

Economic Impact of Inter-Regional Health Mobility In The Oldest European Administrative Region: A Starting Point For Changing Organizational Model?

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Abstract

Objectives: The aim of this study is to evaluate the inter-regional mobility expenditures, with particular reference to oncology, in Liguria Region.

Study design: A descriptive analysis of inter-regional mobility expenditures from 2008 to 2015 was carried out.

Methods: The analysis involved a detailed assessment of global balance of inter-regional health mobility by means the DRGs; the flow of specialist outpatient and pharmaceutical was also used.

Results: Since 2008 until 2012 an increase of negative balance of global healthcare expenditure in Liguria Region was observed [34.7 € mill (2008) and 62.3 € mill (2012)]; subsequently a quite stable trend was recorded between 2012 and 2015 [ranging between 59.8 € mill (2013) and 63.2 € mill (2014)]. The passive mobility was 15.1% on the total spending for hospital acute care in 2012 and a similar value was detected in 2015 (15.2%). The higher costs for passive mobility were attributable to the surgical DRGs (69.4% in 2012 and 69.8% in 2015) with a double estimate of the expenditure in comparison with medical ones (2012: 99.4 € mill vs 43.8 € mill, $\Delta = 55.6$ € mill; 2015: 96.6 € mill vs 41.9 € mill, $\Delta = 54.7$ € mill). The highest cost sources in the process of passive mobility are the surgical areas, particularly the surgical hospitalizations for orthopaedic and cardiologic interventions. The spending analysis for oncologic DRG, divided into surgical and medical for passive and active mobility, showed that the surgical DRG determined a negative balance of 3.8 € mill in 2012 and 4.3 € mill in 2015, while the medical DRG showed a positive balance of 0.5 € mill in 2012 and 0.7 € mill in 2015.

Conclusions: Our evaluation highlights that the inter-regional mobility for hospital acute care is the most relevant issue for the economic regional balance and reveals an important flow of patients moving from Liguria Region to neighbouring regions. As the equity of access and distribution of the supply of care remains a priority of Regional Health System, the active mobility in oncologic field could be a marker of quality health planning.

Keywords: Inter-regional health mobility, Passive mobility, Active mobility, Economic impact, Oncology

Introduction

Italian National Health Service (NHS) is based on a federal model where each Administrative Region is responsible for the organization of the local healthcare system and for funding addressed to health need of residents.

Starting from 90s, the system was reformed in order to strengthen the role of each Region and since 2001 Administrative Regions granted exclusive legislative powers in this policy domain. According the new rules, Regions are held responsible for covering for expenditure exceeding health care standard fixed by National Care Plan and negative balance due to inter-regional mobility. In fact, patients are free to choose any accredited facility in Italy, inside or outside the Region of residence.

Health mobility has become a semi-structural element of Italian NHS that can be associated to relevant risk regarding inequity of access, inappropriate services and difficulty in maintaining the sustainability of regional health system [1].

The need to govern this phenomenon justifies an effort to gather more evidence,

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while maintaining the principle of the patient's freedom of choice to decide in what structure of the NHS receive health service. In fact, one of the fundamental rights Italian citizens have in the field of healthcare is the "freedom of choice of provider and place of treatment" [2-6].

In 1995, the Italian NHS began to fund hospitals on a system based on cases classified according to Diagnosis Related Group system (DRG). Five out of 21 Italian regions have developed a system of regional DRG fares, while the majority adopted the system established on a national level [7].

Since 2003, the so-called "single fare" (TUC- Tariffa Unica Convenzionale) applies to the hospital treatment provided outside the Region of residence. This fare is DRG specific and is fixed on a national level. At the end of each year, the TUC fares are used to calculate the "active-passive" balance and to determine the financial resources that need to be transferred to each region. Liguria is one of the smallest and yet most densely populated regions in Italy with over 1,500,000 inhabitants and a density of 288 inhabitants/km², much above the national average, which varies considerably between inland and coastal areas, touching 1,000 inhabitants/km² in the latter [8,9]. One of the most relevant issues is the aging of the population with a 27% over 65 years, a 11.4% under 14 years old, an index of old age of 234.5 (the ratio of elderly people and children), the highest in Europe, and an index of structural dependency equal to 61.9 (ratio of the sum of the geriatric, paediatric and adult population) [8,9].

Liguria shows a heterogeneous active-passive balance according to specialization field with a incoming mobility for some specialties, i.e. paediatric, haematology and strong outbound mobility towards large neighbouring regions.

Cancer care is a paradigmatic field for mobility both for obvious reasons of technical-scientific and psychosocial complexity, but also for the increasing costs of treatments and the growth of the private medical agreement in the neighbouring regions, especially Lombardia with greater Milan at 150 km from Genoa. In recent years, the burden of care for cancer patients has been gradually increasing for three basic reasons: first, the progressive increase in the number of observed cases (although unchanged at incidence rates) due to the progressive aging of the population (expected 20-30% more cases in 2020) [10,11]; second, new therapeutic options targeted to obtain the healing or chronicity of the disease, with increased of the overall survival and prevalence of cancer cases; third, the applicability of new therapeutic agents also to fragile patients (elderly, complexes by co-morbidity, etc).

The aim of this study is to provide a descriptive analysis of inter-regional mobility expenditures overall, with particular reference to oncology. The analysis involved a detailed assessment of the DRG to identify flow characteristics by Local Health Units (LHU) of departure, arrival Region, type of service. All sources of health activities, be them hospital based or ambulatory based, acute and chronic, were included given that the goal was to get a wider understanding of the phenomenon to allow corrective proposals for the improvement of the health governance through greater appropriateness and reduction of spending. The issue of inter-regional mobility may also have international implications for those mixed public private health care systems, particularly

in Europe, where intense marketing strategies by private institutions is present, such as for instance in Lombardia region around the greater Milan.

Methods

Liguria Region is located in the North-western of Italy, it has five LHUs covering 1,591,939 inhabitants: LHU1 (217,703 residents), LHU2 (283,813 residents), LHU3 (723,182 residents), LHU4 (148,106 residents) and LHU5 (219,135 residents).

The global balance of inter-regional health mobility was evaluated in the period between 2008 and 2015 to better contextualize the phenomenon; the analysis of main descriptive elements, i.e., macro cost items, direction of mobility, area of DRGs, etc. considered the period from 2012 to 2015.

The information flow

The health consultation "Data warehouse" service is accessible from the portal www.liguriainformasalute.it through identification of the enabled operator.

The data source consists in the flow of hospital discharge cards (SDO) - informative debt of Healthcare Agencies- which, monthly, is sent to the Liguria Region and in the flow of information sent from other Regions or autonomous Provinces with regard to hospitalization for services provided to Ligurian residents in facilities of such regions or provinces (passive mobility).

The data of the activity of the Liguria Healthcare Authority (ALiSa) are consolidated within the 10th of March of the following year to the reference one while the passive mobility is sent within the month of May of the following year to the end of the period. All data are classified according to ICD-9-CM 2007 (diagnoses and procedures) and HCFA DRG 24 (outcome of the hospitalization) systems and are constantly updated for epidemiological purposes. The flow of specialist outpatient and pharmaceutical was also used.

The analysis of the Mobility

This is a descriptive analysis aimed at understanding which are the clinical specialties that most contribute to determine the health mobility in Liguria. We use two basic indices to measure patient flows: i) the attraction rate calculated at the ratio of number of patients coming outside Liguria admitted to any regional hospital to the total number of admission at that hospital; ii) the escape rate calculated as the ratio of the number of resident patients flown to other regions to the total number of residents of Liguria admitted to any Italian hospital. The analysis of the mobility shows that the costs of hospitalization procedures that Ligurian citizens, divided by area of residence, have received from various public and accredited private structures in Italy, classified according to different criteria:

1. According to the hospitalization: for this classification have been used the SDO fields marked with information related to the type of hospitalization (ordinary or day-care) and the homogeneous functional area (which allows identifying the rehabilitation).
2. According to the diagnostic grouping: the DRG system, which in the current version includes 538 codes, also

includes the episodes of hospitalization in 25 broad categories (MDC or main diagnostic groups) generally corresponding to organ pathology.

Considering the particularity of the field of oncology (multidisciplinary, transversal compared to DRG and with a high social and economic impact) a specific evaluation on oncological DRG was performed (Supplemental file 1).

Results

Since 2008 until 2012 an increase of negative balance of global healthcare expenditure in Liguria Region was observed [34.7 € mill (2008) and 62.3 € mill (2012)]; subsequently a quite stable trend was recorded between 2012 and 2015 [ranging between 59.8 € mill (2013) and 63.2 € mill (2014)] (Figure 1 and Table 1). The economic data related to the period 2012-2015 for the passive and active mobility divided by macro cost items showed that the main negative voices were represented by ordinary hospitalizations outside the region [range: -44.4 € mill (2012); -47.1 € mill (2014)], followed by outpatient services/treatments [range: -10.7 € mill (2012); -12 € mill (2014)], day care hospitalizations [range: 0.7 € mill (2015); 1.9 € mill (2013)], and direct pharmaceutical expenditure (direct drug administration) [range: -2.7 € mill (2014); -4.1 € mill (2012)]. In 2015, the hospital spending average per resident was equal to € 571.99. The LHU2 and LHU5 showed the highest per-capita expenditure, with a value of 2.6% and 1.7% higher than regional average, respectively. In 2015, the per-capita expenditure of passive mobility was 80.5€ in LHU1, 79.4€ in LHU2, 65.9€ in LHU3, 87.9€ in LHU4 and 171.6€ in LHU5. With regard to per-capita costs for inter-regional passive mobility due to hospital admissions, LHU1 has showed a slight increase of expenditure between 2012 and 2014 (76.8€ - 81.2€) and a quite decrease

for the subsequent year (80.5€). A slight reduction of per-capita costs was observed for LHU2 (88.4€ in 2012 - 79.4€ in 2015) and LHU4 (90.5€ in 2012 -87.9€ in 2015). The trend of per-capita values in LHU3, that serves the most populated area, was stable, ranging from 64.8€ and 65.9€ in 2012 and 2015, respectively. Major expenditures were recorded for LHU5 in comparison with other LHUs (174.9€ in 2012 and 171.6€ in 2015).

The descriptive analysis of the phenomenon: the directions of mobility

In order to determine the volumes and, contextually, highlight the main mobility directions, we proceeded to the description of the phenomenon for all types of hospitalization (Figure 2) showed the expenditure of the hospital passive mobility for the most attractive regions. In particular, the passive mobility was 15.1% on the total spending for hospital acute care in 2012 and a similar value was detected in 2015 (15.2%) confirming a stable trend.

It was observed that the most attractive Regions are the neighbouring ones, specifically in descending order: Lombardy, Piedmont, Tuscany and Emilia Romagna. The percentage relating to passive mobility remains almost unchanged for the period under study in each Region (Figure 2).

The majority of the migrations occurred in ordinary hospitalization compared to those in day care regimen. Indeed, considering the total economic burden, in 2012 € 128.1 million were destined for ordinary hospital admissions, while minor amounts were due to day-care admissions (15.0 € mill); similarly, the costs amounted 125.4 €million (ordinary hospital admissions) vs 13.4€ million (day-care admissions) in 2015. Specifically, the maximum expenditure for day-care admission was attributed to residents of LHU5 (5.0 € mill in 2012 and 4.2 €

ONCOLOGICAL DRG	
010 - NERVOUS SYSTEM NEOPLASMS WITH COMPLICATIONS	307 - PROSTATECTOMY WITHOUT COMPLICATIONS
011 - NERVOUS SYSTEM NEOPLASMS WITHOUT COMPLICATIONS	338 - TESTES PROCEDURES FOR NEOPL
064 - EAR, NOSE, MOUTH & THROAT MALIGNANCY	318 - KIDNEY & URINARY TRACT NEOPLASMS WITH COMPLICATIONS
075 - MAJOR CHEST PROCEDURES	319 - KIDNEY & URINARY TRACT NEOPLASMS WITHOUT COMPLICATIONS
082 - RESPIRATORY NEOPLASMS	346 - MALIGNANCY, MALE REPRO SYSTEM, WITH COMPLICATIONS
146 - RECTAL RESECTION WITH COMPLICATIONS	347 - MALIGNANCY, MALE REPRO SYSTEM, WITHOUT COMPLICATIONS
147 - RECTAL RESECTION WITHOUT COMPLICATIONS	353 - PELVIC EVISC,RAD HYSTERECT & RAD VULVECT
149 - MAJOR SMALL & LARGE BOWEL PROCS WITHOUT COMPLICATIONS	354 - UTER,ADNEX PROC NON-OV/ADNEX MALIG WITH COMPLICATIONS
172 - DIGESTIVE MALIGNANCY WITH COMPLICATIONS	355 - UTER,ADNEX PROC NON-OV/ADNEX MALIG WITHOUT COMPLICATIONS
173 - DIGESTIVE MALIGNANCY WITHOUT COMPLICATIONS	357 - UTER&ADNEX PROC FOR OVAR,ADNEXAL MALIG
191 - PANCREAS,LIVER & SHUNT PROCEDURES WITH COMPLICATIONS	366 - MALIGNANCY, FEMALE REPRO SYSTEM WITH COMPLICATIONS
192 - PANCREAS,LIVER & SHUNT PROCEDURES WITHOUT COMPLICATIONS	367 - MALIGNANCY, FEMALE REPRO SYSTEM WITHOUT COMPLICATIONS
193 - BIL PROC, EX ONLY CHOLCYST WWO CDE WITH COMPLICATIONS	401 - LYMPHOMA&NONACU LEUK OTH O.R PROC WITH COMPLICATIONS
194 - BIL PROC, EX ONLY CHOLCYST WWO CDE WITHOUT COMPLICATIONS	402 - LYMPHOMA&NONACU LEUK OTH O.R PROC WITHOUT COMPLICATIONS
199 - HEPATOBIL DIAGNOSTIC PROCEDURE FOR NEOPL	403 - LYMPHOMA & NON-ACUTE LEUKEMIA WITH COMPLICATIONS
203 - MALIGNANCY OF HEPATOBIL SYST OR PANCREAS	404 - LYMPHOMA & NON-ACUTE LEUKEMIA WITHOUT COMPLICATIONS
257 - MASTECTOMY FOR MALIGNANCY WITH COMPLICATIONS	405 - ACUTE LEUKEMIA W/O MAJ O.R PROC AGE <18
258 - MASTECTOMY FOR MALIGNANCY WITHOUT COMPLICATIONS	406 - MYEL DIS/PRLY DIF NEO&MAJ O.R.PROC WITH COMPLICATIONS
259 - MASTECTOMY FOR MALIGNANCY WITH COMPLICATIONS	407 - MYEL DIS,PRLY DIF NEO&MAJ O.R.PROC WITHOUT COMPLICATIONS
260 - MASTECTOMY FOR MALIGNANCY WITHOUT COMPLICATIONS	408 - MYEL DIS,PRLY DIF NEO&OTH O.R.PROC WITH OTHER INTERVENTIONS
303 - KIDNEY,URETR & MAJ BLADDR PROC FOR NEOPL	409 - RADIOTHERAPY
306 - PROSTATECTOMY WITH COMPLICATIONS	410 - CHEMOTHERAPY WITHOUT ACUTE LUKEMIA AS SEC DX

Supplemental file 1. Oncological DRGs evaluated in the analysis.

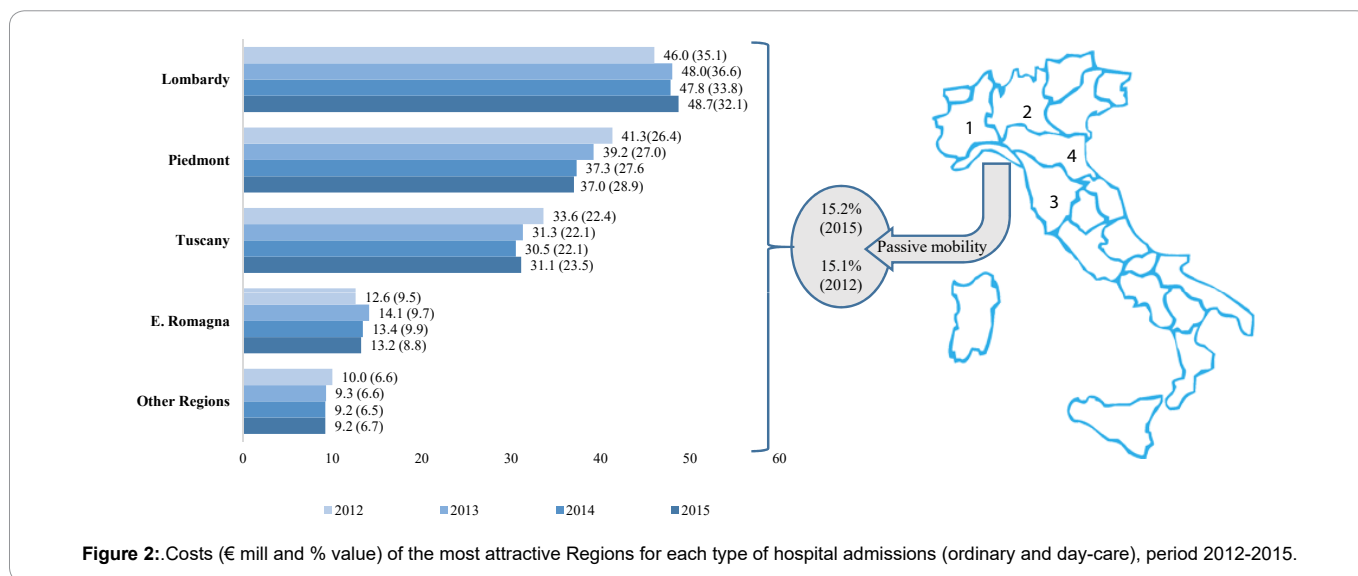


Figure 2: Costs (€ mill and % value) of the most attractive Regions for each type of hospital admissions (ordinary and day-care), period 2012-2015.

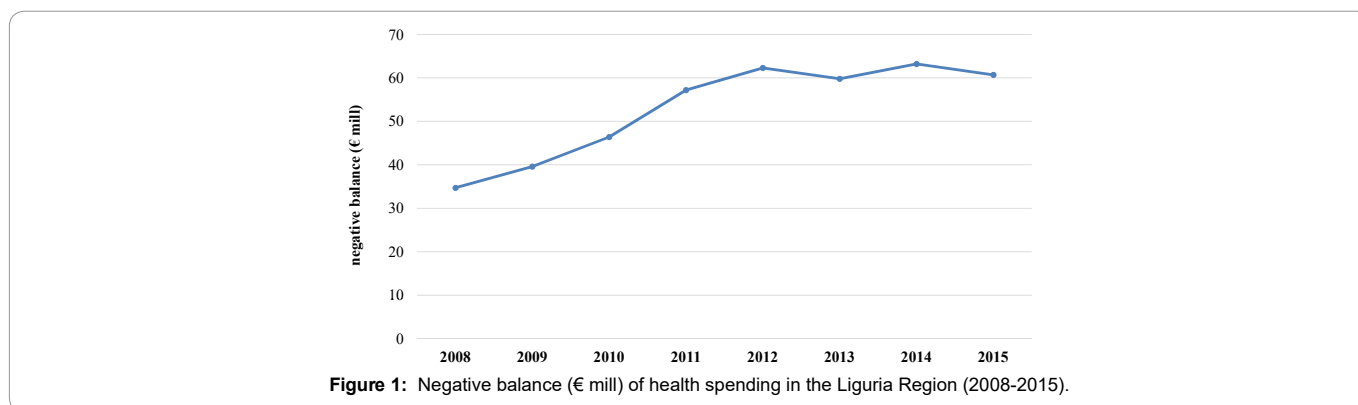


Figure 1: Negative balance (€ mill) of health spending in the Liguria Region (2008-2015).

TOPIC	SUB-TOPIC	2015			2012		
		Credit (€)	Debt (€)	Balance (€)	Credit (€)	Debt (€)	Balance (€)
HOSPITAL ADMISSIONS	DAY-CARE	14,095,562	13,447,862	647,700	16,465,013	15,021,101	1,443,912
	ORDINARY	80,191,237	125,386,836	- 45,195,599	83,762,635	128,139,497	- 44,376,861
GENERAL MEDICINE		711,681	1,271,565	- 559,884	713,225	1,261,534	- 548,309
SPECIALIST OUTPATIENT SERVICES		14,972,301	25,641,756	- 10,669,454	13,383,647	24,212,331	- 10,828,684
PHARMACEUTICAL	TERRITORIAL PHARMACEUTICAL	3,450,994	3,658,716	- 207,722	3,546,164	4,000,645	- 454,480
	DIRECT DRUG ADMINISTRATION	8,181,705	11,467,957	- 3,286,251	5,204,400	9,311,005	- 4,106,605
THERMAL CARE		38,127	1,657,375	- 1,619,248	50,434	1,963,693	- 1,913,259
AMBULANCE/HELICOPTER RESCUE TRANSPORT		2,567,101	2,419,268	147,833	478,653	1,931,086	- 1,452,433
RESIDUAL MENTAL HOSPITALS		0	0	0	0,00	108,928	- 108,928
TOTAL		124,208,708	184,951,335	- 60,742,626	123,604,172	185,949,820	- 62,345,648

Table 1: Balance of health spending in the Liguria Region for macro-cost items

mill in 2015) and for the ordinary hospitalization to residents of LHU3 (44.4 € mill in 2012 and 44.2 € mill in 2015).

Figure 3 shows the costs for hospitalization inside and outside our Region of Ligurian residents, according LHUs in 2012 and 2015, and the percentages of expenditure for passive mobility out of hospital expenditure. In particular, in 2012, the average value of passive mobility observed in LHU5 was double than the regional one (29.3% vs 15.1%); the same ratio is observed in 2015 (29.6% vs 15.2%). Interestingly, the LHU3, where regional reference hospitals are sited, showed

the lowest average proportion (2012: 11.1% vs 15.1%; 2015: 11.4% vs 15.2%) (Figure 3).

The global expenditure for hospitalization decreased in every LHUs, while the percentages of expenditure for passive mobility out of hospital expenditure was stable during the period, with fluctuation lower than 1.5% in every Units.

The Top 20 of the DRG: who comes and who goes

We proceeded to analyze the phenomenon of mobility, both active and passive, for DRG by issuing a decreasing spending rank

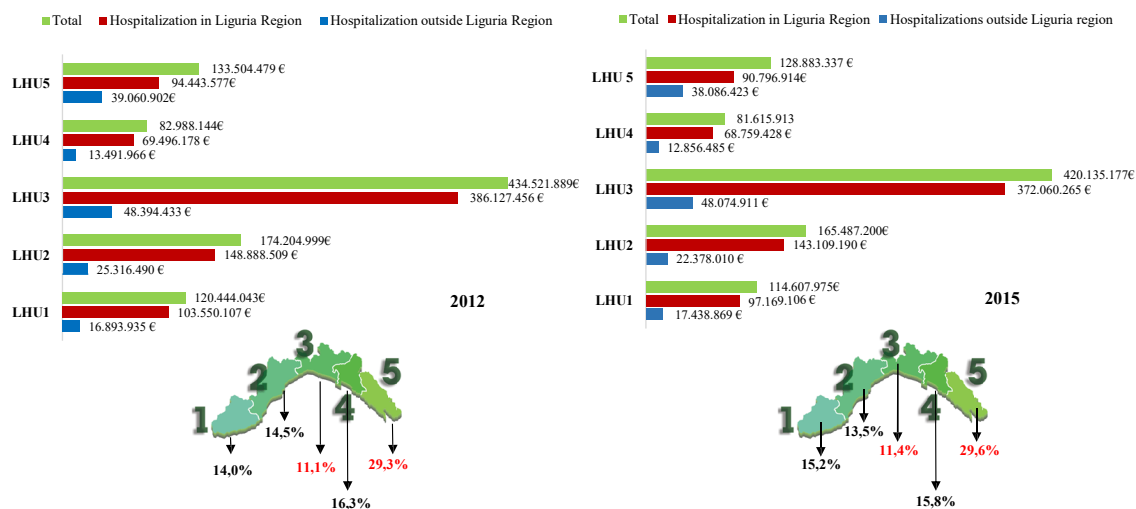


Figure 3: Costs of hospital admissions inside and outside the Liguria Region for LHUs (€ mill and % average).

in period 2012 and 2015. Table 2 shows the top 20 DRGs with a highest economic impact. The higher costs for passive mobility were attributable to the surgical DRGs (69.4% in 2012 and 69.8% in 2015) with a double estimate of the expenditure in comparison with medical ones (2012: 99.4 € mill vs 43.8 € mill, $\Delta = 55.6$ € mill; 2015: 96.6 € mill vs 41.9 € mill, $\Delta = 54.7$ € mill) (Table 3a). In details, the orthopaedic and cardio-surgical interventions represented the 30.2% and 15.6% of the total amount of passive mobility, respectively. The DRG544 (major joint replacement or reattachment of lower extremity) was the most implicated in the passive mobility with an economic value of 15.3 € mill in 2015 and 16.0 € mill in 2012. The DRG410 (chemotherapy) was the only oncologic DRG present in the top 20 list of passive mobility. The attractiveness showed digits slightly in favour of the surgical DRGs (2012: 57 € mill vs 43.2 € mill, $\Delta = 13.8$ € mill; 2015: 57.3 € mill vs 37.7 € mill, $\Delta = 19.6$ € mill) (Table 3a). The surgical area covered the 60.3% of total costs. The DRG481 (bone marrow transplantation) appears to be the first with 6.3 € mill brought in Liguria Region in the 2015 and 9.4 € mill in the 2012 (data not shown). The DRG410 (chemotherapy) and DRG075 (major chest procedure) are the only two oncologic DRG which appear in the Top20 list of active mobility.

The Mobility process in oncology: An overview

The spending due to oncologic escapes was 12.3 € mill in 2012 (8.6% of total passive mobility) and 11.8 € mill in 2015 (8.5% of total passive mobility). The spending analysis for oncologic DRG, divided into surgical and medical for passive and active mobility, showed that the surgical DRG determined a negative balance of 3.8 € mill in 2012 and 4.3 € mill in 2015, while the medical DRG showed a positive balance of 0.5 € mill in 2012 and 0.7 € mill in 2015 (Table 3b). The expenditure on cancer drugs at high cost (L01, L02, L03) for 2012 showed a negative balance of approximately 0.4 € mill and a containment of costs in 2015 with a positive balance of 0.7 € mill (Table 3c).

Discussion

Liguria is the region with the highest aging index in Europe and a steadily increasing burden of chronic patients. Therefore,

the response to chronicity is one of the major challenges to which the Regional Health System is called to respond both in terms of quality of supply to the needs of the citizen and in terms of system sustainability. In Liguria, since 2008 until 2012 an increase of negative balance of global healthcare expenditure was observed, while in recent years a quite stable trend was recorded, showing that it became a structural issue of Regional health supply with potential risks for sustainability of health system. In fact, inter-regional mobility for hospital acute care is the most relevant issue for the economic regional balance. Our evaluation highlighted an important flow of patients moving from Liguria Region to neighbouring regions. The Regions most attractive in terms of migrations are: Lombardy, Piedmont, Tuscany and Emilia Romagna. As reported in another study, the Northern - Central regions such as Lombardy, Emilia Romagna and Tuscany have the largest number of attractions in absolute value [12].

As expected, the highest cost sources in the process of passive mobility are the surgical areas, particularly the surgical hospitalizations for orthopaedic and cardiologic interventions. Strengthening of clinical pathway in these areas represents one of the priorities to contrast the aggressive attractive policy by neighbouring regions.

Passive mobility for oncology represents <9% out of global escape costs. In particular, oncologic surgical DRGs turn out to be more involved in the migrations with about 4.3 € mill of negative balance, while the DRGs of medical oncology have led to a positive balance of 0.7 € mill in 2015. It is therefore evident how the oncologic passive mobility is a problem of moderate severity for the surgical area, partially compensated for attractiveness by medical supply. Compared with the negative balance item, other surgical areas - above all those of the orthopaedic knee and hip replacement - are more critical and require specific action to contrast a phenomenon that risks to blow up the regional balance. The oncologic network model for the early taking charge of the patient and the government of the appropriateness of the processes seems to be the model that on a national and regional level has been most successful.

The strategic actions planned by Liguria Healthcare Authority

DRG	N.	DRG
481 - BONE MARROW TRANSPLANT	89	6.26
544 - MAJOR JOINT REPLACEMENT OR REATTACHMENT OF LOWER EXTREMITY	519	4.59
410 - CHEMOTHERAPY WITHOUT ACUTE LUKEMIA AS SEC DX	785	2.29
541 - TRACH MV 96+H OR PDX EX F/M/N W MAJ OR	32	1.99
144 - OTHER CIRCULATORY SYSTEM DIAGNOSES WITH COMPLICATIONS	354	1.75
503 - KNEE PROCEDURES WITHOUT PDX OF INFECTION	825	1.66
087 PULMONARY EDEMA & RESPIRATORY FAILURE	392	1.45
075 - MAJOR CHEST PROCEDURES	133	1.39
557 - PERCUTANEOUS CARDIOVASCULAR PROCEDURE WITH DRUG-ELUTING STENT WITH MAJOR CARDIOVASCULAR DIAGNOSIS	148	1.21
108 - OTHER CARDIOTHORACIC PROCEDURES	53	1.12
104 - CARDIAC VALVE PROC WITH CARD CATH	42	1.09
545 - REVISION HIP AND KNEE REPLACEMENT	96	1.07
003 - CRANIOTOMY AGE <18	91	1.04
574 - MAJOR HEMATOLOGICAL/IMMUNOLOGIC DIAGNOSES EXCEPT SICKLE CELL CRISIS AND COAGULATION DISORDERS .	287	1.03
269 - SKIN. SUBCUT TISSUE & BREAST OTHER PROCEDURES WITH COMPLICATIONS	166	1.00
145 - OTHER CIRCULATORY SYSTEM DIAGNOSES WITHOUT COMPLICATIONS	266	0.97
009 - SPINAL DISORDERS & INJURIES	261	0.96
316 - RENAL FAILURE	348	0.95
256 - OTHER MUSCSKL SYST & CONN TISS DIAGNOSES	607	0.95
012 - DEGENERATIVE NERVOUS SYSTEM DISORDERS	265	0.93
€ (MILL)		
544 - MAJOR JOINT REPLACEMENT OR REATTACHMENT OF LOWER EXTREMITY	1,751	15.34
104 - CARDIAC VALVE PROC WITH CARD CATH	166	4.49
256 - OTHER MUSCSKL SYST & CONN TISS DIAGNOSES	1,041	3.61
503 - KNEE PROC WITHOUT PDX OF INFECTION	1,297	2.58
012 - DEGENERATIVE NERVOUS SYSTEM DISORDERS	377	2.52
105 - CARDIAC VALVE PROC WITHOUT CARD CATH	95	2.27
545 - REVISION HIP AND KNEE REPLACEMENT	201	2.21
462 - REHABILITATION	407	2.05
541 - TRACH MV 96+H OR PDX EX F/M/N W MAJ OR	37	2.01
002 - CRANIOTOMY AGE >17 WITHOUT COMPLICATIONS	153	1.88
014 - INTRACRAN HEM OR CEREBRAL INFARCT	191	1.88
225 - FOOT PROCEDURES	1,017	1.82
410 - CHEMOTHERAPY WITHOUT ACUTE LUKEMIA AS SEC DX	588	1.79
498 - SPINAL FUSION EXCEPT CERVICAL NO COMPLICATIONS	143	1.76
359 - UTER&ADNEX PROC FOR NON-MALIG WITHOUT COMPLICATIONS	786	1.67
245 - BONE DISEASES & ARTHROPATHIES WITHOUT COMPLICATIONS	505	1.67
480 - LIVER TRANSPLANT &/OR INTESTINAL TRANSPLANT	21	1.46
035 - OTHER DISORDERS OF NERVOUS SYSTEM	180	1.30
191 - PANCREAS.LIVER & SHUNT PROCEDURES WITH COMPLICATIONS	89	1.29
288 - SURGICAL PROCEDURES FOR OBESITY	216	1.23
430 - PSYCHOSES	418	1.21

Table 2: Descending ranking of the Top 20 DRGs for passive and active inter-regional mobility (2015) In bold are highlighted the DRGs related to the oncology.

included support of the network model and implementation of governance by sharing of objective, indicators and targets on a regional level. For this reason, in 2017, with the deliberation n° 131 of ALiSa, the regional inter-company departments (DIARs) are established as an organizational tool to promote quality, appropriateness of care, homogenous and evidence-based healthcare pathways in the regional area, and clinical efficacy with consequent optimization of resources. The equity of access and distribution of the supply of care remains a priority of Regional Health System; the active mobility in oncologic field could be a marker of quality health planning. In fact, most recent evidence

indicates that the some of cancer drugs registered in Europe by European Medicines Agency (EMA) do not show a benefit in terms of survival or quality of life [13] and in Liguria region the institution of an hemato-oncological DIAR will allow to tightly monitor the prescriptive appropriateness of innovative oncologic therapies and the definition of recommendations. Health mobility picture from Liguria may be paradigmatic of the National phenomenon, although some areas (i.e. Southern Regions) show a more relevant and well known mobility towards Northern Regions. Confirmation from a health mobility analysis would strengthen our findings.

A		Debtor Liguria Region		Debtor Other Regions	
		€ (mill)		€ (mill)	
		2012	2015	2012	2015
Structure outside	Surgical DRG	99.4	96.6		
	Liguria Region	Medical DRG	43.8	41.9	
Structures in	Surgical DRG	395.2	369.6	57	57.3
	Liguria Region	Medical DRG	403.2	402.3	43.2

B	Debtor Liguria (mill)		Debtor Other Regions€ (mill)	
	2012	2015	2012	2015
Surgical Oncologic DRG	7.4	7.7	3.6	3.4
Medical Oncologic DRG	4.94	4.06	5.5	4.8

C	Active	Passive	Balance
	2012	2.522.522,85	2.872.335,41
2015	5.066.207,02	4.376.237,21	689.969,81

Table 3a: Costs of passive and active inter-regional mobility for all DRGs divided by surgical and medical areas. b) Costs of passive and active inter-regional mobility for oncologic DRGs. c) Costs for cancer drugs (L01: anti-neoplastic agents, L02: anti-hormonal agents, L03: immune-stimulants) for active and passive inter-regional mobility.

Conclusion

Our findings show that the highest cost sources in the process of passive mobility are the surgical areas, particularly the surgical hospitalizations for orthopaedic and cardiologic interventions. Oncology represents less than 9% of total expenditures, with surgery being greater than medical oncology. In order to implement the governance of the passive mobility, Liguria Healthcare Authority has proposed a new organizational model (DIARs) to promote and strengthen quality, appropriateness of care, homogeneous and evidence-based healthcare pathways and clinical efficacy with consequent optimization of resources.

Conflict of Interest

The authors do not have conflicts of interest to disclose.

References

1. La Mobilità Sanitaria. I Quaderni di Monitor. Elementi di Analisi e Osservazione del Sistema Salute. AgeNAS, 2012.
2. France G, Taroni F. The evolution of health-policy making in Italy. *J Health Polit Policy Law*. 2005;30(1-2):169-187.
3. Lo Scalzo A, Donatini A, Orzella L. Italy: health system review. *Health Syst Transit*. 2014;16(4):1-168.
4. Fattore G. Cost-containment and reforms in the Italian National Health Service. E. Mossialos, J. Le Grand (Eds.), *Health care and cost containment in the European Union*, Ashgate, Aldershot. 1999;513-546.
5. Fattore G, Torbica A. Inpatient reimbursement system in Italy: how do tariffs relate to costs? *Health Care Manag Sci*. 2006;9(3):251-258.
6. Jommi C, Cantu E, Anessi-Pessina E. New funding arrangements in the Italian National Health Service. *Int J Health Plann Manage*. 2001;16(4):347-368.
7. Taroni F. DRG/ROD e nuovo sistema di finanziamento degli ospedali. Il Pensiero Scientifico Editore, Rome 1996.
8. Rapporto Oasi Cergas Bocconi, 2010.
9. I Quaderni dell'Agenzia. *Lo stato di salute dei liguri. Rapporto sullo stato di salute della popolazione ligure*. 2012.
10. Programma Nazionale della Ricerca Sanitaria. PNRS 2014-2016. Ministero della Salute. 2014.
11. AIOM-AIRTUM. I numeri del Cancro in Italia 2013. Intermedia ed, 2014.
12. Nante N, Messina G, Lispi L, Serafini A, Prisco G, Moirano F. *Mobility trends of Patients across Italian Regions: implications for planning and evaluation of hospital services*. *Ann Ig*. 2016;28:328-338.
13. Davis C, Naci H, Gurpinar E, Poplavskaya E, Pinto A, Aggarwal A. Availability of evidence of benefits on overall survival and quality of life of cancer drugs approved by European Medicines Agency: retrospective cohort study of drugs approvals 2009-13. *BMJ*. 2017;359:j4530.