifications, can suit to different needs and options.

3.4 Donabedian Framework

The Donabedian Conceptual Model which provide framework for evaluating healthcare services and quality of care, taking into account: i) Structures, ii) Processes, iii) Outcomes. and many more such as: i) Operational, ii) Tactical, iii) Strategic indicators, is the next model which is included in the framework of the present study.

As Reeve, Humphreys, Wakerman, describe in their work named: “A comprehensive health service evaluation and monitoring framework”, will be clearly understood the usage of the Donabedian model.

The framework includes **Donabedian’s three seminal domains of structure, process, and outcomes** to determine health service performance. These in turn are dependent on sustainability, quality of patient care and therefore the determinants of

health to provide a comprehensive health service evaluation framework. The principles underpinning primary health service evaluation were pertinent to health services in remote contexts. Sentinel indicators were developed to fit the demographic characteristics and health needs of the population. Consultation with key stakeholders confirmed that the evaluation framework was applicable.

This framework, as it is mentioned in details from *Carole Reeve, John Humphreys, John Wakerman, at: "A comprehensive health service evaluation and monitoring framework", Evaluation and Program Planning, 2015*, goes a step further from traditional QI to link policy to comprehensive health service evaluation using a logic model that examines the system from all aspects; from policy, through to inputs, outputs and outcomes including clinical, health behavioral risk factors and population health. The use of a logic model analysis defines conceptually the links between inputs, preceding the outputs and also the desired outcomes and includes the complex and interactive contextual relationships that are important in complex adaptive systems.

The key principles of primary health service evaluation, continues *Carole Reeve et al.*, were adopted from two seminal pieces of work *Donabedian's (1988)* quality of care paradigm linking structure, process and outcomes using program evaluation theory and *Starfield's (2005)* identification of key features of quality primary health care to reduce disparities in health outcomes in vulnerable populations. The requirements underpinning performance assessment in primary health care developed by *Sibthorpe (2004)* using the Australian National Health Performance Framework (*National Health Performance Authority, 2012*) provided indicators appropriate for the Australian context. This approach combines the two key principles of health performance improvement, external accountability, and internal quality improvement (*Freeman, 2002*).

According to *Donabedian, Wheeler and Wyszewianski (1982)* it is very important to focus on what do we want to look at and why. So, they suggest the following pattern:

- Structures: The context of health care – facilities, equipment, personnel, organizational characteristics, payment models.
- Processes: Actions in healthcare including those of patients and families.
- Outcomes: Effects on health status, quality of life, knowledge, behaviour, satisfaction, experience.

Additionally, *Maxwell* focused on: 1) Social Acceptability (Humanity), 2) Effectiveness, 3) Efficiency (cost/benefits), 4) Relevance to need, 5) Equity, 6) Accessibility, 7) Locality.

C. Reeve et al. / *Evaluation and Program Planning* 53 (2015)

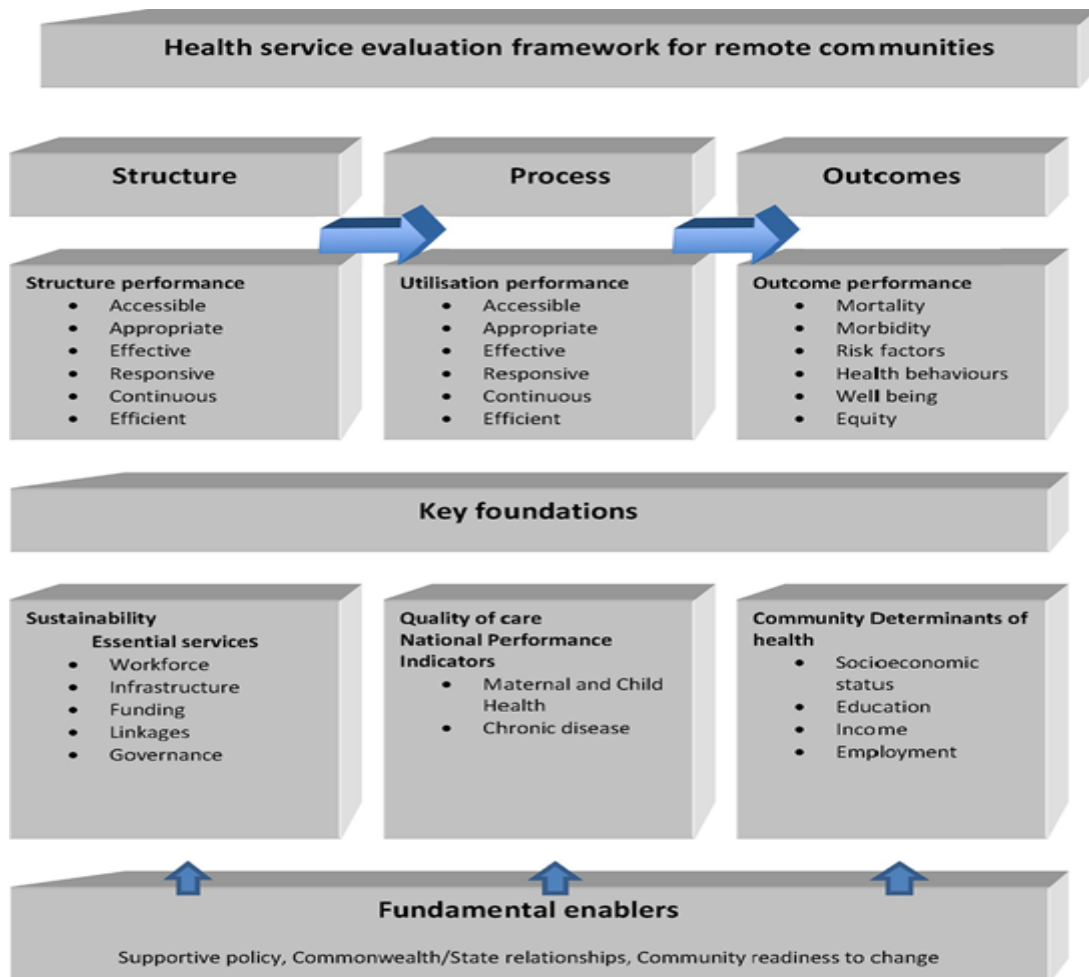


Fig.4: Health service evaluation framework.

“Report by the Expert group on HSPA, Brussels, 2016”:

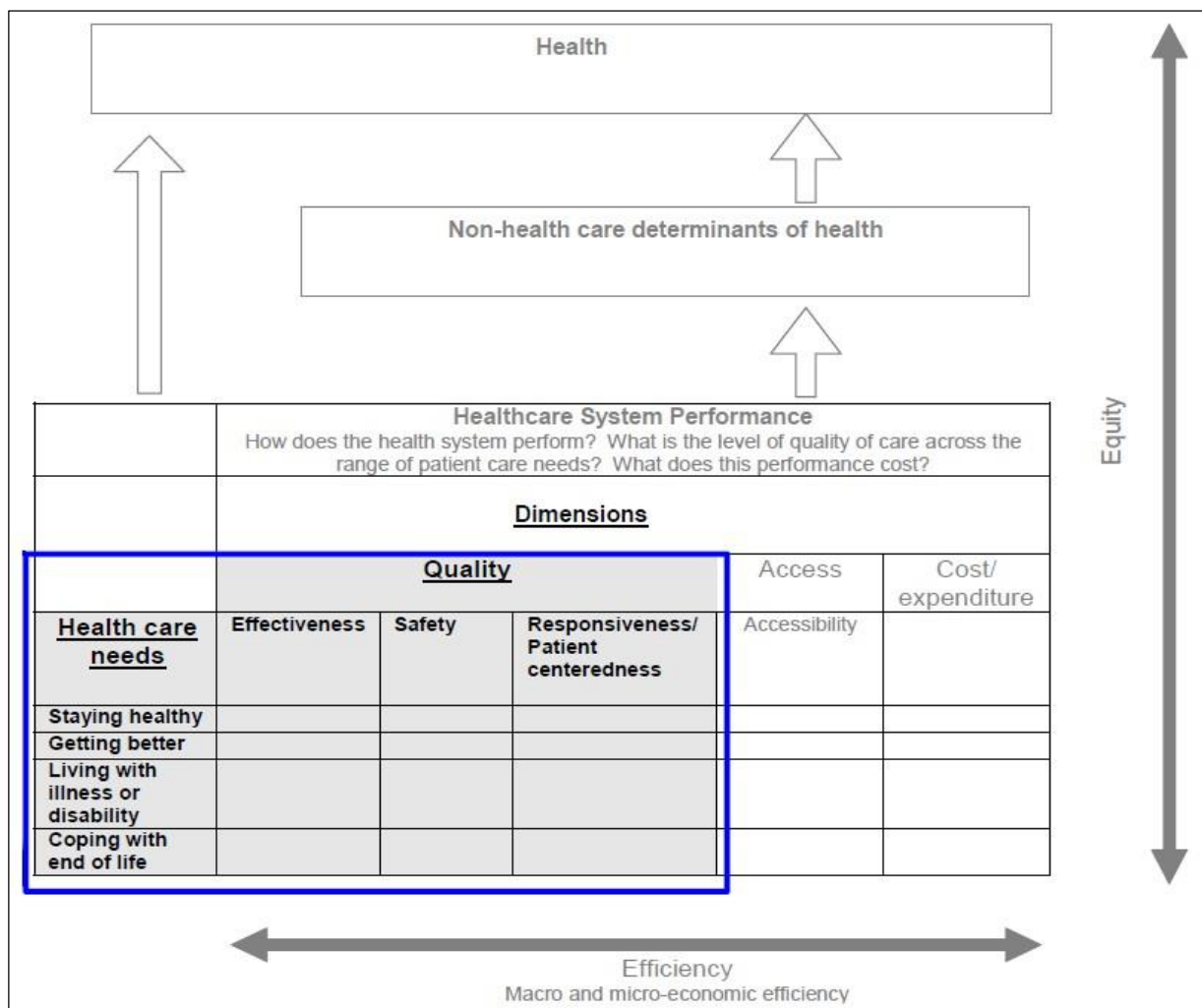
A seminal model to assess health services and evaluating quality of care was developed in previous century *by Avedis Donabedian*. In this model, are distinguished three domains where information on quality of care can be derived from: process, structure, and outcomes. As outcomes is meant the impact that healthcare has on patients’ health status. Furthermore, it is a measurement of the effectiveness of health

care. The Donabedian model remains at the idea of several frameworks to assess quality of care. Including this one.

Partially based on the Donabedian model is additionally the framework developed by the OECD as a part of the Health Care Quality Indicators project, which is widely accepted by its member countries. *The OECD framework*, which is also building on the definition of quality of care as developed by the US Institute of Medicine, defines 'good quality care' by means of **six core dimensions**: effectiveness, safety, responsiveness (or patient-centeredness), accessibility, efficiency, and equity, from which only the first three are included in OECD framework.

In 2001, the Institute of Medicine in the US published a report named: "Crossing the Quality Chasm", in which there is similar definition of quality of care as the previous one. Given the wide acceptance of the OECD framework, the Expert Group agreed to use these common domains of quality of care to guide this report.

Fig. 5: the OECD framework for HSP



However, we must note that similar but not totally different definitions of quality of care, have adopted by different organizations and Member States, and they have operationalized these in different ways. For instance, the Expert Panel on effective ways of investing in health defined high quality health care as "the health care that uses the available and appropriate resources in an efficient way to contribute equitably to the health improvement of individuals and the population as a whole". Along with safety, effectiveness, and responsiveness, previous definition introduces efficiency and equity as well, as domains of good quality care.

The WHO, proposes the following working definition, shared by its member countries, suggesting that a health system should seek to make improvements in the following six areas or dimensions of quality:

- **Effectiveness:** delivering health care that is adherent to an evidence base and results in improved health outcomes for individuals and communities, based on need.

- **Efficiency:** delivering health care in a manner which maximizes outcomes per resource used and avoids waste.

- **Accessibility:** delivering healthcare that is timely, geographically reasonable, and provided in a setting where skills and resources are appropriate to medical need.

- **Patient-centeredness:** delivering health care which considers the preferences and aspirations of individual service users and the cultures of their communities, thus reflecting the extent to which they are well informed about treatment alternatives, are involved in the decision-making process of their own care, and they are treated with empathy and respect.

- **Safety:** the degree to which health care processes avoid, prevent, and ameliorate adverse outcomes or injuries that stem from the processes of health care itself.

- **Equity:** delivering health care which does not vary in quality because of personal characteristics such as gender, race, ethnicity, geographical location, or socioeconomic status.

3.5 3Es

The 3Es approach framework: Effectiveness, Efficiency, Equity. The next main model that is included in the present framework.

ASSESSMENT OF PUBLIC HEALTH SERVICES

The assessment according to Leger, Schieden and Walsworth-Bell (1992) is "the critical assessment, in the most objective way possible of the extent to which all or part of the services (diagnostic tests, treatment) meet the objectives we have set."

Holland (1983) defines evaluation as "determining the effectiveness, efficiency and acceptance of planned interventions that contribute to the achievement of the predetermined objectives." (*Soulis S., 1999*)

Another definition defines as 'a systematic assessment' of the degree of achievement of pre-planned and predetermined objectives and objectives over a specified period of time. The aim is to confirm the achievement of these objectives and the adequacy of the instruments and processes used. The objective of the evaluation is to improve the (extent to which it is defined) offered Health Services. (*Lianis St., 2004*).

The basic concepts by which we can evaluate the purposes and operation of the structures that provide health care, are:

Equity - Adequacy

Effectiveness - Efficacy

Efficiency - Efficiency

Equity is the extent to which the system's resources respond to the health needs and demand of a defined population, in relation to the objectives we have set and includes the concepts of suitability, equality and acceptance. (*Soulis S., 1999*).

According to Kyropoulos, adequacy is linked to the unit cost outflow. Resources are used adequately if a given outflow is produced at the least cost or if the best possible result (operational adequacy) is achieved at a given cost. In the health sector, a program is considered sufficient if its results are in accordance with the requirements laid down in.

Effectiveness is the relationship between the predetermined objectives set by the planning of medical care and the objectives finally achieved by the implementation of these interventions and procedures. Efficacy is the most important indicator of the quality of health care. (Soulis S., 1999)

Another definition of effectiveness is: "The degree of success of a particular production process or health care intervention in relation to the predetermined objectives and objectives, which can aim to reduce the dimensions of a problem, to improve a morbid situation. (Kyropoulos G.)

Efficiency is the relationship between inputs/results – outputs, i.e., at what financial burden, with which resources are used and with what amount of production factors some results are achieved. In efficiency we compare two or more processes that bring about the same or different effect. (Soulis S., 1999)

As far as efficiency is concerned, Kyropoulos stresses that resources are used efficiently when a given quantity of product is produced at the minimum possible cost or when given the cost the maximum quantity of product (the maximum quantity of product) is produced. The efficiency of a service is considered excellent when given the quantity and quality of the production factors (funds, machinery, human resources, etc.) the maximum possible result is achieved both qualitatively and quantitatively.

The key is to make these first steps, by using this framework. Being sure that mistakes will be made along the way. But by constant monitoring and evaluating this framework, it becomes possible to make steady progress toward a more financially sustainable, patient-oriented, and stakeholder-friendly health care system, as very sharply, *Bede Broome et al.* describes at their: "*Clinical operations excellence: Unlocking a hospital's true potential*".

3.6 Parasuraman

Parasuraman et al. (1985) studied services and identified ten criteria utilized by consumers once they evaluate service quality. In 1988, they classified them as five broad dimensions:

- tangibles (the appearance of physical elements)
- reliability (dependable, accurate performance)

- responsiveness (promptness and helpfulness)
- assurance (competence, courtesy, credibility, and security) and
- empathy (access, communications, and customer understanding).

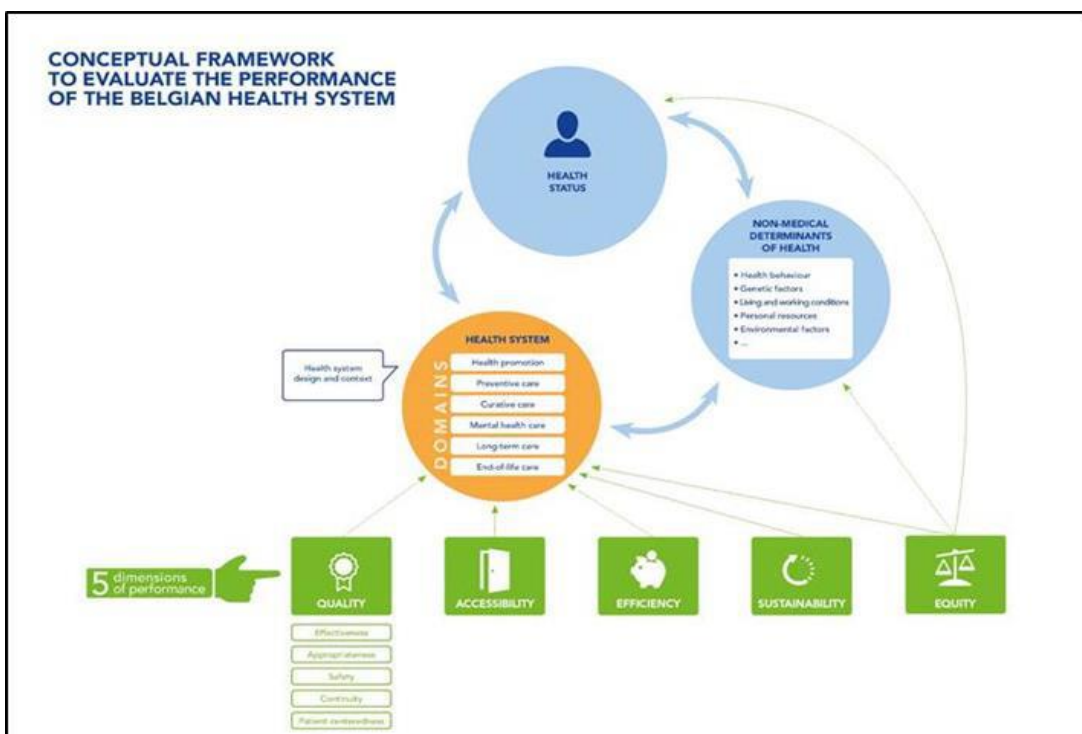
Rubin et al. (2001b, p. 490) discerned that those indicators are designed as a method to boost clinical, service, and economic performance. As an example, based on the SERVQUAL model developed by Parasuraman et al. (1988), Lytle and Mokwa (1992) viewed health care services as a collection of three forms of benefits:

1. Core benefits (the nucleus of the product offering or the outcome that the patient is seeking)
2. Intangible benefits (interactions between doctor and patient largely based on reliability, empathy, assurance, and responsiveness); and
3. Tangible benefits (physical surroundings like the placement, decor and appearance of facilities and personnel). [By Vasco Eiriz, Jose Antonio (2005)].

3.7 Additional Choices of Frameworks

Dimensions considered.

Conceptual Framework. Firstly, we distinguish three similar interconnected tiers: non-medical determinants of health, health status and therefore the health care system.



In this model, the health system comprises preventive care, health promotion, long-term care, curative/acute care, and end-of-life care. Primary and institutional care are implicitly within the model.

Sub Dimensions defining quality of care.

Effectiveness, safety, appropriateness, continuity, and patient centeredness are essential to define quality, but quality should be analyzed in a comprehensive approach including access/ inequalities and resilience/ efficiency.

Sub dimensions of Quality of care

The quality of care is defined as “the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge”. In Belgium, quality is subdivided into 5 sub-dimensions: appropriateness, patient-centeredness, effectiveness, safety, and continuity of care described in the KCE Report.

Effectiveness, is defined as “the degree of achieving desirable outcomes, given the correct provision of evidence-based healthcare services to all who may gain advantage but not people who would not benefit”. All indicators are thus outcome indicators.

Appropriateness is defined as “the degree to which provided healthcare has relevancy to the clinical needs, given the current best evidence”. The link between outcomes and processes is reflected in the link between effectiveness and appropriateness.

Continuity of Care is a concept that encompasses different dimensions, such as the planning of contacts with different health providers, the continuity in information between providers, the relational aspect of the patient-GP contacts or the coordination between providers or organizations.

Patient-Centeredness is defined as “providing care that is respectful of and responsive to individual patient preferences, needs, and values, and ensuring that patient values guide all clinical decisions”.

Safety is defined as “the degree to which the system does not harm to the patient”.

Additional dimensions related to Quality of care.

Four more dimensions are also described in the Belgian HSPA: equity, sustainability, access, and efficiency: imagine a high qualitative system which would be not efficient, not accessible, and not affordable...

Equity / inequalities, in the Belgium report are part of the dimension of equity. It has been approached in analyzing indicators by socio-economic position when possible. Which means that each quality indicator is also used to measure inequalities.

Accessibility of a health system is an essential requirement for a high-quality and efficient health system. The level of easiness and lack of difficulties with which health services are reached in terms of physical access (geographical distribution), cost, time, and availability of qualified personnel, defines accessibility. Underuse, captured by this accessibility dimension is also part of the quality dimension.

Efficiency of the healthcare system, in the Belgium report is defined as “the degree to which the right level of resources (i.e.money, time and personnel, called input) is adequate for the system (macro-level) and is ensuring that these resources are used to yield maximum benefits or results (called output)”. Overuse and Misuse captured by this efficiency dimension are also part of the quality dimension.

Hereby a list of some quality indicators described by the Belgian report. A sample of such indicators are randomly mentioned in following list:

- dimensions: the quality sub-dimension to which the indicator refers.
- indicator: name of the indicator.
- international versus national: I = international indicator or N = National limited indicator
- source of data: cancer register, public health, insurance, survey, ...
- institution/ primary care: focus of the indicator HOP= hospital primary care
- type of care: cancer = indicator specific to cancer, 65+ = indicator specific to older people
- use for inequalities: is the indicator used to measure the inequality dimension?

- use for another sub-dimension of quality
- use to measure another dimension of performance



Fig. 7: Framework adopted in Malta

(Mohamed Khalifa, Parwaiz Khalid, "Developing Strategic Health Care K.P.I's:
A case study on tertiary care hospital"

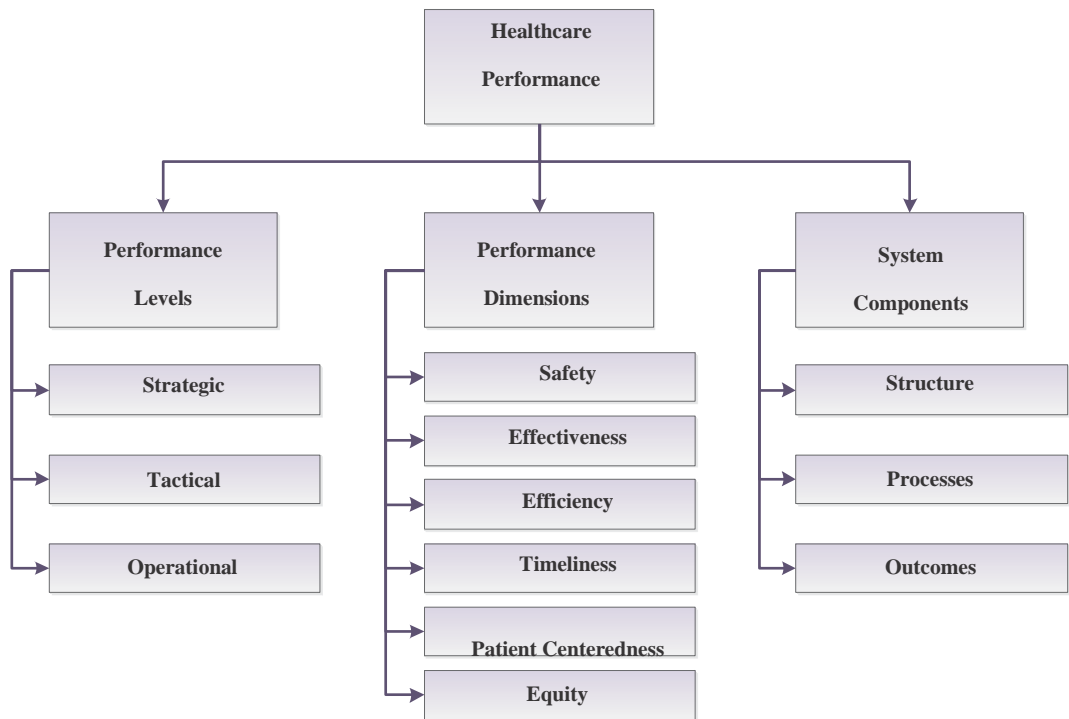


Fig. 8: Healthcare Key Performance Indicators: What Can They Measure?

To provide health care professionals with a focused perspective towards classifying KPIs into functional categories and specific measurement groups. The main and more important question is: *why we measure?* than just: *how we measure?* This Evaluation and Monitoring Framework, is very essential not only to report performance, highlight deficiencies and suggest improvements, but also to provoke more new ideas and suggestions on monitoring health care services, though indicators are endless.

Performance Frameworks lends support to the globally growing recognition of the need for conceptual clarity in performance measurement. (*Onyebuchi A. Arah et al, "A conceptual framework for the OECD Health Care Quality Indicators Project"*)

A good conceptual framework is essential when there are: performance attribution, societal requirements for fairness, accountability, transparency, and rewarding of excellence.

The HCQI framework has four interconnected tiers (to denote potential causal pathways shown in figure 5.) which represent:

i) *Health* – to capture the broader measures of the health of the society that may be influenced by health care and non-health care factors.

ii) *Non-health care determinants of health* - to delineate mostly society-wide, non-health care factors that also influence health.

iii) *Health care system performance* - to capture the processes, inputs, and outcomes of the health care system and its efficiency and equity; and to recognize that these may sometimes influence non-health care determinants; and

iv) *Health system design and context* - to give pertinent country and health system policy and delivery characteristics which affect costs, expenditure, and utilization patterns and which are necessary for appreciating and contextualizing the findings of the health care performance tier.

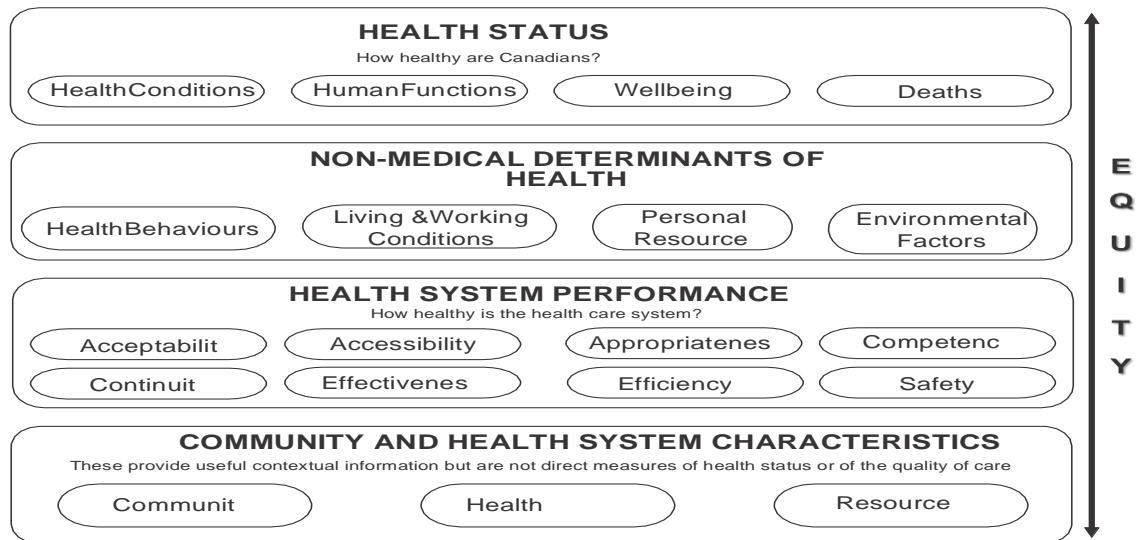


Figure 3 Canada's health indicators framework (adapted from [21,22]).

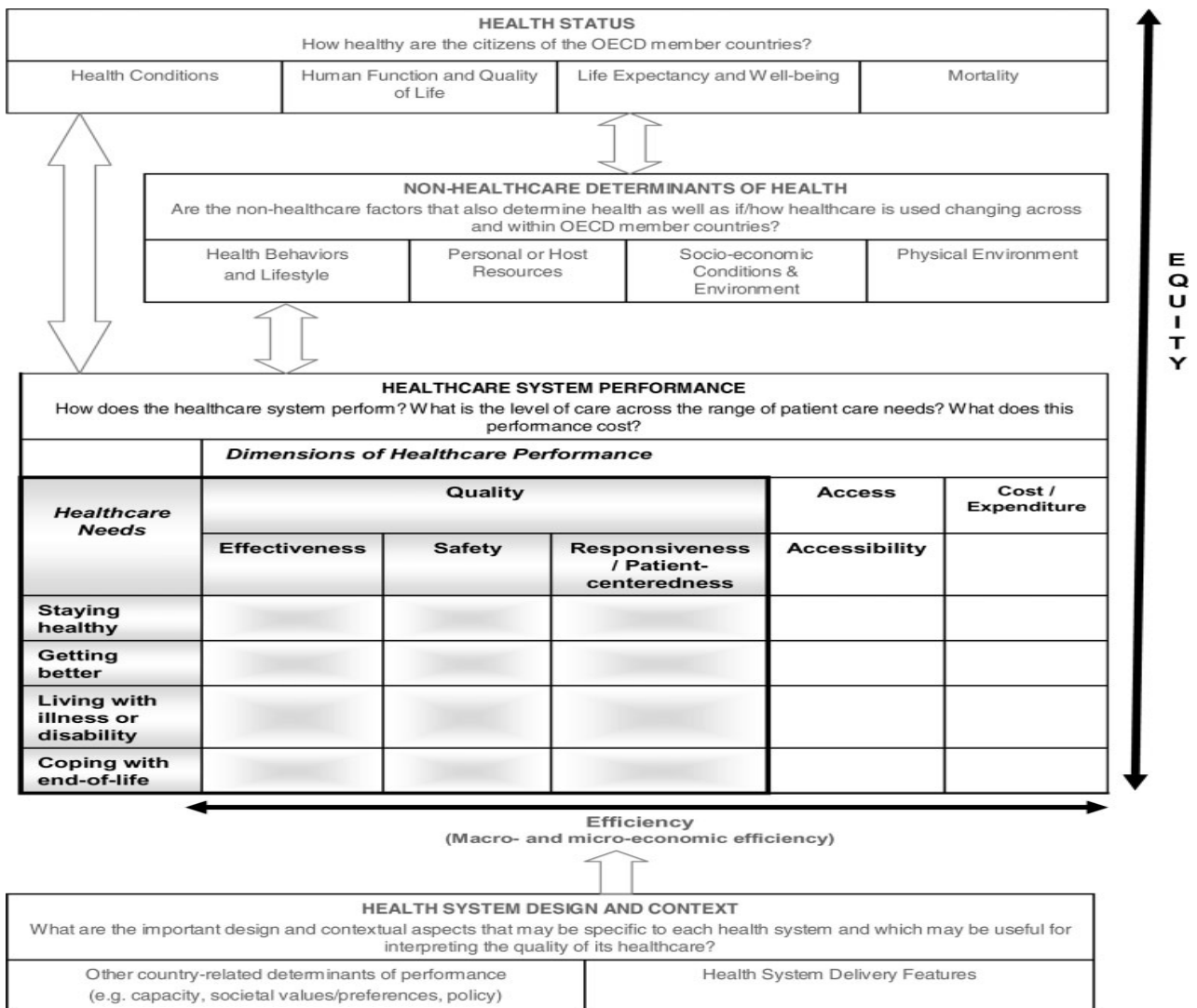


Fig. 9: Conceptual framework for Organization for Economic Cooperation and Development Health Care Quality Indicator (HCQI) Project. The shaded area represents the current focus of the HCQI Project.

(Ioan, Nestian and Tita, "Relevance of KPIs in a Hospital Performance Management Model")

Performance represents the extent to which set objectives are accomplished. The mission of any hospital is to provide specific health services, which can solve the patients' health problems (*efficacy*) in the best manner (*quality*) and in the most economical way possible (*efficiency*).

Table 2. Main Dimensions in Measuring Performance

Dimension	Content of the Dimension
Clinical efficiency	Technical quality, evidence-based practice and organization, health improvement and outcomes (both individual and related to patients)
Production efficiency	Resources, financial component (financial systems, continuity, additional resources) more high proficiency personnel and provision of state-of-the-art medical equipment and technique.
Personnel	Satisfying the human resources needs, creating motivational systems in order to stop migration of specialized human resources (physicians and nurses), providing proper conditions to keep the health of the hospital personnel safe and also to improve it, ensuring fair opportunities for continuous medical education.
Social accountability and reactivity	Orientation towards community (response to needs and requirements), access to resources, continuity, health promotion, equity, abilities to adapt to increasing demands of the population (strategically).

Safety	Patients satisfied by the medical services, suppliers aware of the importance of maintaining a partnership with a hospital, a functional organizational structure.
Focus on patient	Availability towards patients: focusing on the client (prompt attention, access to social aid, politeness, selection of the services supplier), patient`s satisfaction and patient`s experience (dignity, confidentiality, autonomy, communication).

Source: Adapted from: “*Measuring Hospital Performance to Improve the Quality Of Care In Europe: A Need For Clarifying And Defining the Main Dimensions*”, Barcelona, Report on a WHO Workshop, Spain, 10 - 11 January, 2003, p. 25.

Eiriz and Figueiredo, in their “Quality evaluation in health care services based on customer-provider relationships”, propose a preliminary framework to evaluate health care quality that considers customers’ (patients, their relatives, and citizens) and providers’ (managers, doctors, other technical staff, and non-technical staff) expectations and perceptions. To encompass these different views, inquiries have to differ for every of those actors.

It is important to establish patterns of quality and to evaluate the balance between customers’ expectations and their experience. Naturally, it is far more difficult to define levels of quality in health care services than in other services, such as financial outlets or tourism, mainly because it is the human being and therefore the quality of his/her life that is being evaluated (*Herzlinger, 1997*). Nevertheless, it is important to define frameworks for quality evaluation.

Health care quality can be studied at **two different levels**. At first level, it can be assessed as a performance issue associated with the entire health care system. At organizational, the second level, on the other hand, health care quality can be assessed by actors such as patients and doctors involved in service delivery.

More recently, *Floyd (2003, p.233)* considered the performance of the health care system as a question of efficiency and by defining spending limits, given the actual fact that “government cannot afford to pay for or ensure access to health care without limitations for all its citizens”. Nevertheless, *Rubin et al. (2001b, p. 489)* added that it is important to define the aim and goals of quality measurement, including the intended

audience or information consumers. They also recognized the requirement to define the unit of analysis, the evaluation of the process and therefore the variety of outcomes to be evaluated.

The program relies on a rating system, which evaluates the following seven items:

- 1) leadership
- 2) Strategic planning
- 3) focus on patients, other customers, and markets
- 4) information and analysis
- 5) staff focus
- 6) process management
- 7) organizational performance results.

The authors based their investigation on a WHO framework, which is supported by three main goals:

- a) to improve people's health
- b) to respond to legitimate non-health-related expectations (respect for people and client orientation)
- c) fairness in financing.

Ware et al. (1978), cited in Sargeant (1999), studied the measuring and meaning of patient satisfaction and identified four satisfaction dimensions that affect patients' perceptions:

1. doctor conduct
2. service availability
3. confidence and
4. efficiency/outcomes.

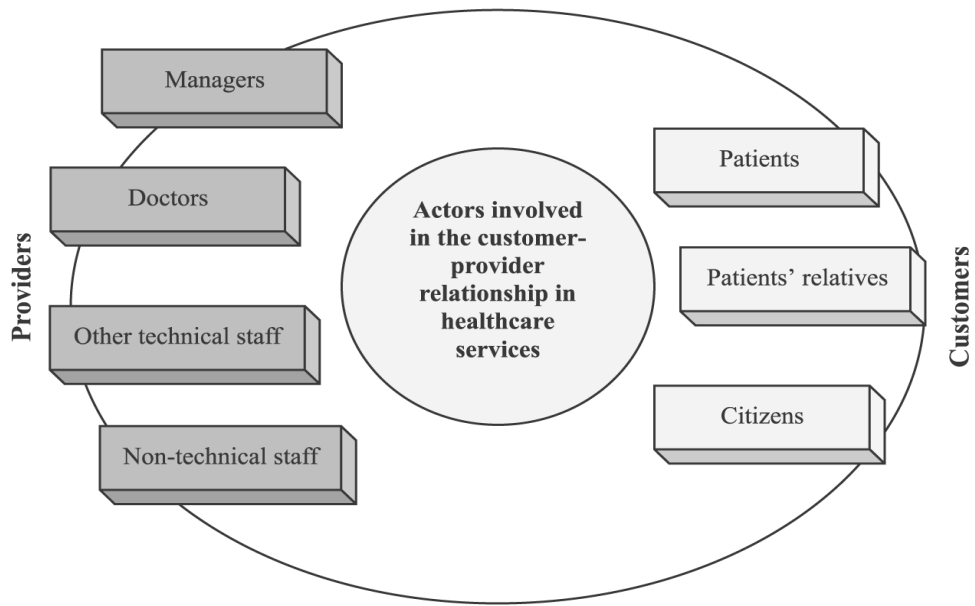


Fig. 10: Actors involved in the customer-provider relationship in healthcare services.

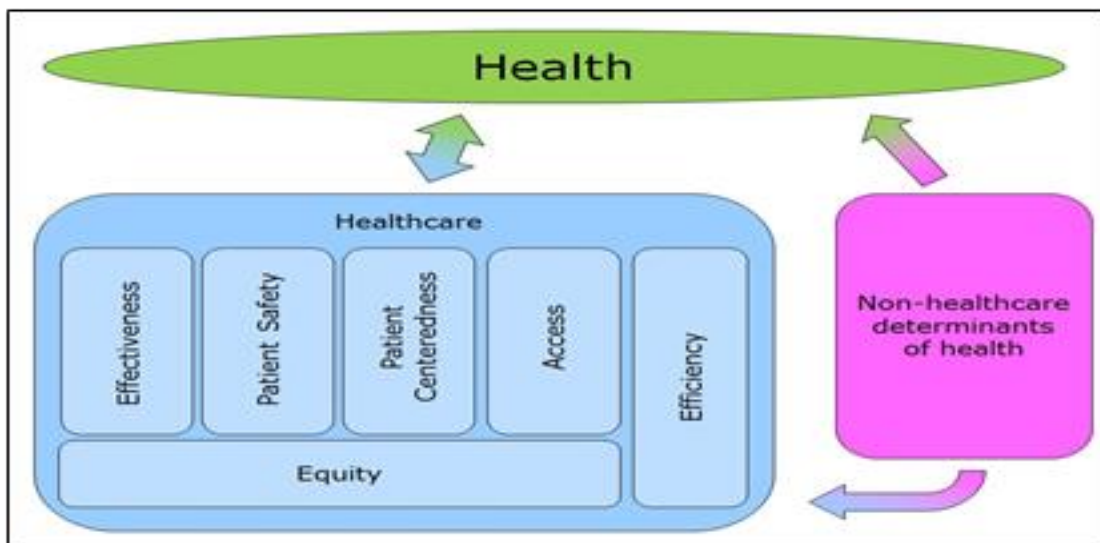


Fig. 11: A simplified version of OECD framework

4. INDICATORS

4.1 General information about indicators.

The effort of this work is to gather existing and already validated frameworks and indicators, from expanded group of resources, in order to produce the most representative list of indicators. The final result, after cross checking and elimination of double entries, was a list of 151 indicators. The list was presented under six main domains:

1. Advancement of integration.
2. Use of healthcare services.
3. Health outcomes.
4. Patients' satisfaction and quality of life.
5. Financial outcomes.
6. Higher management and policy making.

Taking into account the heterogeneity in the implementation of integrated care across the EU, this proposing framework is composed of two sets of indicators: **1) core indicators** which are considered to be central to integrated care and should be easy to measure directly, and **2) optional indicators**; which are a variation of indicators from already existing frameworks that, although not considered necessarily central to integrated care, may be valuable to users implementing integrated care at the level of the organization, the health system or at policy level.

Core indicators

In the HSPA Expert Group's BLOCKS report, is described the reason why there is the need of establishing core indicators in order to measure the performance of integrated care. As such, to be included in the core framework, indicators needed to fulfil selection criteria from the OECD Health Care Quality Indicators, presented in the BLOCKS report, such as:

“• **Validity**: sufficient scientific evidence exists to support a link between the value of an indicator and one or more aspects of healthcare quality.

- **Relevance:** an indicator measures an aspect of quality with high clinical importance, a high burden of disease or high healthcare use.

- **Reliability:** repeated measurements of a stable phenomenon get similar results.

- **International feasibility:** an indicator can be derived for international comparisons without substantial additional resources.

- **Actionability:** an indicator measures an aspect of quality that is subject to control by providers and/or the healthcare system and is actually used at a national level for policymaking, monitoring or strategy development.

- **International comparability:** reporting countries comply with the relevant data definition and where differences in the 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.”

Often, the selected and chosen indicators, have the burden of the data collection. Preference is given then, to the use of existing information from existing data sources, instead of using an indicator without validated measurements, which comes, because of the lack of data. The design of a quality measurement system cannot be independent from the final goal / purpose. Thus, each indicator is used for different purpose, and methods for developing indicators are different as well, depending on the significant purpose. Indicators do not measure quality but only indicate the level of quality a system delivers. This implies that indicators must be read within a broad text and not alone.

The core indicators selected through the co-design and stakeholder engagement process are considered key to assess integrated care performance, but many of them are also applicable outside integrated care initiatives. Reversely, there are indicators that could provide interesting measures of performance in particular contexts even if they are not considered as core ones. These are considered optional indicators within the Integrated Care Performance Assessment framework. The framework can also be adapted to be used as part of a broader performance assessment approach by focusing on a subset of core indicators if the rest of the indicators are captured elsewhere.

Optional indicators

Indicators proposed by existing frameworks that could potentially help practitioners and policymakers in the implementation of integrated care were not discarded from the framework model presented in this report. These indicators are presented as optional

indicators that can be included in the performance assessment cycle and assessed in the same manner as the core indicators. The list of optional indicators is categorized according to the level of the health system; of the organization(s) and their staff; or from the perspective of patients and carers. Indicators have also been categorized as outcome or process indicators of the structure.

4.2 Detailed description of KPI's List.

More specifically, and accordingly, **Table 4 in Chapter 11, "KPI's List"**, the indicators in present work, are distinguished in:

- i) Individual level, where are examined all the indicators that refers to or interest in, patients and their relatives, the doctors and the scientific and the administrative staff.

In this group, are included indicators that reflects personal tastes, responses will be influenced by individuals' preferences and expectations, which vary across countries or across sociodemographic groups within the same country, or age, level of education, income quintiles, gender, etc...For instance Politeness of Staff - Immediacy – Intimacy. Indicators such as cleanliness of the structure, the presence or not of parking area, beauty of surroundings and similar ones, are distinguished according the SERVQUAL of Parasuraman. Time, in its all aspects, is very important for the patient. It is crucial cause it affects the punctuality of admissions, diagnosis, and cure. TTS (Time to Surgery) being one of the most important indicators of this group.

Another important and serious debate is that between Autologous reconstruction vs Implant reconstruction, considering the women's decision in the recovery way from breast cancer. It is very important to give women the power of their own decision, as we speak for the rest of their lives.

Even the duration of a visit in a practitioner can indicates the importance with which the practitioner minister to the patient. All the examples above, as well as the rest of the indicators that are included in the present framework, and refers to the individual level of the patients, have been presented in order to enhance the idea that outcomes such as life expectancy are important, but they are silent on a range of other things valued of patients, including pain, function and quality of life as well as the experience of care itself.

On behalf of the doctors now, it is very important to have the ability of online and digital services. Such facilities will have great effect on their job, through quick diagnosis, having instant access on the results of their patients, especially if there is a Digital / Electronic Health Record. (E.H.R.)

High wages accordingly with the worker's qualifications, in addition with the awareness that a doctor will gain through the sites or the scientific publications and magazines of the structure, will play a significant role in the balance of brain drain vs brain gain. On the other hand, rates of absenteeism and resignation are two indicators that must be taken into account in order to focus on the personnel needs.

Latest research has proved, that higher involvement of the physicians, in operational decision making and in managerial decisions will have impact by 5-10% reduction in costs.

Perhaps the most important indicator that affects the scientific and administrative staff and it shouldn't be missed, is the percentage of needle injuries, as it has many varied aspects through the operation of a structure. It is representative of safety in the workplace and of proper education. It also has financial implications for the cost of dealing with the accident.

- ii) Organizational level, where are examined the indicators that reflects the needs and priorities of the manager of the structure, indicates the requirements the structure must meet, and those, (indicators) that impacts the needs of the suppliers of the structure that provides health care.

First and above all, a manager considers any structure, as a business unit. As a result, indicators that shows profitability, sustainability, cash flow ability and relevant financial aspects are of high importance. Trade cycle, meaning the Deadline for Collection of Claims - Deadline for Payment ≤ 0 , the Customer Retention Rate (CRR) equation, $CRR = [(CE - CN) / CS] \times 100$, where CE: number of customers at end of period, CN: customers during period, CS: customers at start of period, Average beds occupancy, where Beds occupancy means the Accountable hospitalization days / average number of beds used throughout the year, Average number of days of hospitalization per physician, Average cost per patient / Hospital spending per discharge, Average cost per patient / Hospital spending per discharge, Average income per day of hospitalization, in addition to Relative Stay Index - RSI and Standardized Day Surgery

Rate are some of the most important indicators for the efficiency of the structure. Tools for the manager in order to ensure that the right level of resources, are used to yield the maximum benefit of results/output.

Effectiveness is another aspect of equal importance that a manager must keep in mind and of high priority. Is defined as the degree of achieving desirable outcomes. Unplanned Readmissions and 30-day Mortality or Surgical room performance, which indicates the total time spent in the room / total number of scheduled hours of operation of the room. Last Patient Output Time - Scheduled Room Shutdown Time = Overtime, are some of the indicators for effectiveness of a structure. Mortality rates, among others, also reflects effectiveness of early diseases detection, proper diagnosis and appropriate treatment. Average Duration of Hospitalization / Average length of stay for curative days is another indicator because short duration is more economical but may not have the perfect therapeutic effects. Chronic patients might need to be transferred to another long-term care facility or to a home healthcare program. Cost of HAIs, Healthcare Associated Infections is one more indicator that combines economic cost and financial management but also have serious effect in mortality and morbidity of the patients. Mainly caused by resistance in antibiotics.

From another point of view, the Manager must hold the required qualifications, and have the competence, skills, and experience required for the role. Honest, trustworthy, reliable, and respectful and high commitment. From the Board to the Ward! A better clinically trained manager appears better management practices. Duty of Candour - "Legal representative" who will represent the structure against the law whenever necessary. A manager in the field of health care system must have a strong sense of duty, be honest, and trustworthy. Obedient to the laws and cooperative with the authorities.

On behalf of the requirements that must be met by the structure, this haw to be fully staffed with all specialties - adequacy of active specialties and fully equipped with state-of-the-art machinery. Provider must provide sufficient numbers of suitably qualified, competent, skilled and experienced staff. At the end of the day, it is individual doctors, not hospital executives, who make the key decisions about patient care. That is why, the link between hospital management practices and clinical outcomes, has remained a subject to be solved. The equipment must be safe, used in a safe manner, by properly trained and qualified personnel.

Providers must do everything reasonably practicable to make sure that people who use the service receive person-centered care and treatment that is appropriate, meets their needs and reflects their personal preferences, whatever they might be. Patient-Centeredness in a few words. Assessments of people's care and treatment needs, should include all their needs, including health, personal care, emotional, social, cultural, religious and spiritual needs. We have to keep in mind, that Survival and Mortality say little about... nausea, pain, sleep quality, body image, sexual function independence and time spent with loved ones. Imagine an Indian patient, that there is beef in his menu. Is defined as "providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions." On top of that, provider must have an effective and accessible system for identifying, receiving, handling, and responding to a complaint.

Of course, it could not be missed, the aspect of ISO and similar certifications. The implementation of a quality management system aims at: (a) Enhancing reputation by ensuring customer confidence, (b) improving the image and reliability of the service, (c) raising employees' awareness of quality management and quality service provision, (d) reducing production costs due to optimization of resource and time management, (e) continuous improvement of processes.

- iii) Political level, where are examined the indicators that presents the legal framework of a structure, the correct and essential decisions that must be taken by the ministries and finally, the indicators that refers to the proper way of financing the whole system through taxpayers, insurances, funds etc.

The legal framework of the political level must be consisted of evaluation systems, the establishment of Institutions / Committees e.g., Care Quality Commission, and conduction of annual patient experience surveys. These surveys must be met by hospitals and other providers in order to keep accreditation. In the case of institutions and committees, their role is: "i) Protect people who use regulated services from harm and the risk of harm, and to ensure they receive health and social care services of an appropriate standard, ii) Hold providers and managers to account for failures in how the service is provided" (CQC MARCH 2015).

Medical Patient File with shared access from all Structures, Linked Data, is another indicator, which have a conflict related to personal data, that is detailed analyzed in next chapter. The aim of this indicator is to improve cooperation between hospital and outpatient sector, in order to improve efficiency of healthcare through treatment of individual patients.

Diagnostic Related Groups (DRGs) is an indicator for checking resource allocation/remuneration system among hospitals, based on the specific characteristics of the services: Insertions - Diagnosis – Treatment. DRG also helps, among others, to compare costs and procedures between states, using different terminologies/procedures.

Even for the use of Blood Derivatives (Transfusions), must be an indicator in political level, in order of proper use. There must be a legal framework for the proper use of transfusions, as in addition to the incorrect use of treatment protocols, there is an extra cost which the health system is burdened. Limitation on the need for transfusion when hemoglobin drops below 7 g/dl is a good practice. Such protocols are going to affect the whole voluntary blood donation plan!

Indicators related to hospital spending, utilization and capacity and medical technology are some of which that influence the correct and essential decisions of the ministries and competent authorities in political level. Doctors, nurses, beds, discharges, MRI exams, all these per 1000 population gives crucial information to policy makers.

Health Risk Factors, through society, such as smoking, obesity, alcohol consumption, stress, environmental pollution, are the indicators that will help the policy makers to run campaigns and inform the general population, in order to have important outcomes in macroeconomic level, through prevention.

The Research and Development funding, the use of antibiotics as well as the use of Generic Medicine and Biosimilar, Spending in general on pharmaceuticals per capita, are serious financial aspects that demands a holistic decision of the policy makers. They account for a fifth of health spending and the third largest expenditure in the health budget, hospital consumption but also through pharmacies (OTC). To reduce pharmaceutical spending, this includes the uptake of biosimilar medicines (complex medicines that are clinically comparable to the branded product), the use of new generic medicines.

Financing through taxes, insurances, investments and funds in relation with spending which reflected in Health spending per capita, Health spending share (% gdp) are the economical aspect of the decision that policy makers must take.

These were only some typical and characteristic indicators that are presented in detail in chapter 11, table 4.

These three levels above, comes from **the PaRIS – OECD model**, which is chosen from the very beginning as the main, bedrock model on which the present framework is built.

Consequently, with the **Score column**, is examined, if a specific indicator is met or not and in what level. There are 3 main ways to check this, which are YES or NO situation, meaning if the indicator is met or not, Numeric, in which there is a specific number, indicating quantity, and a 1-5 scale, which most of times indicates a percentage or a scale of satisfaction, with number 1 indicating the worst version and 5 the best one. In some situations, perhaps it is needed a combination of the suggested ways above.

The next level that the indicators are distinguished, is accordingly **the 6 dimensions of the PAF**. In this situation, the indicators are examined about:

- a) the Safety of the structure and the feeling of safety of the patient,
- b) the Responsiveness of the services provided to the needs of the community, reflecting the equal accessibility for everyone to public health,
- c) the clinical efficacy, the correctness of clinical practices and achievement of core medical objectives
- d) the efficiency, the value for money relation that an indicator can transfuse as an added value to the structure,
- e) the staff orientation, concluding the training of the staff or the potentiality of self-evolution, and last but not least,
- f) the patient – centeredness in services, including the communication between the patient and the provider of health service, confidentiality, and dignity. It must be mentioned once more that the whole work and framework, has in its heart, as the fundamental aim, to give the proper information, in order, the health care system to become more patient centered.

The next column of the indicators list is **the Donabedian**. The indicators are examined about their ability to add value in a) Structures, meaning facilities, equipment, personnel, payment models, organization characteristics, b) Processes, meaning actions

in health care, not only the doctors' and scientific staff, but also including those of patients and their families, and c) Outcomes, effects/results on health status, quality of life, satisfaction experience and more.

The **3Es column**, which examines the quantity of indicators' Efficiency, Effectiveness, and Equity.

Finally, the last choice, in order to test the indicators of the present framework, is through the **Parasuraman column**. Accordingly, this model, is tested how much an indicator meets the core, the tangible, or the intangible benefits, of the health care.

4.3 Examples of types of Indicators

Additionally, to the presented framework of this work, will be shown some examples of Indicator frameworks, from Health Care System across the world. Starting with the vision of the Norwegian National Quality Indicator System (N.Q.I.S.) which is to visualize the quality in a health care sector under development.

The high-level goals for the system, according to the Norwegian N.Q.I.S. are to:

- “ Include all relevant sectors and disciplines.
- Present a balanced set of Indicators within all the dimensions of quality and for all services.
- Measure quality of services, fulfilment of patient's rights and practices in accordance with existing, guidelines, regulations, and laws
- Measure effects of the implementation of new policies and changes in practice
- Analyze the development, visualize results to the target groups, notify any negative trends and support continuous quality improvement.

The target groups and their indented use of the system are to:

- Give healthcare providers a basis and an incentive for local quality improvement.
- Provide the patients and users with qualified and quantified information to enable them to make sound choices.

- Give management and owners at all levels a sound basis for decision making.
- Give political leadership a sound basis for prioritization in the health care sector.
- Contribute to transparency and openness in the general public/society.”

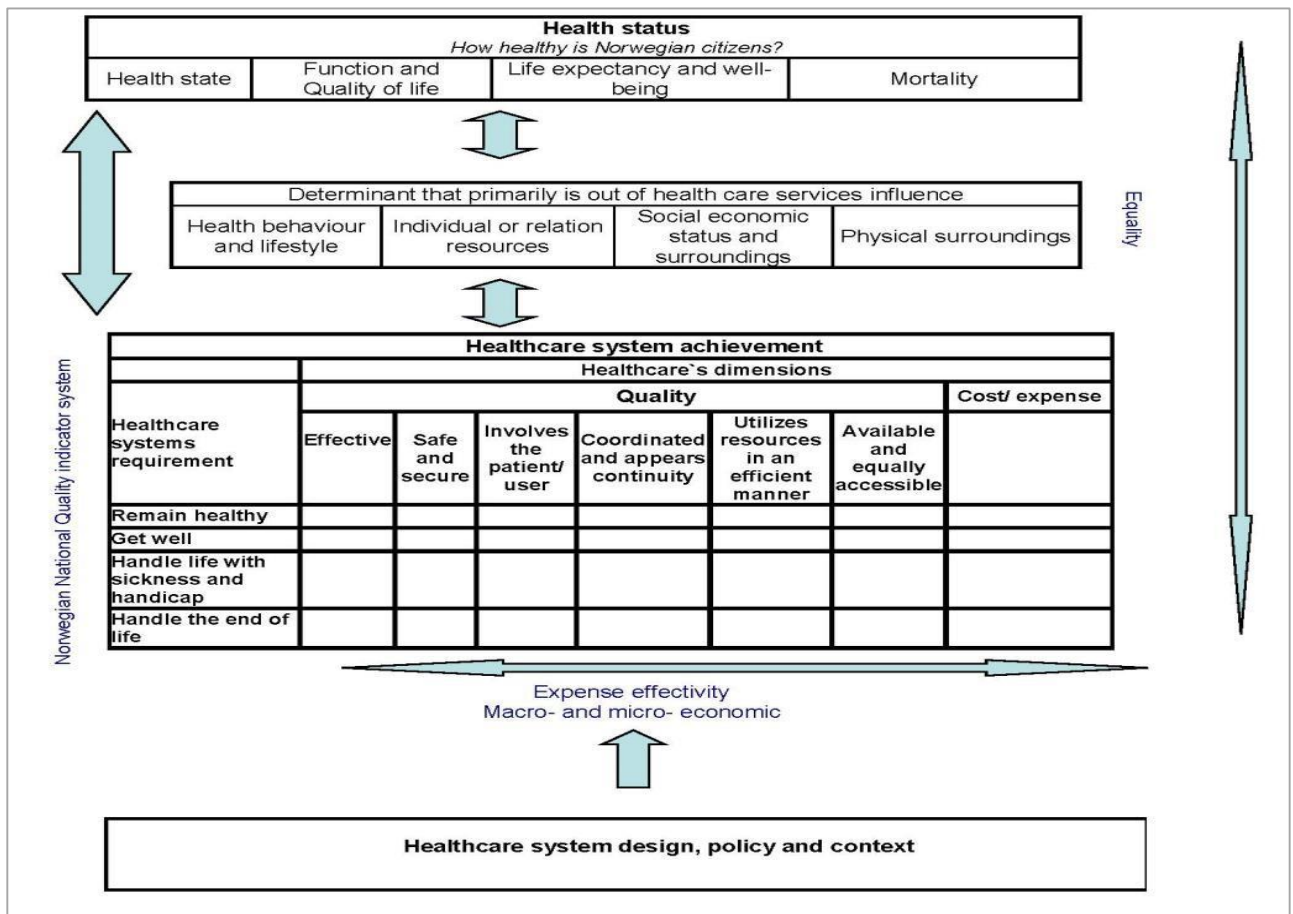
Dimensions considered.

The Norwegian National Strategy of Quality in Health Care Services characterizes health care services of good quality as:

- being effective.
- being safe and secure.
- involving the Patients/Users and secure their influence.
- being coordinated and “seam-less.”
- utilizing the resources in an efficient manner.
- being available and equally accessible.

The baseline for the Norwegian National Quality Indicator System, is services of good quality. These key elements must be used in the development of Quality Indicators considering the patients/users need for health care services for their whole life; stay healthy, get well, handle life with sickness and handicap, and handle the end of the life.

Fig.12: Concept model for Norwegian National Quality indicator system



Focus of the evaluation.

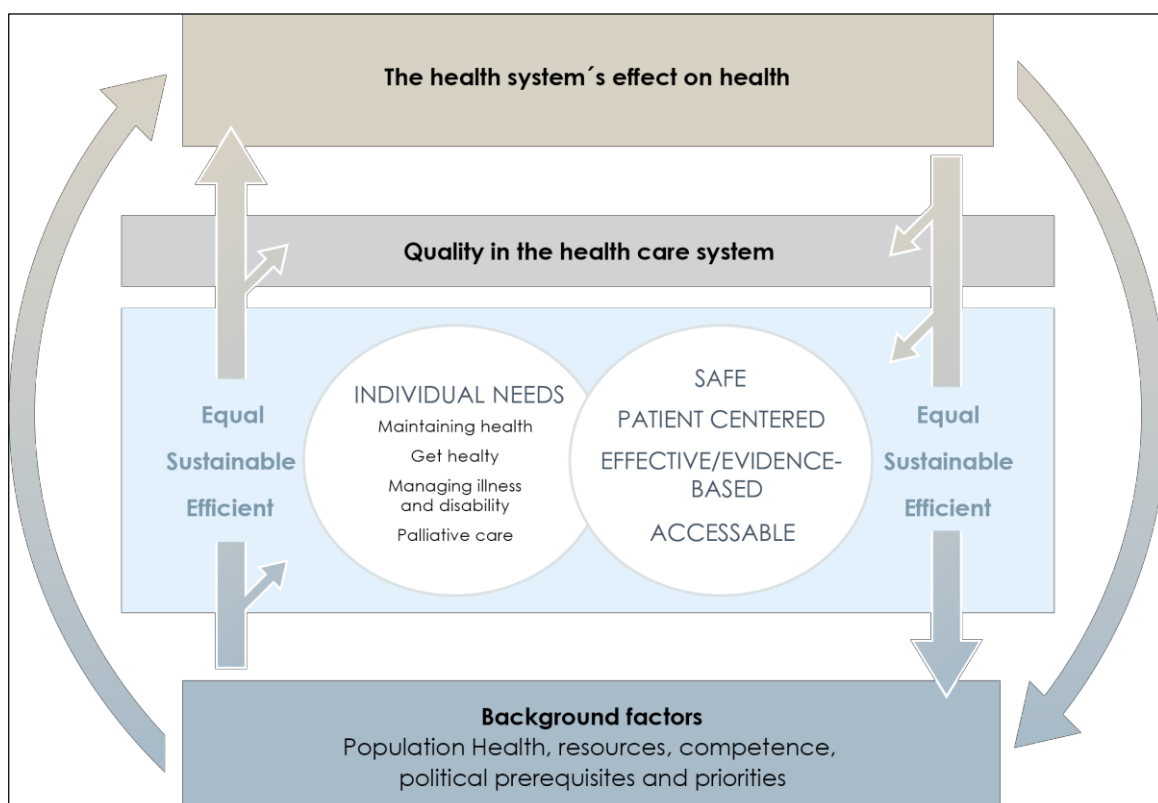
To achieve the desired effects of quality improvements, it is important that the outcomes can be evaluated and compared over time for the different health care providers i.e. hospitals, regions and countries. It is also crucial to be able to evaluate the complex correlations that provide good quality. The three types of quality indicators (according to OECD):

Structure indicators describe health care's framework and recourses. Examples are health personnel competence and the availability of medical devices, technological equipment and facilities. In other words, this type of indicators quantifies the framework for prevention, diagnostic, treatment, care and rehabilitation.

Process indicators describe concrete activity in patient treatment processes. This type of indicators is normally developed on the basis of clinical guidelines and best practices, and as such evaluates whether the patients have received the health services, they should follow current best practice.

Outcome indicators describe the patient's outcome in form of i.e., survival, symptoms, laboratory characteristic, physical conditions or ability to live with chronic disease, and include satisfaction with received treatment.

Fig. 13: Conceptual framework to evaluate quality in the Swedish system.



The WHO, in HEN 2003, “How can hospital performance be measured and monitored” tries to define “Performance” in relation to explicit goals reflecting the values of various stakeholders, such as professions, regulators, patients, insurers. The WHO, World Health Report 2000 (World Health Organization, The World Health Report 2000, Health Systems: improving performance, Geneva, 2000), sets out a framework for evaluating and improving performance of health systems in four key functions: financing, creating resources, providing services, and oversight.

Hospitals have many targets and many stakeholders; these may be seen as clusters of values and aims behind performance measurement (Øvretveit J. Quality Evaluation and Indicator Comparison in Health Care. International journal of health planning and management, 2001, 16,3:229-241.), in such areas as:

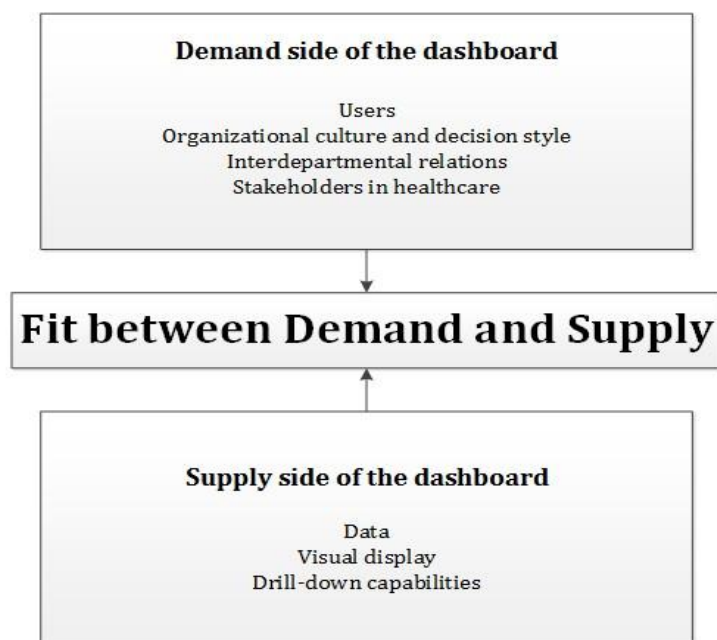
- *Research*: Data about structure, activities and effectiveness can be used to study the link between organization and performance, and to inform planning and system development.
- *Service improvement*: Purchasers and providers can compare performance within and among hospitals to stimulate and measure change.
- *Referrer and patient choice*: Patients and their referrers can use information such as waiting times, outcomes, and patient experiences in choosing a provider.
- *Resource management*: Purchasers and provider managers need data on performance, costs, and volume of activity in order to decide on the best use of resources.
- *Accountability*: Politicians and the public increasingly demand transparency, protection, and accountability for performance.

In 2003, a WHO Regional Office for Europe working group (*World Health Organization Regional Office for Europe. Measuring hospital performance to improve the quality of care in Europe: A need for clarifying concepts and defining the main dimensions. Report on a WHO Workshop in Barcelona, Spain, 10-11 January 2003. Copenhagen, World Health Organization, 2003.*) began to define performance measures for hospitals’ voluntary self-assessment and for external benchmarking in six domains: clinical effectiveness, patient centeredness, production efficiency, safety, staff development and responsive governance.

A similar point of view comes from *A. Georgeopoulos, 2017* with the Common Evaluation Framework (CEF) which consists of 9 criteria and 28 sub-criteria for evaluation. The 9 criteria focus on the organizational points to be considered in any strategic planning. Criteria 1–5 relate to the conditions of an organization/service, which determine the actions of the organization and how the programs/projects entrusted to it are managed in order to achieve the desired results. Criteria 6-9 refers to the results that a public organization have, related to the citizens-customers, human resource, society, and other stake holders.

On the other hand, Kaat de Pourcq, Paul Gemmel and Jeroen Trybou, with their “Measuring Performance in Hospitals...” tell us, that: “KPIs can be developed and monitored at different levels within a hospital, depending on the goal and needs of the specific user. Consequently, the level on which the dashboard should be implemented is determined by the selected KPIs”. Nonetheless, even if a dashboard focuses more on the operational and tactical level, it is important that it is administered employing the vision and of a hospital (*Dumas et al. 2013*). *Parida and Chattopadhyay (2007)* state that the strategic goals of an organization need to be broken down into objective targets for operating managers, which may act as performance drivers for this group. *Pauwels et al. (2009)* developed a conceptual framework to develop a dashboard that sustains this vision. They discuss the relationships among demand for dashboards, supply of dashboards and the implementation process in driving adoption and use of dashboard systems (see figure 14 below).

Fig. 14: The adjusted framework of Pauwels et al.



5. SIMULATED EXAMPLES

In order to explain in more detail, the purpose, and the use in the daily routine of any healthcare structure, of this multidimensional tool, we will present some case studies, from a primary health care structure as well as from a secondary one.

5.1 Primary health care structure case study.

We will start with a simple example, which will concern customer satisfaction, from the facilities of the primary health care provider's structure. We will therefore compare the answers from an internal satisfaction survey of 200 customers, from all kinds of building facilities, of the provider, how satisfied they are with the group's older facilities, with the new facilities and the renovated ones, but also with the Central Facility, which is the newest, the fully renovated and is considered the pinnacle.

So, from the framework that we have designed, we will choose those filters from the models, on which we want to focus, and depending on the kpi's that it will indicate to us, we will be acknowledged in a very easy, fast, and targeted way, where we will have to focus the resources and efforts in order to achieve the desired result and improve the general image of the structure.

From the PAF Dimensions we choose, the Patient Centered as a filter, since the opinion of the customers is the one that interests us. From the Donabedian we choose the Structure, since the structure as a building is the one controlled, by the Parasuraman we choose the Tangible, since what we want to check is material and tangible. So from the 3Es the remain choice is Equity. The specific selection of these filters, give us as a result, 3 KPIs, which as it was expected, are from the Individual level, a very reasonable result, such the opinion of the customers is what we investigate.

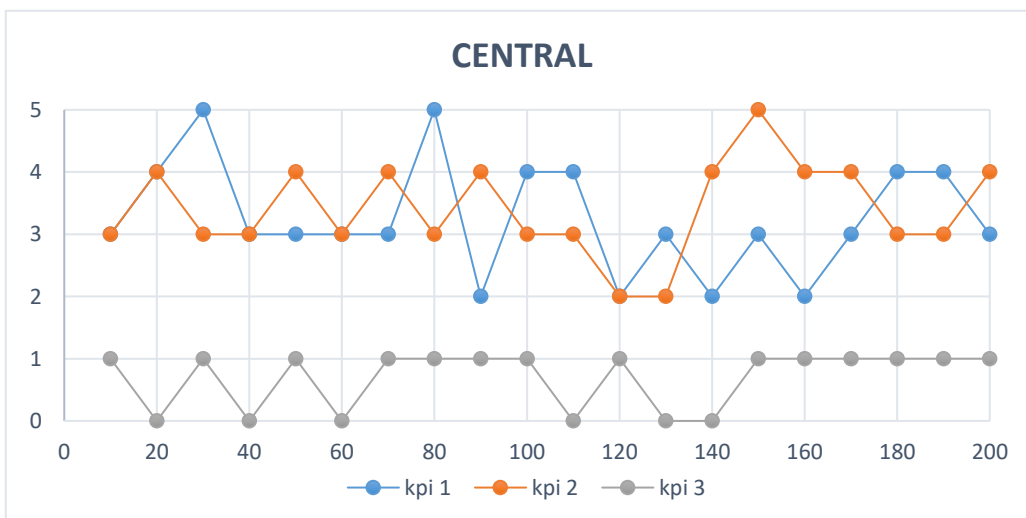
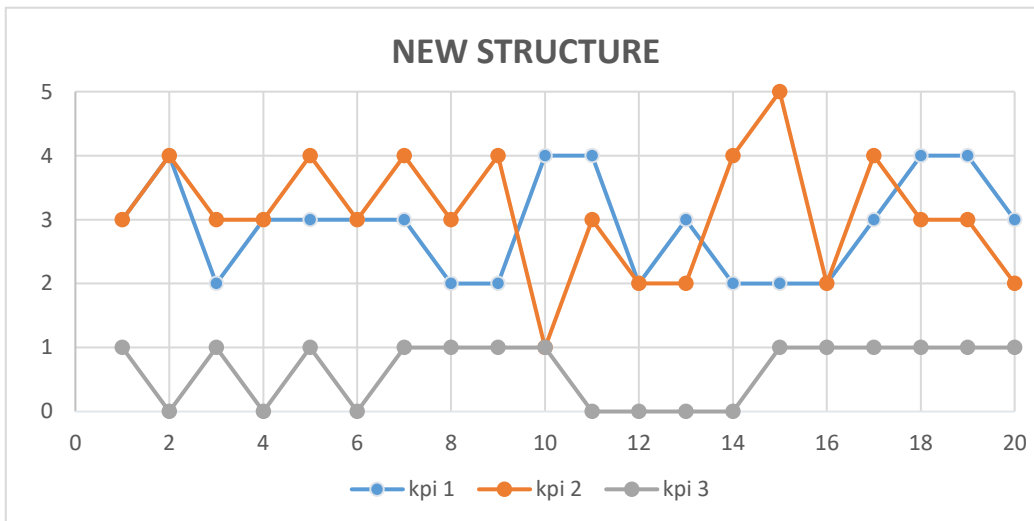
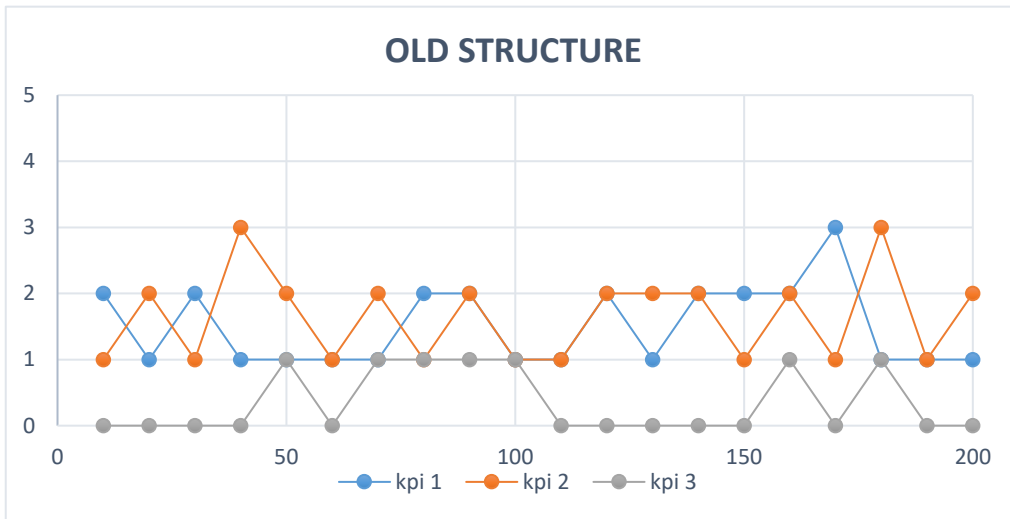
The 3 KPIs that came out as a result are:

Kpi 1) Beautiful Surroundings, scored from 1 (min) to 5 (max).

Kpi 2) Appearance (Size – Modernity – Comodity), scored from 1 (min) to 5 (max)

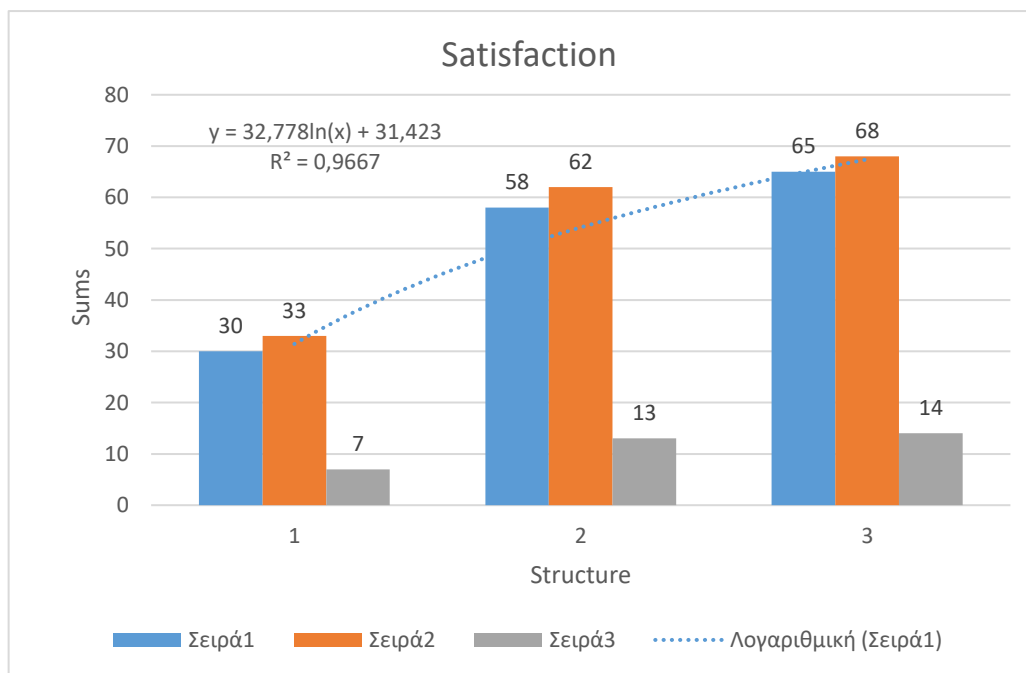
Kpi 3) If there is Parking Place. Scored 1- Existence, 0-NOT Existence

The results of this survey are represented in the following diagrams:



From the answers of the customers which are represented in the above diagrams, it is obvious the tendency of greater satisfaction from the new facilities instead of the old ones and certainly an important factor is the existence of parking area. It is impressive the constant view of the customers about the Central Facility compared to the new ones, as the degree of satisfaction is almost the same. This means that customers focus on their basic and fundamental needs to be served and not on the presence or not of works of art, modern sculptures and disintegrated chairs, elements which greatly differentiate the central unit from the new ones. All the previous observations are clearly represented in the diagram below.

	kpi1	kpi2	kpi3
old	30	33	7
new	58	62	13
central	65	68	14



1: Old Structure, 2: New Structure, 3: Central, and

Blue: KPI 1, Orange: KPI 2, Grey: KPI 3.

5.2 Secondary health care structure case study.

We continue with the analysis of a more complex case study by Secondary Health Care, in order to understand the usability of the framework. So, from our basic table, chapter 11, I want to focus on the KPIs that concern, simultaneously, in core benefits, that it refers purely to the medical process and that it has to do with the provision of health care, the effectiveness of these KPIs (efficacy) but also the economic impact they will have on the structure. All the aforementioned filters are the table below.

INDICATORS	PAF DIMENSIONS	DONABEDIAN	PARASURAMAN	3Es
Rapid Recovery - Effective *	Efficacy	Outcome	Core benefit	Effectiveness
Effective Nursing Project - Re-insertions	Clinical Efficacy	Outcome	Core benefit	Effectiveness
Customer Retention Rate (CRR)	Clinical Efficacy	Outcome	Core benefit	Effectiveness
Percentage of Postoperative Complications (e.g. Thromboembolism)	Clinical Efficacy	Outcome	Core benefit	Effectiveness
Rate of re-hospitalizations	Clinical Efficacy	Outcome	Core benefit	Effectiveness
Mortality Rates	Clinical Efficacy	Outcome	Core benefit	Effectiveness
30 day of ischaemic stroke Case fatality rates	Clinical Efficacy	Outcome	Core benefit	Effectiveness
30 day AMI case fatality rate	Clinical Efficacy	Outcome	Core benefit	Effectiveness
Breast cancer 5 year net survival	Clinical Efficacy	Outcome	Core benefit	Effectiveness
Colon & Rectal cancer 5 year net survival	Clinical Efficacy	Outcome	Core benefit	Effectiveness
Lung - Stomach cancer 5 year net survival	Clinical Efficacy	Outcome	Core benefit	Effectiveness
HIP & Knee score*	Clinical Efficacy	Outcome	Core benefit	Effectiveness
Minimising the patient's stay time in the hospital	Clinical Efficacy	Outcome	Core benefit	Effectiveness
Hospital discharges per 1000 population	Clinical Efficacy	Outcome	Core benefit	Effectiveness

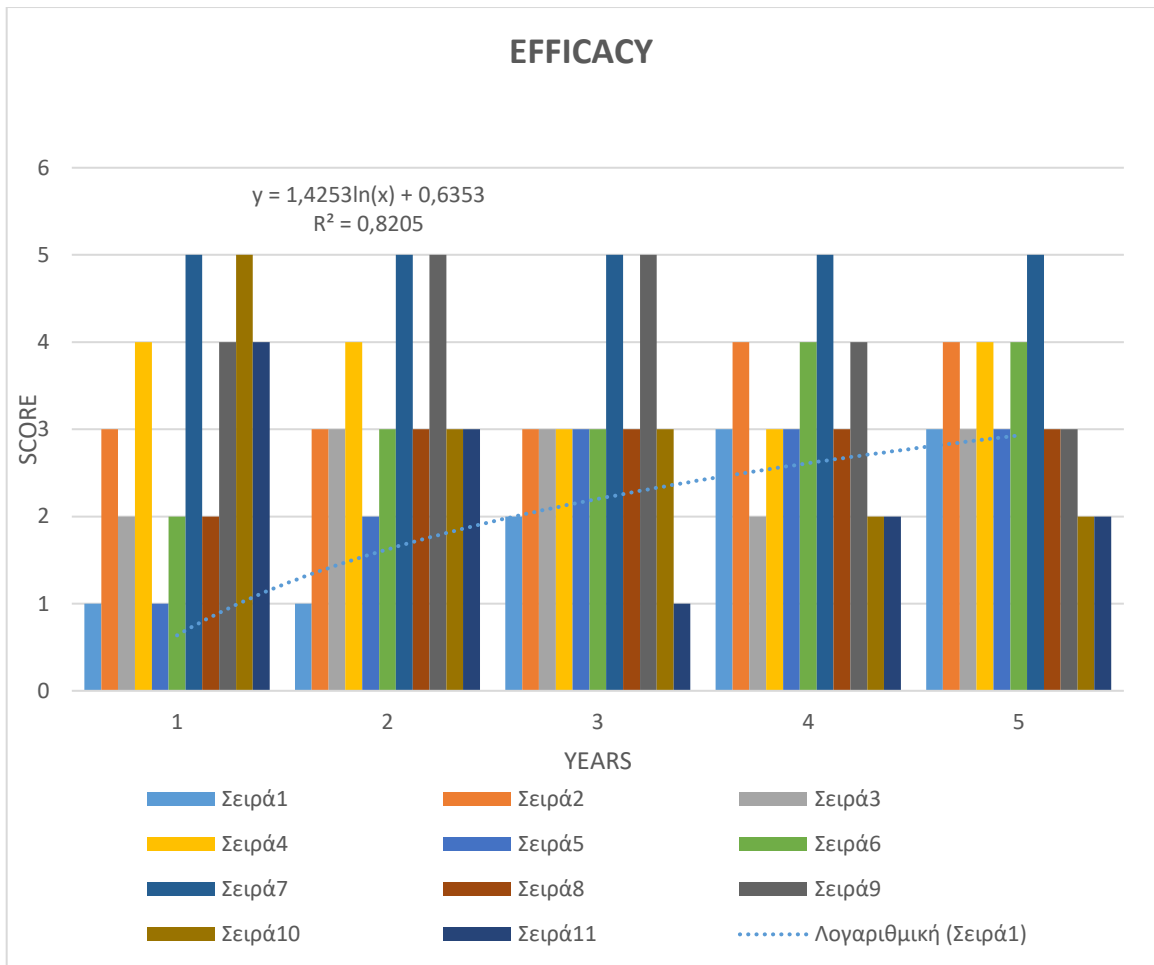
Insertions with first diagnosis of Diabetes at the age of 15/ Diabetes admissions	Clinical Efficacy	Outcome	Core benefit	Effectiveness
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As we see, the above choices have an impact on individual level, organizational and political level at the same time. Now, we can explore which factors affect the individual parts of a structure's management and eventually we can conduct more targeted research.

Analyzing the results of the survey, we get the scores of each KPI in the last 5 years, in order to create the following table:

	1st year	2nd year	3rd year	4th year	5th year
kpi 1	1	1	2	3	3
kpi 2	3	3	3	4	4
kpi 3	2	3	3	2	3
kpi 4	4	4	3	3	4
kpi 5	1	2	3	3	3
kpi 6	2	3	3	4	4
kpi 7	5	5	5	5	5
kpi 8	2	3	3	3	3
kpi 9	4	5	5	4	3
kpi 10	5	3	3	2	2
kpi 11	4	3	1	2	2

The scores that have been derived from the individual analysis of the data for each kpi separately, we convert them into a grading scale from 1 (minimum)– 5 (maximum). The results of the common scale for all KPIs are depicted in the diagram below. The improvement trend is evident within 5 years, but there are plenty of observations and conclusions that we can draw from the following diagram, both for the overall picture of the efficacy of the structure, as well as the individual contribution of each KPI, to the overall picture.



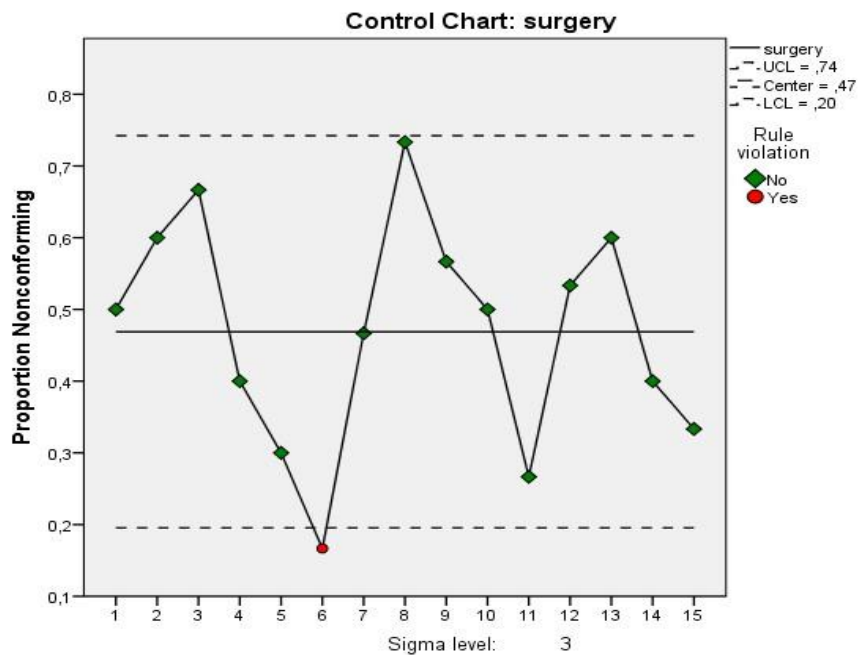
Conversely, we can choose a single Kpi, and analyze its contribution to the individual models, and by what amount it affects the general functioning of the structure. We will take as case study, the KPI from line 72 of our table. «Surgical Room Performance». The table below shows the number of surgeries performed in the previous 15 days. We assume that the capacity of this particular hospital, is 30 surgeries per day. First we will check whether the variability of the number of surgeries performed in one day is consistent with the common random variability.

DAY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
SURGERIES	15	18	20	12	9	5	14	22	17	15	8	16	18	12	10

Using IBM SPSS, from Analyze menu we select Quality Control and Control Charts. From the dialog box that appears we select p, np and in the Data Organization box we select Cases are subgroups. We select Define and in the dialog box that appears, we transfer the variable "surgery" to the Number Nonconforming position, and we declare

the value 30 in the Constant position of the Sample Size box (every day 30 surgeries are performed). We select Control Rules and in the window that appears we select the “all control rules” option. We choose Continue and OK.

The np control diagram is presented below. The central value (average number of surgeries per day) equals 14.07 surgeries, the lower control threshold (LCL) equals 5.87 while the upper control limits (LUL) equal 22.27. Reading the diagram, we observe that there is a conflict in the variability of the performed surgeries as the point corresponding to the 6th day, which is below the lower limit.



After checking the variability of the performed surgeries per day, we can delve into the factors that affect the functioning of the structure and in which way. At the level of efficiency and outcome, it is obvious that the full capacity of the operating rooms of the structure, have a direct impact on the revenues and by extension on the financial situation of the structure.

6. CONCLUSIONS

As it is described in previous chapters, this evaluation framework includes 151 KPIs, broken down and controlled by 6 key evaluation models. Additionally, to the obvious score column, which checks whether and to what extent the structure meets the criterion, the remaining 5 ones (ParIS, 6 PAF, 3Es, Parasuraman, Donabedian) thoroughly monitor all aspects of the functioning of structures which deliver health service.

This framework enables the stakeholders of the structures and the actors involved in the health system to use it as a 2-way tool. Both, from the point of view of KPIs, where efforts should be focused to improve each indicator, as well as on behalf of model's point of view, where we have to decide with which KPIs it is needed to be more concerned in order to get the desired result.

For instance, in order to improve the following indicators, 30-day of ischaemic stroke Case fatality rates, 30-day AMI case fatality rate, Breast cancer 5-year net survival, Colon & Rectal cancer 5 year net survival, Lung - Stomach cancer 5-year net survival, who aim to promote preventive/diagnostic checks, in addition to the emphasis to be placed by the manager at organizational level, should also must, in terms of PAF to improve the "Clinical Efficiency", from Donabedian's point of view, to improve the "Outcome", at the level of "Core Benefits" on the part of Parasuraman and "Effectiveness" in terms of 3Es.

Similarly, we can identify specific KPIs that we need to work with in order to get the desired result in terms of criteria. These criteria can be one of each evaluation model, or up to a combination of all 5 models developed in the framework.

For example, if we want to control the outcome accordingly to the Donabedian model, we should focus on improving the corresponding KPIs that affect this factor, such as, Offers - Inexpensively packages, Experienced access barrier because of cost in the past, Results in time for quick diagnosis, Rapid Recovery – Effective, Ability to get same/next day appointment when sick, Wait 2 months or more for specialist appointment, Waiting time for next appointment - surgery / Wait 4 months or more for selective surgery, Reliable - Good Reputation - Company Culture, Women's decision in the recovery way from Breast cancer, and Home Care at Individual level, or Good reputation in the medical world / Recommend it, Cover of non-Medical Needs , Effective Nursing Project - Re-instructions at The Organizational level, or Suicide rates after hospital diagnosis for

mental ill individuals, Control and improvement of TTS, Instructions with first diagnosis of Diabetes at the age of 15/ Diabetes admissions, Healthy Life Years, Cost of HAIs at the Political level.

Similarly, we can check the indicators combining the models, on the basis of the desired results, and accordingly to focus on the respective KPIs. For example, for a structure is wanted to be improved: Safety by PAF, Process by Donabedian, Intangible by Parasuraman and Effectiveness by the 3Es model. The only indicator that we should definitely focus on is, on individual level, "Duration of Visit"! On a different situation, the desired effect we want to have an impact on: Patient Centered by PAF model, Structure by Donabedian, Tangible by Parasuraman and Equity by 3Es model. So, the KPIs that we for sure is needed to be improved, are: Beautiful Surrounds, Appearance, and size of structure - Comfortable, Modern, Parking - Garage at the Individual level.

In this way, we have a combination of 151 KPIs, which we can control by 6 division, per each subcategory of each model. Thus, every Customer/Patient, or Health Service Structure Manager, or the one who makes political decisions about the functioning of the health system, has a plethora of options, in tool form, and depending on where he wants to focus on, can make the appropriate decisions.

7. SUGGESTIONS

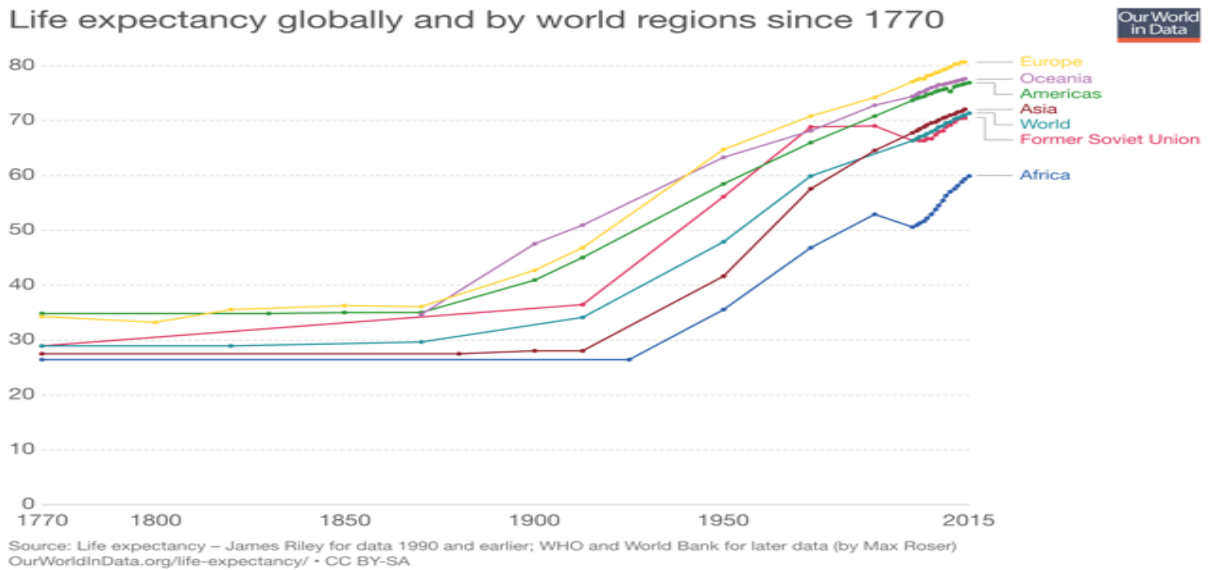
As it is mentioned in the introduction, and at *J.Oderkirk et al./Health Policy 112 2013*, there is a controversial issue about **the use of personal health data of the patients**, in order to improve the Health Service through the use of frameworks, which combines breaches of confidential personal information. Laws and policies enabling data sharing and data linkage are needed to strengthen national information infrastructure. To develop international studies comparing health care quality and health system performance, actions are needed to address heterogeneity in data protection practices.

As *Jillian Oderkirk, Elettra Ronchi and Niek Klazinga describes in "International comparisons of health system performance among OECD countries: Opportunities and data privacy protection challenges", Health Policy, 2013*, "The most common sources of health data are registries, administrative data, population surveys, patient surveys and clinical records. Second, it relies on the capacity to follow individual patients across the care continuum and through different health and health care events to measure change. Following patients through different events often requires the linkage of patient records across datasets. These data can then be used to reduce unsafe practices, to improve guidance to clinicians on the most appropriate care and to make good decisions about the wise use of health care resources. Data linkages often depend on the sharing of data across authorities in custody of data and require the amalgamation of patient-level information from two or more distinct datasets. Both the sharing and the linkage of data place risks on the protection of the privacy of the persons whose data are involved". Many countries have made steps with legislations and practices for data privacy protection including project approval processes, data linkage, data sharing, data security and data access modalities through Strengthening Health Information Infrastructure for Health Care Quality Governance: Good Practices, New Opportunities and Data Privacy Protection Challenges.

Another big issue, we have to discuss, is the matter of **longevity** and its consequences. Taking as granted the fact, that if we use wisely the frameworks and the KPIs mentioned in this work, the result will be the phenomenon of longevity. So, we must bear in mind the consequences and effects of this phenomenon at financial level and the burden on the insurance system, pensions, unemployment and, in general, whether the social fabric is being disturbed through generations.

Nevertheless, as shown in the diagram below, we live in the "Healthiest" period in the history of mankind. Even countries with very low life expectancy have higher than

that of the countries with the highest life expectancy in 1800, while at that time, a 5-year-old child would not exceed 55 years, today this figure rises to 82!



In addition to the economic consequences of longevity in societies, which will be the result of faithful adherence to and implementation of frameworks and KPIs, the planet will also be affected environmentally, as resource extraction, raw material depletion and air pollution. So, what is the critical point, beyond which the consequences of healthy longevity will have a negative impact on humanity, either health (the emergence of new viruses and diseases, as a result of contamination/pollution of the environment, but also from the consumption of technical-mutated foods, the creation of resistant strains of existing viruses and bacteria) or economically, as it will not be sustained?

Further research must therefore be carried out to find ways to ensure that the threshold of this critical point moves in parallel and in line with the growth of the world's healthy population and at the same time fuels global healthy longevity.

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9. Acronyms:

HSPA: Health System Performance Assessment

KPIs: Key Performance Indicators

OECD: Organization for Economic Cooperation and Development

NHS: National Health System

QoL: Quality of Life

PaRIS: Patient Reported Indicator Surveys

PIMAR: Planning – Implementation – Measuring – Analyzing – Readjusting

PDSA: Plan – Do – Study – Act

EHR: Electronic Health Record

HAIs: Healthcare Associated Infections

CRR: Customer Related Groups

DRGs: Diagnostic Related Rate

RSI: Relative Stay Index

R&D: Research and Development

SHC: Secondary Health Care

PHC: Primary Health Care

10.

APPENDIX:

1. *Table 1*

Summary of the six countries: demographic characteristics and health performance frameworks.

	Australia	Canada	Denmark	England	The Netherlands	United States
Estimated population (rank)	22,262,501 (55)	34,568,211 (37)	5,556,452 (11)	53,900,000 (22)	16,807,037 (64)	316,668,567 (3)
Life expectancy at birth: overall years (rank)	82 (10)	82 (13)	79 (48)	80 (30)	81 (21)	79 (51)
Infant mortality: deaths per 1000 live births (rank)	.49 (190)	4.78 (182)	4.14 (197)	4.5 (189)	3.69 (205)	5.9 (174)
GDP(\$US) (rank)	986.7 billion (19)	1.513 trillion (14)	213.6 billion (55)	2.375 trillion (9)	718.6 billion (24)	15.94 trillion (2)
GDP per capita (\$US) (rank)	42,400 (94)	43,400 (142)	38,300 (32)	37,500 (34)	42,900 (23)	50,700 (14)
Healthcare expenditure (%GDP) (rank)	8.7 (2010) (48)	11.3 (15)	11.4 (14)	9.6 (32)	11.9 (7)	17.9 (2)

	Australia	Canada	Denmark	England	The Netherlands	United States
Type of health system	Universal coverage— Medicare Voluntary private insurance available	Publicly funded— Medicare provides universal coverage for all hospital and out-of-pocket physician services expenses out-of-pocket expenses dental, optometry and pharmaceuticals Voluntary private insurance available	Publicly funded— dental, NHS optometry and pharmaceuticals insurance available	Publicly funded— Voluntary private insurance available	Universal coverage ensured – mix of public and private insurance	Public and private majority private insurance
Health system performance frameworks	PAF and ROGS provide key conceptual principles	Framework is conceptualised across four dimensions: (1) health status, (2) non-medical determinants of	No framework as yet	NHS Outcomes Framework CCG Indicator QOF	Overarching framework to meet four needs: (1) staying healthy, (2) getting better, (3) living independently with a chronic illness across	Two locally reported Commonwealth Fund – no set framework reports health

	Australia	Canada	Denmark	England	The Netherlands	United States
		health, (3) health system performance and (4) community and health system characteristics			and (4) end-of-life care dimensions (see below)	Hospital Compare – no framework reports on seven dimensions (see below)
Dimensions/domains reported	PAF – safety, effectiveness, appropriateness, quality, access, efficiency, equity, competence, capability, continuity, responsiveness, sustainability and ROGS effectiveness, appropriateness,	Eight domains: (a) acceptability, (b) accessibility, (c) appropriateness, (d) competence, (e) continuity, (f)effectiveness, (g)efficiency and (h) safety	Under development	NHS Outcomes – five domains: premature death, quality of life, recovery, positive experience and care/safety CCG – adds to healthcare the overarching NHS Outcomes QAO Framework – four domains – clinical,	Three overarching themes: (1) quality of care, (2) access to care and (3) avoidable hospital use and health outcomes	The Commonwealth Fund – four domains: access, prevention and treatment, costs and potentially avoidable hospital use and health outcomes Hospital Compare – seven dimensions – general

	Australia	Canada	Denmark	England	The Netherlands	United States
	quality, access, efficiency, equity			organisational, patient care experiences and additional services		information, timely and effective care, readmissions, complications and death, use of medical imaging, survey of patients' experiences, Medicare payment and number of Medicare patients
Framework purpose	ROGS, PAF: To determine (1) - to support the health of improved local- Canadians and (2) level how well the performance health system assessment performs and - to support a operates on the safe, high-quality principles of Australian health providing report		N/A	NHS Outcomes Framework and CCG Outcomes Indicator Set: - to provide a national-level overview of how well the NHS is performing	Used to compare healthcare system performance in other years and countries, with policy and procedure and where possible between healthcare providers	Commonwealth Fund: uses comparative data to assess the performance of their healthcare systems, establishes priorities for

Australia	Canada	Denmark	England	The Netherlands	United States
system, through that is secure, that improved transparency and accountability	that is secure, that respects Canadians' privacy and is also consistent, relevant, flexible, integrated, user-friendly and accessible		<ul style="list-style-type: none"> - to provide an accountability mechanism between the Secretary of State for Health and the NHS Commissioning Board for the effective spend of some £95 billion of public money - to act as a catalyst for driving up quality throughout the NHS by encouraging a change in culture and behaviour <p>QOF is not about</p>		<p>improvement and sets achievement targets</p> <p>Hospital Compare: to help stimulate and support improvements in the quality of care delivered by Medicare hospitals, with the intention of improving hospitals' quality of care through the distribution of objective, easy to understand data on hospital performance and quality information</p>

	Australia	Canada	Denmark	England	The Netherlands	United States
				performance management perspective, but incentivising and rewarding good practice		from consumer perspectives
Data sources	Multiple data sources as identified in the data plan 2-13-2016 Australian Institute of Health and Welfare national data holdings National Partnership Agreement Data submissions Australian	Statistics Canada CIHI Canadian Hospital Reporting Project	Clinical Quality Development Programme (RKKP), individual registries and databases, Sundhed.dk	Health and Social Care Information Centre; College of Physicians	Dutch Royal Databank College of Physicians	Main sources of data include Centre for Medicare and Medicaid, The Joint Commission, Hospital Centers for Disease Control and Prevention and other Medicare data and data from within Hospital Referral Regions

Australia **Canada** **Denmark** **England** **The Netherlands** **United States**
Bureau of
Statistics data
Other collections

DBH: District Health Boards; GDP: gross domestic product; NA: Nott applicabel; NHS: National Health Service; QAO; Quality and Outcomes; PAF: Performance and Accountability Framework; PHO: Primary Health Organisations; ROGS: Report on Government Services; QOF: Quality and Outcomes Framework; CCG: Clinical Commissioning Group; QOI: Quality Outcome Indicator; QSM: quality and safety marker; CIHI: Canadian Institute for Health Information.

2. **Table 2**

Domains of performance indicators by country.

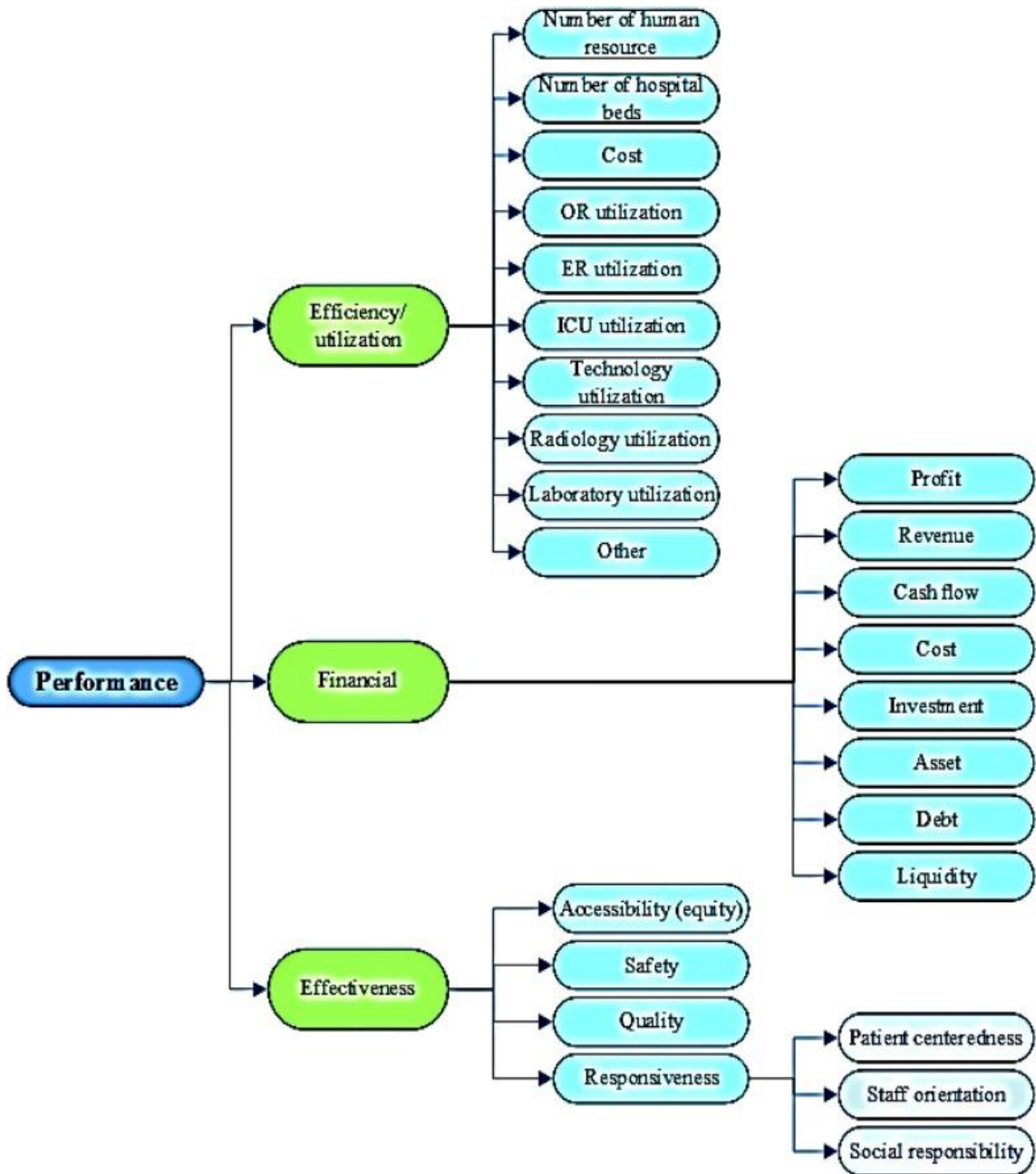
	Australia– PAF	England NHS Outcomes Framework	Canada– Health Framework	Canadian Indicator	The Netherland dimensions of healthcare performance	United States– Agency for Healthcare Research and Quality	OECD
Effectiveness	X	X	X		X	X	X
Access	X		X		X		X
Safety	X	X	X		X	X	X
Efficient	X		X				X
Quality	X				X		
Appropriateness	X		X				

	Australia– PAF	England NHS Outcomes Framework	Canada– Health Framework	Canadian Indicator	The Netherlands dimensions of healthcare performance	United States– Agency for Healthcare Research and Quality	OECD
Outcomes of care/health improvement		Three domains relate to outcomes					
Patient centred/experience		X				X	X
Cost					X		X
Equity	X						X
Responsiveness	X				X		X
Competence/ capability	X		X				

	Australia– PAF	England NHS Outcomes Framework	Canada– Health Framework	Canadian Indicator	The Netherlands dimensions of healthcare performance	United States– Agency for Healthcare Research and Quality	OECD
Continuity	X		X				
Timely						X	
Acceptability			X				
Sustainability	X						
Avoidable hospital use							

PAF: Performance and Accountability Framework; NHS: National Health Service; OECD: Organisation for Economic Co-operation and Development.

3 Final generated model of public hospitals performance evaluation



11. KPIs FRAMEWORK

	LEVEL	INDICATORS	PAF DIMENSIONS	DONABEDIAN	PARASURAMAN	3Es	SCORE
*At the INDIVIDUAL level we control the needs of:							
(i) the patient - guest - relative	INDIVIDUAL	All in one step: Prescription - Examination - Opinion	Responsiveness	Process	Core benefit	Equity	1-5
		Offers - Inexpensively packages	Patient Centered	Outcome	Tangible	Efficiency	1-5
		Alternative ways of pay off, friendly to the customer	Patient Centered	Process	Tangible	Equity	1-5
		Experienced access barrier because of cost in the past	Responsiveness	Outcome	Intangible	Equity	YES-NO (1-0)
		Cleanliness	Safety	Structure	Tangible	Equity	1-5
		Beautiful Surroundings	Patient Centered	Structure	Tangible	Equity	1-5
		Appearance and size of structure - Comfortable, Modern	Patient Centered	Structure	Tangible	Equity	1-5
		Parking - Garage	Patient Centered	Structure	Tangible	Equity	YES-NO
		Results in time for quick diagnosis.	Efficacy	Outcome	Core benefit	Effectiveness	1-5
		Rapid Recovery - Effective *	Efficacy	Outcome	Core benefit	Effectiveness	1-5

Accessibility	Responsiveness	Structure	Intangible	Equity	1-5
Minimal pain	Efficacy	Process	Core benefit	Effectiveness	1-5
Polite Staff - Immediacy - Intimacy	Patient Centered	Process	Intangible	Equity	1-5
Highly Trained Personnel (Blood Donors, Machine Operators)	Staff orientation	Structure	Core benefit	Effectiveness	1-5
Waiting time	Patient Centered	Process	Intangible	Efficiency	Numeric (min)
Able to get same/next day appointment when sick	Patient Centered	Outcome	Intangible	Equity	1-5
Easy communication for next appointment	Patient Centered	Process	Intangible	Equity	1-5
Waited 2 months or more for specialist appointment	Responsiveness	Outcome	Core benefit	Equity	less-more
Waiting time for next appointment - surgery* / Waited 4 months or more for elective surgery	Responsiveness	Outcome	Core benefit	Effectiveness	less-more
Extended opening hours	Responsiveness	Structure	Intangible	Equity	YES-NO
Sense of security	Safety	Structure	Intangible	Equity	1-5
Comprehensible instructions from the doctor	Patient Centered	Process	Intangible	Effectiveness	1-5
Reliable - Good Reputation - Company Culture	Patient Centered	Outcome	Intangible	Equity	1-5
Participation of the patient's opinion in the treatment. Personalized therapy	Patient Centered	Process	Core benefit	Effectiveness	1-5

ii) the doctor	High quality of service	Responsiveness	Process	Intangible	Effectiveness	1-5
	Fulfilment of all needs	Clinical Efficacy	Structure	Core benefit	Effectiveness	1-5
	Women's decision in the recovery way from Breast cancer*	Patient Centered	Outcome	Core benefit	Equity	YES-NO
	Out of hour service - Urgent care	Responsiveness	Structure	Core benefit	Effectiveness	YES-NO
	Duration of visit - Capable	Safety	Process	Intangible	Effectiveness	1-5
	Home Care	Responsiveness	Outcome	Core benefit	Equity	YES-NO
	Online Services - Digital - CRM *	Responsiveness	Structure	Tangible	Equity	YES-NO
	Fully equipped with suitable equipment in the best possible facilities	Staff orientation	Structure	Tangible	Effectiveness	1-5
	Gain awareness/advertising through structure	Staff orientation	Structure	Intangible	Efficiency	1-5
	Health professional did not review patient's prescription in past years	Staff orientation	Process	Intangible	Effectiveness	YES-NO
	Rate of absenteeism	Staff orientation	Structure	Intangible	Equity	NUMERIC
	Rate of resignations	Staff orientation	Structure	Intangible	Equity	NUMERIC
	Number of specialization courses	Staff orientation	Structure	Intangible	Equity	NUMERIC
	Higher involvement of the physicians, in operational decision making and in managerial decisions	Efficiency	Process	Intangible	Efficiency	1-5
High wages accordingly with the worker's qualifications	Safety	Structure	Tangible	Efficiency	1-5	

iii) scientific and administrative staff		Be in a thriving phase	Safety	Structure	Tangible	Efficiency	1-5
		Percentage of needle injuries	Safety	Process	Tangible	Equity	NUMERIC
		Performance Bonus	Efficiency	Structure	Tangible	Efficiency	YES-NO
		Percentage of staff retained in a financial year	Responsiveness	Structure	Tangible	Equity	NUMERIC
		Level of commitment to the organization's management	Responsiveness	Structure	Intangible	Effectiveness	1-5
		Appropriate working environment	Safety	Structure	Tangible	Effectiveness	1-5
* At the ORGANIZATIONAL level we control:	ORGANIZATIONAL						
i) what the Structure Manager wants		Profitable - Sustainable *	Efficiency	Outcome	Tangible	Efficiency	1-5 & NUMERIC
		Duty of Candour - "Legal representative" who will represent the structure against the law whenever necessary.	Patient Centered	Structure	Intangible	Equity	1-5
		The Manager must hold the required qualifications, and have the competence, skills, experience required for the role.	Staff orientation	Structure	Core benefit	Equity	1-5
		Good reputation in the medical world / Recommend it	Clinical Efficacy	Outcome	Intangible	Efficiency	1-5
		Comparative advantage over competition with unique tests / pioneering interventions	Clinical Efficacy	Structure	Core benefit	Effectiveness	1-5

Have good cooperation with all insurance institutions, private or public	Efficiency	Process	Intangible	Efficiency	1-5
Cover of non-Medical Needs.	Responsiveness	Outcome	Tangible	Efficiency	YES-NO
Effective Nursing Project - Re-insertions	Clinical Efficacy	Outcome	Core benefit	Effectiveness	NUMERIC
Lost - expired products	Safety	Structure	Tangible	Efficiency	1-5
% of material missing at the start of an operation	Clinical Efficacy	Structure	Core benefit	Effectiveness	NUMERIC
Compensation Control	Efficiency	Structure	Tangible	Efficiency	YES-NO
Medical Tourism	Efficiency	Structure	Intangible	Efficiency	YES-NO
Trade Cycle *	Efficiency	Structure	Tangible	Efficiency	NUMERIC
DRGs	Clinical Efficacy	Process	Core benefit	Effectiveness	YES-NO
EFFICIENCY	Efficiency	Structure	Tangible	Efficiency	1-5
EFFECTIVENESS	Clinical Efficacy	Process	Core benefit	Effectiveness	1-5
EQUITY	Patient Centered	Outcome	Intangible	Equity	1-5

Customer Retention Rate (CRR)	Clinical Efficacy	Outcome	Core benefit	Effectiveness	NUMERIC
Average bed occupancy	Efficiency	Structure	Tangible	Efficiency	NUMERIC
Average number of days of hospitalization per physician	Efficiency	Outcome	Tangible	Efficiency	NUMERIC
Average cost per patient / Hospital spending per discharge	Efficiency	Outcome	Tangible	Efficiency	NUMERIC
Average daily cost of hospitalization	Efficiency	Outcome	Tangible	Efficiency	NUMERIC
Average income per day of hospitalization	Efficiency	Outcome	Tangible	Efficiency	NUMERIC
Surgical room performance	Efficiency	Outcome	Tangible	Efficiency	NUMERIC
Financial result per day of hospitalization	Efficiency	Outcome	Tangible	Efficiency	NUMERIC
Proper Consumption of Medicinal Products	Safety	Structure	Tangible	Effectiveness	YES-NO
Percentage of Postoperative Complications (e.g Thromboembolism)	Clinical Efficacy	Outcome	Core benefit	Effectiveness	NUMERIC
Rate of re-hospitalizations	Clinical Efficacy	Outcome	Core benefit	Effectiveness	NUMERIC

	Mortality Rates	Clinical Efficacy	Outcome	Core benefit	Effectiveness	NUMERIC
	30-day of ischemic stroke Case fatality rates	Clinical Efficacy	Outcome	Core benefit	Effectiveness	NUMERIC
	30-day AMI case fatality rate	Clinical Efficacy	Outcome	Core benefit	Effectiveness	NUMERIC
	Breast cancer 5-year net survival	Clinical Efficacy	Outcome	Core benefit	Effectiveness	NUMERIC
	Colon & Rectal cancer 5-year net survival	Clinical Efficacy	Outcome	Core benefit	Effectiveness	NUMERIC
	Lung - Stomach cancer 5-year net survival	Clinical Efficacy	Outcome	Core benefit	Effectiveness	NUMERIC
	HIP & Knee score*	Clinical Efficacy	Outcome	Core benefit	Effectiveness	NUMERIC
	Average Duration of Hospitalization / Average length of stay for curative days	Efficiency	Outcome	Tangible	Efficiency	NUMERIC
	Estates cost per square metre	Efficiency	Outcome	Tangible	Efficiency	NUMERIC
	Cost of HAIs	Safety / Clinical Efficacy	Process	Core benefit	Efficiency	NUMERIC
ii) requirements to be met by the structure	Fully staffed with all specialties - adequacy of active specialties	Staff orientation	Structure	Core benefit	Effectiveness	1-5

	Fully equipped with state-of-the-art machinery	Staff orientation	Structure	Core benefit	Effectiveness	1-5
	Ensure Safe Treatment /Safe Environment - Rate of nosocomial infections - Rate of accidents - Rate of complications	Safety	Outcome	Core benefit	Effectiveness	1-5 & NUMERIC
	ISO - Certifications	Safety	Structure	Core benefit	Effectiveness	YES-NO
	Providers must do everything reasonably practicable to make sure that people who use the service receive person-centered care and treatment that <u>is appropriate, meets their needs and reflects their personal preferences,</u> whatever they might be. Patient-Centeredness	Responsiveness	Process	Intangible	Equity	1-5
	Nutritional coverage, of all needs during patient's hospitalization	Patient Centered	Process	Tangible	Equity	1-5
	To have back up plan, in case of emergency situations, such as fires, floods, earthquakes etc...	Safety	Structure	Intangible	Equity	YES-NO

		How the provider reacts to a complaint.	Patient Centered	Process	Intangible	Equity	1-5
		Possibility of taking on heavy incidents	Staff orientation	Structure	Core benefit	Effectiveness	YES-NO
		ICU - ER Infrastructure	Clinical Efficacy	Structure	Core benefit	Effectiveness	1-5
		Quality Hotel Services	Responsiveness	Structure	Tangible	Efficiency	1-5
iii) suppliers		Trustworthy partner with suppliers	Patient Centered	Structure	Intangible	Equity	YES-NO
		Coordinating Bodies: Provider with insurance	Efficiency	Structure	Intangible	Efficiency	YES-NO
		Control of Pharmaceutical Expenditures	Efficiency	Structure	Tangible	Efficiency	YES-NO
* At POLITICAL level we control:	POLITICAL						
i) the legal framework		Evaluation System	Responsiveness	Structure	Intangible	Equity	YES-NO
		Conduct annual patient experience surveys	Responsiveness	Process	Intangible	Equity	YES-NO
		Drafting and Maintenance of Therapeutic Protocols	Clinical Efficacy	Process	Intangible	Equity	YES-NO
		DRGs => Σ.A.N. *	Efficiency	Structure	Intangible	Efficiency	YES-NO

	Minimising the patient's stay time in the hospital	Clinical Efficacy	Outcome	Core benefit	Effectiveness	1-5
	Establishment of Institutions / Committees e.g Care Quality Commission	Safety	Structure	Intangible	Equity	YES-NO
	Medical Patient File with shared access from all Structures	Patient Centered	Outcome	Core benefit	Effectiveness	YES-NO
	Use of Blood Derivatives (Transfusions)	Clinical Efficacy	Process	Core benefit	Effectiveness	NUMERIC
	Infant Mortality	Responsiveness	Outcome	Core benefit	Effectiveness	NUMERIC
	Doctors per 1000 population	Responsiveness	Structure	Core benefit	Equity	NUMERIC
	Nurses per 1000 population	Responsiveness	Structure	Core benefit	Equity	NUMERIC
	Beds per 1000 population	Responsiveness	Structure	Core benefit	Equity	NUMERIC
ii) the correct and essential decisions of the ministries and competent authorities						

	Hospital discharges per 1000 population	Clinical Efficacy	Outcome	Core benefit	Effectiveness	NUMERIC
	Percentage of population over age 65	Responsiveness	Outcome	Intangible	Equity	NUMERIC
	Proper Geographical Distribution of Structures	Responsiveness	Structure	Core benefit	Equity	1-5
	Correct Geographical Distribution of Specialties	Responsiveness	Structure	Core benefit	Equity	1-5
	Number of Emergency Transits from one structure to another	Clinical Efficacy	Process	Core benefit	Effectiveness	NUMERIC
	Investing in medical equipment* / Proper placement in the population	Staff orientation	Structure	Tangible	Effectiveness	1-5
	Trend in Deaths from ischemic heart disease per 100,000 pop	Responsiveness	Outcome	Core benefit	Effectiveness	NUMERIC
	MRI machines per million population	Responsiveness	Structure	Core benefit	Equity	NUMERIC
	MRI exams per 1000 population	Efficiency	Process	Core benefit	Efficiency	NUMERIC
	Control of the number of students in the Universities of Medicine / Nursing	Responsiveness	Structure	Intangible	Equity	YES-NO
	Minimize the time needed for Specialty - Practice	Responsiveness	Structure	Intangible	Equity	YES-NO
	Legislation for Home Nurses / Homecare	Responsiveness	Structure	Core benefit	Equity	YES-NO
	Salaries of Doctors - Nurses	Responsiveness	Structure	Tangible	Efficiency	1-5
	Upgrade the role of a Family Physician	Clinical Efficacy	Process	Core benefit	Effectiveness	YES-NO

	Provision for an ageing population / Change in pension system	Responsiveness	Outcome	Intangible	Efficiency	1-5 & YES-NO
	Promotion of Preventive Medicine / Number of follow up appointments and recall appointments attended each year	Responsiveness / Efficiency	Process	Core benefit	Efficiency / Equity	NUMERIC
	Numbering and Calculation of visits per physician* / Average annual number of physician visits per capita	Efficiency	Structure	Tangible	Efficiency	NUMERIC
	Measures to strengthen informal care (From relatives and friends), Caregivers.	Responsiveness	Outcome	Intangible	Equity	YES-NO
	Strengthening the LTC workforce/exclusive nurses	Staff orientation	Structure	Core benefit	Effectiveness	1-5
	Vaccinations - Disease Prevention* / Vaccination coverage	Responsiveness	Process	Core benefit	Equity	NUMERIC
	Campaigns against health-harmful habits	Patient Centered	Outcome	Intangible	Equity	1-5
	Percentage of adults who report being daily smokers	Patient Centered	Outcome	Intangible	Equity	NUMERIC
	Obesity (BMI>30) prevalence	Patient Centered	Outcome	Intangible	Equity	NUMERIC
	Campaigns for Prevention / rapid diagnosis of fatal diseases - cancers	Responsiveness	Outcome	Intangible	Equity	1-5

		Admissions for asthma / 100,000 pop aged +15	Clinical Efficacy	Process	Core benefit	Efficiency	NUMERIC
		Suicide rates after hospital discharge for mental ill individuals*	Safety	Outcome	Core benefit	Equity	NUMERIC
		Improving the quality of services provided to mentally ill people	Responsiveness	Process	Core benefit	Effectiveness	1-5
		Control and improvement of TTS	Responsiveness	Outcome	Intangible	Effectiveness	1-5
		Quick and Correct Incident Sorting - Quick Transition to Structure - Directly Diagnosis - Treatment	Staff orientation	Process	Core benefit	Effectiveness	1-5
		Insertions with first diagnosis of Diabetes at the age of 15/ Diabetes admissions	Clinical Efficacy	Outcome	Core benefit	Effectiveness	NUMERIC
		Prescription Control	Patient Centered	Process	Intangible	Efficiency	YES-NO
		Percentage of Caesarean Sections	Clinical Efficacy	Process	Core benefit	Efficiency	NUMERIC
		Spending on pharmaceuticals per capita	Efficiency	Process	Tangible	Efficiency	NUMERIC

	Use of antibiotics	Efficiency	Process	Core benefit	Effectiveness	NUMERIC
	Use of Generic Medicine and Biosimilar.	Efficiency	Process	Core benefit	Effectiveness	YES-NO
	Healthy Life Years	Safety	Outcome	Intangible	Equity	NUMERIC
	Percentage of daily operations, ODC	Efficiency	Process	Core benefit	Efficiency	NUMERIC
	R&D funding	Responsiveness	Structure	Core benefit	Efficiency	1-5
	Cost of HAIs	Efficiency	Outcome	Tangible	Efficiency	NUMERIC
	Fundings	Efficiency	Structure	Tangible	Efficiency	NUMERIC
	Health Spending per Capita	Efficiency	Structure	Tangible	Efficiency	NUMERIC
	Health Spending share (% of GDP)	Efficiency	Structure	Tangible	Efficiency	NUMERIC
	Out of pocket health care spending per capita	Efficiency	Structure	Tangible	Efficiency	NUMERIC
Prices of services provided VS Frequency of use	Efficiency	Structure	Tangible	Efficiency	NUMERIC	
iii) financing through taxpayers, insurance, funds...						