

The economic burden of COVID-19 hospital management: results from a pilot study

Background

COVID-19 has created unprecedented disruption for global health. Hospitals are fighting to provide appropriate healthcare services and require substantial resources to improve their delivery of care, managing the tension between safety needs and the unexpected priority to redesign their healthcare processes (Gilmartin & D'Aunno, 2007). In this regard, **COVID-19 has imposed huge investments for the proper management of hospitalized COVID-19 individuals**

Despite little attention was initially paid to the economic aspects, today **the investigation of the economic resources absorption is becoming an urgent priority, in particular with regard to the management of a COVID-19 patient requiring a hospitalization, in order to support the decision-making process, and to implement adequate health planning policies**

Objectives

The study aims at determining the hospital cost for the management of a COVID-19 patient, considering both a single day and the entire hospital stay, for the identification of the overall resources' absorption, and the average length of stay, based on the COVID-19 patients' severity and clinical condition, thus answering to the following research questions:

- How many resources does the hospital management of a COVID-19 patient absorb within the different care intensity settings (low, medium or high care intensity), considering a single hospitalization day?*
- How many resources does the hospital management of a COVID-19 patient absorb, considering the entire hospital stay, from diagnosis to discharge?*

The hospital guaranteed **154 beds for COVID-19 management**

Considering a 6-week time horizon, 75%, 14% and 11% of patients requested a medium-complexity (average length of stay equal to 11.7 days), a low-complexity (average length of stay equal to 7 days) and a high-complexity (average length of stay 10.7 days) hospitalization, respectively

From an economic perspective, the diagnosis phase required €586.48, 28% of which related to the nasopharyngeal swab for COVID-19 test. On the other hand, **the higher the complexity of care, the higher the hospitalization cost per day** (low-complexity=€427.77; medium-complexity=€582.38; high-complexity=€1,278.50)

The most impacting items of healthcare expenditure are related to **medical and nursing assistance (65%) and diagnostic procedures conducted at hospital beds (19%)**

Conclusions

COVID-19 has highlighted the importance of being able to rely on valid and real-time information, **emphasizing the relevance of real-world information**

The pilot study presented the preliminary results, concerning the economic evaluation of COVID-19 pandemic in an Italian Hospital

The hospital involved, supported further investments for the acquisition of both individual protection devices (€47,793) and ventilation equipment (€453,375)

In conclusion, the information obtained could represent the baseline cost for COVID-19 hospital management, independently from the concomitant diseases developed by a patient. The hospital information could represent useful data for benchmarking activities. The at home, territorial and rehabilitation information, could complete the COVID-19 patient clinical pathway, with a comprehensive approach

Methods

The activity-based costing approach (Kim et al., 2006; Kollberg et al., 2007) was implemented to define the costs related to the COVID-19 hospital' clinical pathway, according to real-world data derived from Alessandria Hospital (Piedmont, Italy), assuming a 6-week time horizon (28th February-15th April 2020)

The following healthcare items of expenditure were investigated: i) human resources; ii) hospital' length of stay; iii) hematological exams; iii) diagnostic procedures; iv) drugs; v) equipment; vi) personal protective equipment (PPE); vii) cleaning services and meals; viii) fixed costs (representing 20% of the total average direct costs – Adduce and Lorenzoni, 2004), divided into two phases:

a) Diagnosis

b) Hospitalization

The average per day cost and the average most frequent clinical pathways (considering the internal transfers between wards, based on the patient's clinical improvement or deterioration), were accordingly valorized on the basis of:

- low-complexity medical hospitalizations**
- medium-complexity hospitalizations, with the presence of hospital beds equipped with C-PAP or non-invasive ventilation**
- high-complexity intensive care unit hospitalizations, for treating COVID-19 patients requiring invasive ventilation, through intubation**

Results

Phase	Items of healthcare expenditure	Low care intensity	Medium care intensity	High care intensity
Diagnosis	Direct costs related to diagnosis	488.73 €	488.73 €	488.73 €
	General costs (20%)	97.75 €	97.75 €	97.75 €
	Total cost related to diagnosis	586.48 €	586.48 €	586.48 €
Hospitalization	Laboratory exams	73.09 €	125.30 €	780.27 €
	Diagnostic procedures	517.97 €	833.52 €	3,004.04 €
	Human resources	1,625.19 €	4,129.20 €	5,636.76 €
	Drugs	111.27 €	317.09 €	1,376.54 €
	Individual protection devices	61.95 €	86.18 €	211.60 €
	Equipment	0.19 €	1.74 €	3.33 €
	Meal and cleaning services	105.67 €	185.14 €	387.41 €
	Direct costs related to hospitalization	2,495.33 €	5,678.17 €	11,399.95 €
	General costs (20%)	499.07 €	1,135.63 €	2,279.99 €
	Total cost related to hospitalisation	2,994.40 €	6,813.80 €	13,679.94 €
Total costs (diagnosis + hospitalization)		3,580.88 €	7,400.28 €	14,266.42 €
Cost related to the single hospitalization day, without considering diagnosis costs		427.77 €	582.38 €	1,278.50 €

From the economic evaluation of the single hospitalization day, to the economic evaluation of the entire clinical pathway, considering ER access and internal ward transfer

	Complexity Area of Access	Internal Ward transfer	Length of stay	Economic evaluation (diagnosis+hospitalization)
Clinical pathway # 1 (6%)	Low-complexity hospitalization	High-complexity hospitalization	15.5 days	14,873.48 €
Clinical pathway # 2 (44%)	Low-complexity hospitalization	Medium-complexity hospitalization	14.68 days	8,130.83 €
Clinical pathway # 3 (13%)	Medium-complexity hospitalization	High-complexity hospitalization	24.23 days	24,443.17 €
Clinical pathway # 4 (25%)	Medium-complexity hospitalization	Low-complexity hospitalization	20.56 days	10,963.06 €
Clinical pathway # 5 (12%)	High-complexity hospitalization	Medium-complexity hospitalization	22.1 days	19,791.71 €

References

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