

Proposal of a multidimensional strategic-management dashboard for use in a rehabilitation respiratory unit

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Abstract

Health information systems are the core support to decision-making in health organizations. Economic and clinical managements often function separately, while a governance system for quality and safety functions with quality checks and performance accountability, could improve efficiency. The aims of this study were, within a respiratory rehabilitation unit (RRU), to: develop a management-strategy dashboard based on key performance areas (KPAs), identify key performance indicators (KPIs) for each KPA which allow multidimensional assessment; estimate the expected results from the implementation of this dashboard using the balanced score card (BSC) method.

In December 2017, a working group was set up at the RRU to develop the dashboard by selecting criteria for KPA and determining the KPIs with their rationale, weight, calculation method, measurements, supply system, target values, and working rules.

After 3 meetings, 6 KPAs and 12 KPIs for the financial area, 3 KPAs and 15 KPIs for internal processes, 6 KPAs and 8 KPIs for innovation and growth, and 4 KPAs and 5 KPIs for the Clients' Perspective were approved. A strategic map showing the cause/effect relations between the different KPAs was drawn.

A BSC-based quality measurement integrating economic and clinical management dimensions is possible also in an RRU. The proposed dashboard can improve communication, strategy, information dissemination, information communication technology management, budget negotiations, organizational quality, and accountability to stakeholders.

Abbreviations: BSC = balanced score card, HIs = health indicators, HISs = health information systems, KPAs = key performance areas, KPIs = key performance indicators, MV = mechanical ventilation, NIV = noninvasive ventilation, RRU = respiratory rehabilitation unit.

Keywords: decision-making support, health budget, health information systems, quality

1. Introduction

Health information systems (HISs) are the core support to decision-making in health organizations. Within a HIS, health indicators (HIs) reflect, numerically, events measured in the health-illness continuum.^[1,2] An integrated HIS is intended to standardize, integrate, and organize all the information available in the HIS through an accessible and secure repository, and to efficiently distribute this information for decision-making.^[1]

Analytical monitoring is an important issue for health units^[2] but, unfortunately, healthcare staff often attach too much importance to cost control and other easily measurable economic

activities, while forgetting clinical, customer-, and staff-climate measurable indicators. Published reports show that current applications of quality monitoring tend not to show the health of patients as central in the development of balanced scores, since the balance is tilted toward the financial not the health outcomes.^[3–5] Organizations are discovering how the traditional structure limits a hospital's ability to achieve sustainable improvements in clinical and service quality^[5] initiating to completely redesign their organizations to create systems that are patient centered and customer responsive.^[5]

At the same time, local health service organizations, such as health authorities, health maintenance organizations, hospitals, and healthcare trusts, have difficulty in obtaining evidence from economic appraisals.^[6]

Healthcare companies have many proposed goals deriving from high interaction with stakeholders and their requirements. This might lead to misalignment of goals with difficult top-down communication with their employees, particularly when they are organized according to traditional hierarchical organizational models based on rigid vertical division of functions and departments, discouraging creation of social networks and management of complexity.^[1,7]

Public spending on healthcare is one of the largest items of government expenditure: population ageing, rapidly rising health-care consumption, and high-cost medical technology are putting upward pressure on healthcare budgets.^[8] In the European Union, the average total government expenditure on health in 2015 was 7.2% of gross domestic product; in Italy, 7.1%.^[9]

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A governance and management system for quality and safety functions (similar to that operating in a finance system) with quality performance documented/reported and performance accountability from bench to bedside could be an ideal solution to ensure quality and efficiency.

Managed care organizations, in a highly competitive environment, constantly face the pressure of improving their financial performance.^[10] At the same time, customers of the organization expect the organization to deliver high-quality outcomes and improve customer service.^[10] Payers expect the organization to develop innovative new products to meet their needs.^[10]

In this direction, the balance score card (BSC) method^[3,10–17] represents an instrument aimed at ensuring organicity of the planning function through methods that guarantee maximum awareness of those involved in formulating the objectives. The logic behind the BSC system is that the performance of a company cannot be adequately represented by 1 single indicator or type of indicator.^[10,12–14,18]

The BSC application to the management of healthcare organizations can provide information on how healthcare personnel and patients perceive an organization, what its financial situation is, what to do to improve the level of services, and what we need to do if we want to be the best.^[15]

In recent years, the Italian National Health Policy^[8,19–21] has focused its attention on the need for cost containment, with incentives/recommendations to reduce both the number of admissions to acute care hospitals and inappropriate admissions to rehabilitation hospitals, giving priority to chronic care models, and the needs of caregivers who care for patients with disabilities.

To survive in the increasingly competitive marketplace, health system needs to adopt new tools that measure the value of all initiatives, both financial and nonfinancial, so that they can make informed decisions about their missions and future direction.^[22] In this context, pulmonary rehabilitation is a well-established and recognized way to enhance standard therapy to alleviate symptoms and optimize functional independence in patients with respiratory diseases.^[23]

However, to our knowledge, there are no reports in the literature on the routine use or a proposal of a dashboard built with BSC methodology to use in a respiratory unit, in particular in a respiratory rehabilitation unit (RRU), to support decision-making in HIS.

The aims of the present study were:

1. to develop, for use in an RRU, a strategic management dashboard based on key performance areas (KPAs);
2. to formulate a set of markers, or key performance indicators (KPIs), for each KPA that meet the need for a multidimensional perspective;
3. to describe the personnel involved in implementing a strategic control model based on this dashboard according to the BSC methodology; and
4. to describe the expected results with implementation of this dashboard.

2. Methods

2.1. Working environment contexts

The Maugeri Clinical and Scientific Institutes (ICS Maugeri) represent a network of 19 scientific centers and institutions spread throughout Italy catering for the hospitalization,

outpatient care, and intensive rehabilitation of patients with neuromotor, cardiac, and respiratory diseases/disabilities. Overall, the ICS Maugeri has about 3600 employees, including medical and nonmedical management personnel, physiotherapists, nursing, and technical staff; added to this are 650 doctors and researchers who work in the clinical centers of ICS Maugeri which has approximately 2300 accredited beds. The ICS Maugeri Respiratory Rehabilitation Division of Lumezzane (Brescia, Italy) is one of the network hospitals and has been operating in the local area since 2004.

2.2. Methodologies and tools

In December 2017, a working group within our RRU composed of 6 doctors, a professional nurse coordinator, and a physiotherapist coordinator, with audit activities regarding the project was set up. Mean age of the team was 49.75 ± 6.34 years, while the mean time of employment was 21.12 ± 4.73 . The working team expertise was based on several years of clinical and scientific activities on respiratory rehabilitation, weaning from mechanical ventilation (MV), chronicity, noninvasive ventilation (NIV), long-term care, neuromuscular diseases, telemonitoring, tele-rehabilitation, home care and caregivers' burden, and palliative care.

2.3. Work methods

The working group: accepted the invitation to develop the project and the “reasons” for the creation of a dashboard; performed a preliminary research on scientific knowledge for this topic; formally constituted the team responsible for the project; analyzed the perspectives useful for understanding and interpreting the performance of our RRU. Following this, a situational analysis of the main environmental forces that affect the organization (what the organization should do), the points of strength and weakness within the organization (what the organization can do), and the basic values of the organization expressed in the mission and in the vision.

The BSC methodology^[11–13,18] proposed in this context used a reading of output (or performance) of the respiratory unit using a balanced set of diverse types of indicators which are polarized with respect to the following different perspectives: financial results, clients' perspective, internal processes, and growth and development.

This choice was considered the better one to read the success of unit's strategy. In detail, Table 1 shows the step-by-step operational activity of the working group.

Being quality internal audit activities aimed at improving the organization as a support to the structure in identifying and disseminating best practices, literature research, retrospective data, and consensus methodology have been used and ethical approval was not necessary.

3. Results

The working group participated in 3 “focus group” meetings held over a period of 20 days. During the 1st meeting and under the supervision of the Unit Chief, the group carried out a situational analysis using the National Plan AGENAS Outcomes platform.^[24]

Table 2 shows the work context of the RRU's activity during the year 2017.

Table 1
Step-by-step operational activity of the working group.

Operational activities

- Identified items by which to measure the RRU's success (client satisfaction, development image, innovation, outcomes efficiency, quality, proactivity, clear goals, resource allocation, coordination learning, motivation, knowledge)
- Formulated an action strategy for the RRU to pursue in the medium-long term
- Evaluated the personnel involved
- Reformulated the mission of the RRU focusing on the four main dimensions of the BSC model
- Defined the "logical" architecture of the dashboard
- Evaluated the selection criteria for the different KPAs
- Proposed which and how many KPAs to select, that is, on "what unit cannot fail"
- Defined the reference values and standards to compare the identified indicators
- Identified the strategic actions, programs, and projects in which the strategic objectives related to each KPA were realized
- Proposed a strategic map showing the cause/effect relations between the different KPAs
- Validated the proposed quality pathway

KPAs = key performance areas, KPIs = key performance indicators, RRU = respiratory rehabilitation unit.

The working group then proceeded to identify, based on its experience and literature reports, the specific characteristics that correspond to the goals of the RRU, proposing a preliminary draft of KPA and KPI priorities with specific "cut-off" values for measurement. During the 2nd meeting and using a Delphi-like procedure, participants were asked to evaluate the importance of the preliminary KPA and KPI items on a 5-point Likert scale (0 = absolutely not important; 1 = not important, 2 = unimportant, 3 = important, 4 = very important). Consensus was obtained when over 75% of the focus group participants evaluated each KPA and KPI as mandatory to include in the dashboard because "important" or "very important." The working group then received feedback from the coordinator (MV) on the results of the 1st step. During the 3rd meeting, the group shared, compared, confirmed, or modified the items or scores proposed, adding any elements (that were not in the initial list) deemed necessary to include in the main set that were not in the initial list. In particular, the focus group rediscussed some ways to measure individual items. After discussion, a preliminary conclusion was reached. The final consensus was obtained when more than 75% of the respondents rated the items as in the totally acceptable areas. The final version of the dashboard items was, finally, approved.

Figure 1 shows a summary of the tools used (KPIs) for each macroarea.

Tables 1–4 of the repository present the KPAs identified and the indicators (KPIs) associated with each KPA. Six KPAs and

12 KPIs were proposed for the financial area (admissions weight, activity, consumption optimization), 3 KPAs and 15 KPIs for internal processes (efficiency, outcomes, scientific production), 6 KPAs and 8 KPIs for innovation and growth (training, skills, satisfaction, reputation), and 4 KPAs and 5 KPIs for the clients' perspective (performances, appropriateness, satisfaction).

For each KPI, the working group defined the actions required, the rationale, the weight given to each KPA, the calculation mode, the unit of measurement, the feeding system for information (computerized or manual), the owner (who is responsible for data collection), the required target for improvement, the measurement frequency, and the working rules (Tables 1–4).

Table 5 of the Repository lists the KPIs excluded from the audit because they did not reach the minimum level of consensus or were considered not relevant to our department or to our rehabilitation mission.

Some of the KPIs were well-known assessment scales gathered from the literature,^[24–30] while for 8 KPIs, the working group proposed tools built ad hoc within the RRU or ICS Maugeri (for details see repository). Tables 3–5 show the cause/effect relations between the different KPIs in the RRU care path, that emerged from the audit. Inside the 4 KPAs, audit team summarized main specific topics of performance improvement for each specific KPA (Fig. 1, Tables 3–5).

4. Discussion

To our knowledge, this is the 1st study to propose, for a respiratory rehabilitation division, a method for measuring its quality according to the BSC model defining and communicating strategy with goals, actions and resources required to achieve them.

A highly regulatory system, together with increased insurance costs and ever-increasing financial constraints, has forced both policy makers and healthcare providers to strengthen "clinical governance," focusing on risk management and appropriateness to balance cost-effective interventions with the need to maintain a high standard of service and long-term financial sustainability.^[11]

Unfortunately, few employees know the company strategies are incentivized to achieve strategy goals and spend time to discuss corporate strategies with low "alignment" between human resource priorities and strategies.^[11]

Currently, many organizations have a myriad of initiatives under way, for example, total quality management, time-based

Table 2
Work context of the RRUs during the year 2017.

Patients admitted from home, %	65
Patients admitted from acute hospitals, %	35
Patients admitted from distant Italian Regions, %	17
Patients with prolonged weaning needs, %	5
Patients with chronic respiratory insufficiency, %	60
Patients under noninvasive ventilation, %	45
ALS patients admitted to the ward, n	30
Days of relief/palliative care provided to "end-stage" patients, n	30
Days of inpatient activities (hospital stay), n	10,000
Outpatient activities, n	9000
ALS patients followed as outpatients, n	55
Polysomnographic activity, n	450
Patients followed under telemedicine service, n	70

ALS = amyotrophic lateral sclerosis; RRU = respiratory rehabilitation unit.

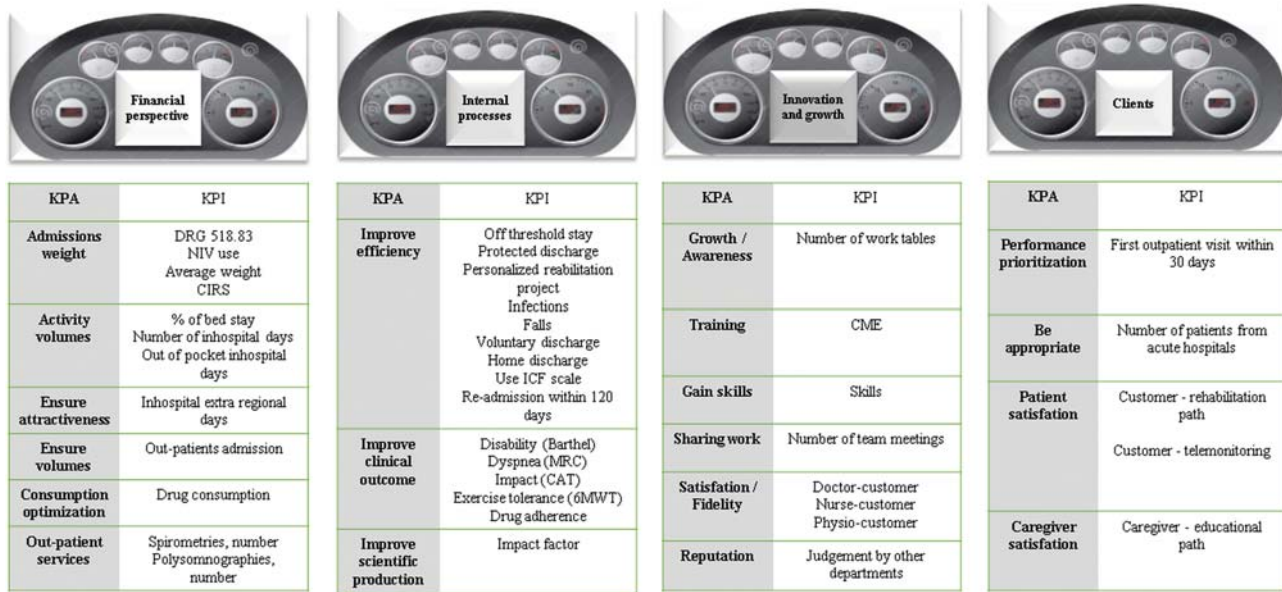


Figure 1. Summary of the tools used (KPA and KPI) for each macroarea. CAT= COPD assessment test, CIRS = cumulative illness rating scale (25), CME= continuous medical education, DRG=diagnosis related group, ICF=International classification of functionality, KPAs = key performance areas, KPIs = key performance indicators, MRC=medical research council, 6MWT=6 minutes walking distance, NIV=noninvasive ventilation.

competition, employee empowerment, and reengineering. Unfortunately, these initiatives are frequently not linked to achieve targeted improvement for strategic objectives. Thus, the efforts are managed independently, sponsored by different champions, and compete with each other scarce resources, including the scarcest resource of all, senior management time and attention.^[31]

The key elements to address in management structures and processes to achieve quality goals in health field are: to create a framework within which the activities performed are organized and reported; to identify care areas where quality is lacking or underdeveloped; to ensure that quality measures are reported and that there is accountability for them; to create a consolidated quality statement similar to a financial statement; to ensure the integrity of the data used; and to measure and report quality and safety performance.^[32] The idea of a redefinition of “value” in healthcare has been the leitmotif of our study through the proposal of a “multidimensional dashboard.” A recent article by Porter^[33] underlined that the current organizational structure and healthcare information systems make it difficult to assess (and deliver) “value” in healthcare. Suppliers tend to measure only what they directly control for a particular intervention, and what is easily measurable, rather than what matters for determining the overall value. For these reasons, our RRU wanted to challenge itself on the words “strategy” and “value in healthcare.”

Hospital variations explain large variance within a single payer’s network: this fact is a source of inefficiency, threatening the quality of healthcare, and financial sustainability.^[34] For these reasons, an integrated information system could be vital to plan, manage, evaluate, and therefore provide managers with a tool for strategic and tactical decision-making.^[1,2] In the search for a common tool of strategic control that could allow a systematic multidimensional approach, the BSC methodology was chosen as an adequate instrument for this purpose able to offer a common language between healthcare and administration.

Starting from 1992, the proposed BSC model has experienced a “universal” expansion.^[11] It has demonstrated excellent flexibility in the industrial, commercial, and service companies, public administration and the different structures that comprise it and in nonprofit-oriented organizations (health organizations, universities, associations, etc).^[11–13,18,35,36] The BSC is therefore used as an obligatory reference point for its managerial processes to align individual behaviors toward the priorities defined at the strategic level, and to support the process of formulation and critical review of the strategies.^[11–13,18,35,36]

In this direction, our audit proposed as 1st step to identify KPAs, that are areas essential for the implementation of the company strategy. In a nutshell, the KPAs indicated “what I must not do wrong.” The next step was to formulate the KPIs, or key indicators used to measure performance in the KPAs to verify the ability of the organization to gain results in the key areas. As 2nd step was to choose the “actions” or “strategic initiatives” that the organization or department has deemed appropriate to undertake in the KPAs.^[11–13,18,35,36]

The KPAs have been “linked” together in a logic of “cause-effect” relationships with the other KPAs. The proposed objectives lead to the realization of a unit “strategic map.” This strategic map offered the “mission” and “corporate vision” by which to develop the necessary indicators with respect to the different perspectives considered.^[11–13,16,35–37]

In the healthcare field, methodology to monitor synthetic indicators of overall preanalytical sample errors has been used as part of a BSC management system in laboratory units,^[38] while a balanced performance measurement system, linked to health targets, with a complementary budgeting process that supports pertinent resource allocation, has been implemented in Hong Kong’s public hospitals^[39] or in a university anesthesiology department where 19 KPI items were established in 4 perspectives.^[40]

Table 3
Relationships with key performance indicator client perspectives.

	CLIENTS PERSPECTIVES			
Clients perspectives	Patient satisfaction	Caregiver satisfaction	Appropriatness	Admission priority
Patient satisfaction		↔		→
Caregiver satisfaction				→
Appropriatness				↔
Internal process				
Scientific production				
Clinical outcomes	↔	↔	↔	
Efficiency in production			↔	↔
Innovation and growth				
Sharing work				
Skills	↔	↔	↔	
Satisfaction	↔	↔		
Training	↔	↔	↔	
Reputation	↔	↔	↔	
Growth/awareness				
Financial perspectives				
Attractiveness	↔	↔		
Admission complexity			↔	
Consumption optimisation				
Admission volumes				↔
Rehab outpatient volumes				
Outpatient volumes				

Legend : ↔ indicates interrelations hip; → ← indicates dependency

Thirty-nine municipalities in the Netherlands conducted a pilot study to develop and try out a methodology to compare the quality of their sewerage management. The participants chose a multidimensional benchmarking with an emphasis on the aim of improving the working processes. The benchmarking methodology was based both on analyzing data within a BSC system as well as on intensive exchange of knowledge and experience.^[41]

The Army Medical Department developed a comprehensive patient-centered enterprise-wide information management and information technology strategy to organize and link with BSC healthcare activities and activity leaders to portray patient care, administrative, business, financial, supply, and strategic support information systems.^[42]

An integrated system consisting of BSC, a “finite-elements” model and “interdisciplinary quality circles” have also been

Table 4

Relationships with key performance indicator internal process perspectives.

	INTERNAL PROCESS		
Internal process	Scientific production	Clinical outcomes	Efficiency in production
Scientific production		↔	↔
Clinical outcomes			←
Innovation and growth			
Sharing work	↔	↔	↔
Skills	↔	↔	↔
Satisfaction		↔	
Training		↔	↔
Reputation	↔	→	←
Growth/awareness			←
Finacial perspectives			
Attractiveness	↔	↔	
Admission complexity	↔	↔	
Consumption optimisation			↔
Admission volumes	↔		↔
Rehab outpatient volumes	↔		↔
Outpatient volumes	↔		↔

Legend : ↔ indicates interrelationship; → ← indicates dependency

proposed in preventive medicine institutions.^[43] In this study, we have proposed a new instrument which is able to show the mission (why our RRU exists), the values (what is important to us), the vision (what we want to be), the strategy (how we want to compete) inside a rehabilitative respiratory unit: all this can be translated, focused, and the steps aligned through the new dashboard.

Previous authors have discussed the pros and cons of the BSC approach that they observed during the 1st year of application and concluded with a list of lessons learned (e.g., start with measures that already exist). They are convinced that the BSC can be of great value to a department, even if the full implementation takes several years to complete.^[22]

4.1. Practical implications

Future step will be the real word validation of the new dashboard with the following expected processes: strong investment in information communication technology management model development with a “business intelligence” report able to manage the dashboard according to individual indicators or sets of indicators; long-term operationalization of continuous and updated reporting of data by information system able to effectively “increase” the card^[13,14,19]; important investment in time consuming for healthcare professionals education to the use of the new dashboard and its dissemination; Ongoing tuning to find KPAs and KPI consistent with the strategic view and periodical review of the whole framework.

Table 5

Relationships with key performance indicator innovation/growth and financial perspectives.

	INNOVATION AND GROWTH					
Innovation and growth	Sharing work	Skills	Satisfaction	Training	Reputation	Growth/ awareness
Sharing work		↔		↔		
Skills	↔			↔	↔	
Satisfaction	↔			↔	↔	
Training	↔	↔	↔		↔	
Reputation						
Financial perspectives	FINANCIAL PERSPECTIVES					
Financial perspectives	Attractiveness	Admission complexity	Consumption optimisation	Admission volumes	Rehab outpatient	Outpatient volumes
Attractiveness		↔		↔	↔	
Admission complexity		↔		↔	↔	
Consumption optimisation		↔				
Admission volumes		↔		↔	↔	
Rehab outpatient volumes		↔		↔	↔	
Outpatient volumes		↔		↔	↔	
Attractiveness				←	←	←
Admission complexity	↔					
Consumption optimisation						
Admission volumes	↔	↔				
Rehab outpatient volumes	↔	↔				
Outpatient volumes	↔	↔				

Legend : ↔ indicates interrelationship; → ← indicates dependency

After the definitive validation and routinary use of this new instrument, the following results are expected: implementation of a common language between the clinical and administrative spheres; better budget negotiation with the Department’s Top Direction; widespread dissemination of productive information and climate among staff.

As a final important implication, we expect that the use of BSC methodology will strengthen the evidence that our company is a “benefit” organization and that, as such, it does not exclusively emphasize the economic-financial profile. We are confident that receiving in “real-time,” its support for decision-making processes and using the strategic map of cause/effect relations linking all the different activities, our RRU will be able to

completely achieve its mission. It is important to note that the BSC will not be a panacea or “magic solution” that fixes everything. But, when designed appropriately, the BSC in healthcare can play a critical role in helping healthcare organizations fulfill their mission and deliver outstanding healthcare to their patients and communities in a rapidly changing world.^[16]

5. Conclusion

In conclusion, the present work has shown that it is theoretically feasible, also in a RRU, to propose a new quality measurement system (dashboard) based on the BSC methodology in which

“economic” and “clinical” (patient-centered and customer responsive) management dimensions work in an integrated way. The clarity of dashboard offering on where we start out from (strategy), where we want to go (vision) and how to get there (strategy) from could facilitate the communication of our “strategic map” to all the unit’s staff as well as to the company directors. Implementing this challenge, we will be able to focus the role of each member inside the organization respecting common goals and strategies.

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