

# HOW TO MONITOR THE PERFORMANCE OF INTERNAL PATIENT TRANSPORT: AN ITALIAN INSIGHT (ID: 63)

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**Abstract:** The internal patient transportation is a topic that has received little attention by healthcare managers. But although this represents a no-core activity, if efficiently managed, it could contribute to the improvement of the quality of healthcare service, increasing the satisfaction of patients and the perceived quality. As a direct consequence of this, the use of performance indicators related to the internal transport of patients, nowadays, is a scarcely used and widespread practice within Italian healthcare structures.

This gap reflects the limited scientific literature available on this topic, but a substantial interest of healthcare structures in receiving information in this particular area has emerged, aiming at a possible future introduction of standardized and shareable indicators at the national level.

Moving from these premises, the aim of the present contribution is to create a tool (i.e. a complete and shared set of KPIs) in order to promote the monitoring of the internal patient transportation and to support the decision-making processes of healthcare structures.

Between April and May 2021, to achieve this goal, a survey was drafted and sent to 398 Italian healthcare structures.

The results revealed a growing interest by hospitals in the creation of consolidated and standardized specific tools of performance measurement, in order to support the healthcare decision-makers in the design of improved processes, without risks and reaching patient satisfaction.

**Keywords:** logistic of patients, transportation management, KPI, performance measurement, survey.

## I. INTRODUCTION

Performance measurement in healthcare is a key element having continuous improvement in business performance. The use of key performance indicators (KPIs) allows to understand the strengths and weaknesses of the healthcare structures needed to improve processes [1, 2].

The monitoring and use of performance indicators is a necessary tool from which to start because only by measuring can we improve [3, 4].

The monitoring of internal transportation of patients is not usually the focus of top management's organizational efforts, but if managed efficiently and

measured, it could improve the quality of service provided by all other operating units involved and increase the quality perceived by patients [5].

Indeed, although patient transportation is performed daily in hospitals, usually healthcare managers underestimate the potential risks for the patients caused by a loss of efficiency. Alamanou and Brokalaki (2014) examined this issue highlighting the risks that patients may experience during transport-related activities [6].

Example of loss of efficiency could derive from problems related to handling during transport, inadequate equipment, lack of qualified personnel, poor monitoring and ineffective communication between staff during the transport [6]. These factors could imply

delays in the transportation activities and, in some cases, worsen the severity of the patient's disease [6].

In conclusion, it emerges that in order to contribute to the reduction of these risk factors, it is necessary to adopt a properly designed intrahospital transport protocol that clearly assigns responsibilities, ensures an adequate level of training of the personnel in charge, and maps the process in detail (Alamanou, Brokalaki, 2014) [6].

From a grey literature review conducted in Italy, results showed the lack of nationally shared and standardized indicators for measuring the performance of inpatient transport.

Therefore, it is considered essential to define indicators to monitor these activities [7-9].

The objective of the research conducted was to create a complete and shared dashboard of Key Performance Indicators (KPIs) to encourage healthcare organizations to monitor activities related to internal patient transport (topics where literature is scarce) and to support their decision-making processes.

In particular, in order to do this, a set of indicators was provided to Italian healthcare structures as a starting point to implement a systematic measurement process [10-12].

The proposed performance indicators are summarized in the table below.

TABLE 1  
SET OF INDICATORS TO MONITOR THE PERFORMANCE OF INTERNAL PATIENT TRANSPORTATION

Indicators	Formula
Average number of transports/day for individual transport worker from department of ordinary hospitalisation to radiology department. [patients/staff]	= (number of patients accompanied by department of ordinary hospitalisation to the radiology department in one day)/(number of transport staff involved on that day)
Average number of patients transported simultaneously by a single operator per day. [patients/travel]	= (number of patients moved on average in one day by an operator)/(number of total trips made in the day)
Average daily time between the end of the cleaning of the diagnostic room of the Department of Radiology and the arrival of the next patient. [min]	= (Time the next patient arrives)-(Time the cleaning of the room ends compared to the previous user)
Error in the reporting of the patient's physical condition (walking or not walking) by the department of ordinary hospitalisation respect to the total number of requests for patient transport on the same day. [%]	= (number of requests for patient transport with signalling physical condition not congruent in the day)/(number of requests for total patient transport of the day)
Saturation of machinery/equipment [%]	= (number of actual examinations performed)/(number of examinations scheduled per day)

The remainder of the paper is organized in four sections. Section 1 presents the context and the objective of the paper, Section 2 describes the literature review carried out to structure the survey, Section 3 shows the main results that emerged from the survey and Section 4 reports the paper's conclusions.

## II. MATERIAL AND METHOD

Literature analysis was performed through a review of scientific articles and books. Data source included: Google Scholar, Researchgate, Pubmed, Scopus, ProQuest, Espacenet and university databases.

For the research, the English and Italian keywords used were: “key performance indicator”, “healthcare”, “KPI”, “performance measure”, “hospital performance”, “intrahospital transport”, “transport”, “logistic”, “patient flow logistics”, “performance management”, “performance model”, “performance system”, “operation management”.

In particular, the keywords were used to construct search strings. These were constructed, first, using mainly the "OR" operator, which allowed for a larger number of results. Later, the "AND" operator was added to the same string, which allowed for a more targeted selection of contributions.

Articles and books deemed most relevant to the analysis were selected, both in English and Italian language.

From these activities of review, to date, a standardized framework of indicators for measuring the performance of internal patient transport seems to be not already present and shared at national level.

Numerous meetings were held with industry professionals in order to explore all the sources of inefficiency in the internal patient transport processes.

After investigating the causes, solutions were identified that, based on the use of performance measurement indicators, aim to monitor and optimize logistics processes [7-9].

Through these meetings conducted with a number of experts in the field, it was possible to develop a targeted dashboard of 5 KPIs related to the above-mentioned activities.

Between April and May 2021, this dashboard was revised by a group of 5 experts with a clinical and managerial background. They tested the survey in order to verify its comprehensibility, clarity, and consistency of content with respect to the objectives. The dashboard was also tested, in the real world practice by some members of the Italian Association of Healthcare Management Engineers (InGeSan), working in reference hospitals [13].

The invitation to participate was sent to 398 Italian healthcare organizations.

Moreover, the responder had the possibility to submit the survey even partially completed, omitting to answer to questions that he/she did not want or know how to answer.

The survey was focused on the organization of transportation activities and intended to collect qualitative data (such as the presence of a centralized service, the different type of transportations, the presence of a specific protocol, the professional devoted to this activity, etc.) [5].

The respondents were also asked to evaluate the KPIs dashboard, specifying, for each KPI, the current use or the intention to use in the future.

The figure below shows the flow chart reporting the main phases of methodology.

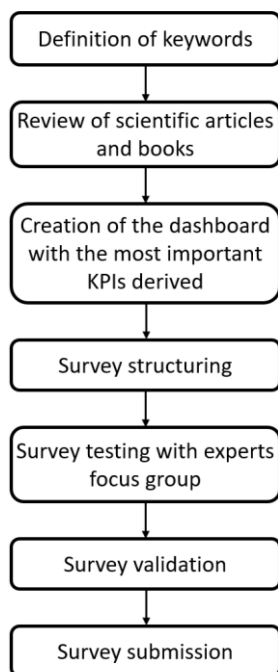


Fig. 1. Methodology flow chart

### III. RESULTS

The sample was composed by 42 hospitals (in particular 88% public structures, 7% accredited private structures, 5% private structures).

Results showed that 60% of hospitals presented a centralized service of patient transportation.

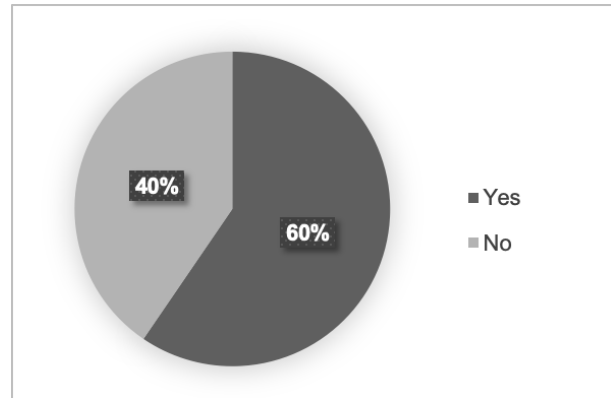


Fig. 2. Presence of a centralized service of patient transportation

Correlating this information with the total number of ordinary beds, it emerged that this service is very widespread (in 78% of cases the service is present) in larger structures (i.e. >900 beds) and is almost completely absent (in 82% of cases the service is not present) in smaller structures (i.e. 0-300 beds).

The central transport activities were 57% of the cases with both intra-building and inter-building transport, 29% with emergency transport, 11% with exclusively intra-building transport and the remaining 3% with exclusively inter-building transport.

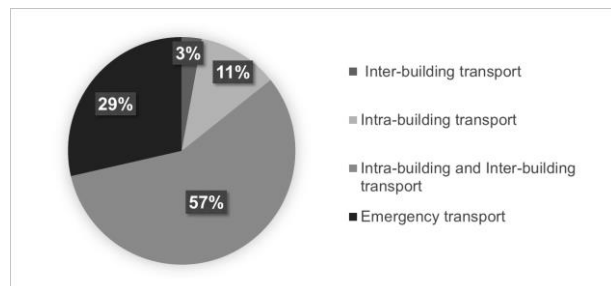


Fig. 3. Types of transports performed by the centralized service

Results reported that in 54% of the facilities, transportation is concentrated more in the morning, in 42% throughout the day and in 4% during the afternoon.

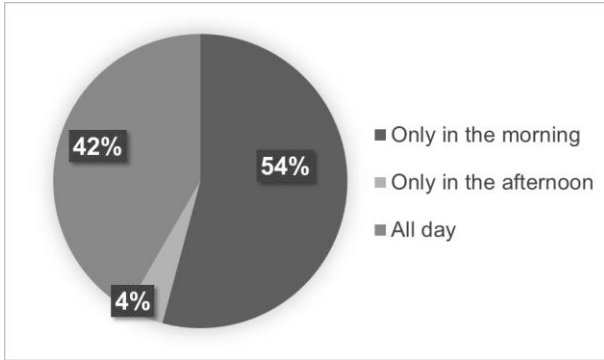


Fig. 4. Range in which the greatest number of transports are carried out

The 64% of structures that have a centralized service for transportation are supported by a specific protocol; the remaining perform internal transportation-related activities without formalized guidelines.

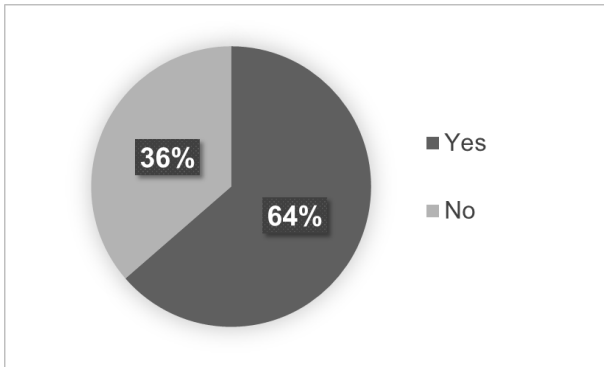


Fig. 5. Presence of a specific protocol

In the healthcare structures that do not have a centralized service, the activities related to the transport of patients are managed by: staff of the inpatient facilities (79%), staff belonging to the diagnostic service (14%) and external specialized companies (7%).

This demonstrates that in most hospitals there is not a work group dedicated exclusively to the activities of transport of patients, but that these are carried out by other professionals with different skills.

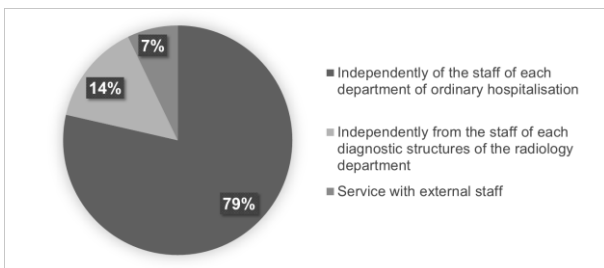


Fig. 6. Personnel performing internal transportation if no centralized service is in place

The professional figures in charge of planning and managing patient logistics are, in most cases, nurses (37%).

In 23% of cases, they are workers belonging to the health professions (i.e. medical radiology technician, health care assistant), in 11% they are the managers of the Operations Unit, in 9% nursing coordinators, in 8% staff related to the transport center, in 6% social health workers, in 3% administrative staff and in the remaining 3% there is no specific figure in charge.

This analysis showed that in almost all cases activities related to internal transportation are performed by workers with a health background [14].

TABLE 2  
PROFESSIONAL FIGURES WHO SCHEDULE AND MANAGE ACTIVITIES RELATED TO PATIENT LOGISTICS

Professional figures who schedule and manage activities related to patient logistics	%
Management engineer and administrative collaborator	3%
Absence of a specific figure	3%
Social health workers	6%
Staff related to the transport center	9%
Nursing coordinator	9%
Manager of the operations unit	11%
Healthcare professions	23%
Nurses	37%

It has emerged that those in charge of transportation-related activities are social health workers (36%), technical assistance workers (21%) or nurses (19%). In few cases they are social workers or technical operators. It can be seen that only social and health workers are present in greater numbers (> 6) while the other figures are usually present in few units.

A Department or an Office completely devoted to the activity of monitoring KPIs of patient transportation was not instituted in 42% of hospitals.

In 32% of cases, instead, these activities are carried out by the head of nurses, the technical coordinator and the health professions management (10%). In a smaller percentage, in some cases, this activity may also be performed by figures with a healthcare background, administrative worker, contract executive directors, or technical care managers.

TABLE 3  
FIGURE RESPONSIBLE FOR MONITORING KPIs OF INTERNAL  
TRANSPORTATION ACTIVITIES

Figure responsible for monitoring KPIs of internal transportation activities	%
Administrative collaborator	3%
Executive Director of the contract	3%
Senior care technician	3%
Healthcare professions	7%
Technical Coordinator and Directorate of Health Professions	10%
Nursing coordinator	32%
Absence of a dedicated office	42%

A set of indicators has also been proposed with the objective of understanding which KPIs are currently used in hospitals or would like to use.

The activities associated with internal transport, in most cases are not monitored with appropriate indicators, but it is noted that there is a desire to want to use them in the future.

The indicator related to the error in reporting the patient's physical condition (35%) and the indicator related to the saturation of the machines (32%) are the only ones that are most used by the structures.

This may be attributed to the ease with which data are collected and the use of similar measurements across departments. The other three indicators, on the other hand, are those that show a lower percentage of use, probably due to the failure to monitor these activities for possible difficulty in finding the data necessary for their measurement.

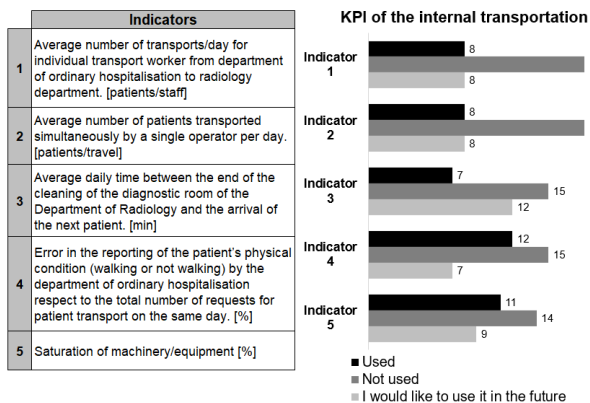


Fig. 7. Set of internal transport performance indicators

Almost the entire sample (97%) does not use geo-location systems to monitor patient and worker transport times.

This finding demonstrates that structures do not have advanced technology to collect data automatically. Finally, it was found that 73% of the structures do not use any software for the management and organization of internal transport and only the remaining 27% use at least one.

#### IV. CONCLUSIONS

The survey demonstrates that the measurement of performance in the hospital sector is a practice that is not yet consolidated but in continuous evolution [15].

In almost all of the structures responding to the survey, the measurement of KPIs relating to the internal transport of patients is not carried out.

In the few cases in which there is a planning and management of activities related to patient logistics, the workers involved have almost exclusively a healthcare background (head of nurses, nurses, social health workers) while figures with management roles have little involvement [14].

For the proposed set of indicators, however, it can be seen that many organizations, even if they do not currently use KPIs, have expressed a desire to measure them in the future. This will require the future involvement of new management figures dedicated to such measurement.

The lack of a systematic measurement of these activities reflects the scarcity of scientific literature.

Despite this, there is substantial interest on the part of the structures for a possible future introduction of standardized indicators that can be shared at the national level.

In conclusion, it is possible to affirm that the monitoring of performance indicators is a necessary tool from which it is necessary to start, since only by measuring can improvements be achieved [10, 16, 17].

One of the limitations of the analysis is related to the size of the sample. The structures that responded to the survey are only about 11% of those to whom it was sent. This can be attributed to the fact that the survey dealt with topics that were still not widespread, such as monitoring transportation activities. In addition, multidisciplinary expertise was required to answer the various questions, making it more difficult to complete the survey.

Another limitation of the analysis relates to the composition of the sample because the survey was sent exclusively to Italian healthcare structures. With regard to this, the idea of extending the analysis outside of Italy could be evaluated in order to better understand the use of KPIs related to patient transport activities.

Future research steps included as follows: deeper research of the scientific literature with an update and a focus on the international settings and an enlargement of the analysis sample, also giving more time to respond to the survey.

Moreover, it could also be useful to analyze the results that emerged from the survey taking also in consideration other variable (such as the size of the hospital and the available internal resources).

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