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CORSO DI LAUREA MAGISTRALE / SPECIALISTICA IN BUSINESS ADMINISTRATION - ECONOMIA E DIREZIONE AZIENDALE

TESI DI LAUREA

"COST DEFINITION IN HEALTHCARE: A CASE STUDY IN THE NEURORADIOLOGY DEPARTMENT OF AZIENDA OSPEDALIERA DI PADOVA"

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Il candidato dichiara che il presente lavoro è originale e non è già stato sottoposto, in tutto o in parte, per il conseguimento di un titolo accademico in altre Università italiane o straniere.
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Firma dello studente

Alla mia Famiglia,
che mi ha accompagnato fino a qui

Un ringraziamento va anche a tutto l'ufficio di Programmazione e Controllo di Gestione dell'Azienda Ospedaliera di Padova, in particolare alla mia relatrice Dott.ssa Giulia Zumerle, alla Dott.ssa Chiozza, a Silvia, Fabiola, Barbara, Riccardo, Fabio e Ciro.

Summary

Titolo: La definizione dei costi delle prestazioni sanitarie: il caso della Neuroradiologia dell'Azienda Ospedaliera di Padova

Questa tesi sperimentale si propone l'obiettivo di dare una panoramica sulla misurazione dei costi e fornire i risultati di uno caso di studio. Questo caso riguarda il reparto di Neuroradiologia dell'Azienda Ospedaliera di Padova, realtà giuridicamente e managerialmente particolare. Funziona infatti come un'azienda privata (responsabilità del management, obiettivi di bilancio, contabilità per centri di costo) pur essendo un'azienda pubblica. Lo studio riguarda la costruzione di una tariffa per alcune prestazioni di interventistica del reparto di Neuroradiologia, diretto dal dottor Causin, a cui rivolgo i più sinceri ringraziamenti per la disponibilità e la collaborazione. La creazione di una tariffa parte dallo studio dei costi, che ho fatto usando il metodo Activity Based Costing, e finisce con un'analisi dei possibili ricavi, che nel mondo ospedialiero sono fissati a monte. Il problema che ha spinto l'ospedale a richiedere questo studio al reparto di Controllo di Gestione, diretto dalla Relatrice di questa tesi, la Professoressa Giulia Zumerle, è stato che spesso l'ospedale, nel gestire pazienti di altre istituzioni, si è trovato a non sapere cosa e come fatturare. Questo studio quindi, oltre a portare un risparmio per l'Azienda Ospedaliera Di Padova, ha ampia possibilità di applicazione perché va a supplire alcune lacune del Nomenclatore Regionale, il quale regola tutti i rimborsi per le prestazioni Ospedaliere. In questo senso tutti gli ospedali potrebbero, attraverso le tariffe create in questo studio, trarre spunto per lo studio dei loro costi per affrontare meglio le scelte di Make or Buy di queste prestazioni.

La tesi è divisa in quattro capitoli.
Il primo tratta della creazione del Sistema Sanitario Nazionale, la sua maturazione e lo stato dell'arte odierno. Vengono illustrati il suo metodo di finanziamento e i possibili punti critici.
Il secondo tratta del concetto di costo, delle sue possibili misurazioni e delle applicazioni in sanità.
Il terzo dell'azienda Ospedaliera Di Padova, la sua organizzazione ed in particolare il funzionamento dell'unità Operativa della Programmazione & Controllo Di Gestione.
Il quarto spiega l'attività che ho svolto, il processo operativo e di analisi che ha portato allo studio dei costi di reparto e alla creazione delle tariffe.

Abstract (ENG):

This experimental thesis has as objective to offer a panoramic view on the cost measurement and to report the result of a case study. This case study is about the Neuroradiology's Department of the Padova's Hospital, the Padova Health Firm (Azienda Ospedaliera di Padova).It is a particular and managerial institution. In fact, it operates as a private firm (Management responsibility, economic targets, Cost Centre Accounting) still being a public body. The operative study that I show is about the development of a tariff for some operations of the Neuroradiology's department, directed by Doctor Francesco Causin, whom I sincerely thank. A study for the development of a tariff starts from a cost analysis, that I performed through the Activity Based Costing Method, and ends with the study of the revenues deriving from those procedures that, particularly in Healthcare, are fixed. The problem that pushed the Padova Hospital's Management to request this study to the Programming and Management Control's Department was that the hospital, dealing with some patients arriving from other institutions, didn't know what and how to invoice these services. This study, beside leading to a saving for the Padova Health Firm, is largely applicable and could be used to fill some gaps in the regional Tariff List for the Health Services. Moreover, all Hospitals could take advantage by the study of these procedures, and eventually study their own costs to take Make or Buy decisions.

The thesis is divided in four chapters.
The first is about the birth of the Italian NHS, its growth and its actual state of art. Are shown its financing method and its critical points.
The second is about the concept of cost, its possible measurements and its Healthcare applications.
The third presents the Padova Health Firm, its organisation and in particular the functioning of the Planning and Management Control Department.
The fourth explains the work that I've done, the operative process and the analysis that led me to the study of the costs for the procedures and to the tariffs creation.

Chapter 1 - The National Healthcare System in Italy

Commonly, the history of the SSN (Italian NHS) is divided in four periods.

- Before law 883/78
- Foundation of National Healthcare System - Law 833/78
- Second reform (Managerialism)– Law 502/92 and 517/93
- Third Reform (Regionalization) - Law 229/99

1.1 - Historic Background and Laws References – Foundation of the SSN

The birth of the SSN (Italian NHS) takes its inspiration by the concept of health as a right, granted by the Italian Constitution. Both of the individual and the community. As descripted by article 32 it must not be affected by territorial differences and has to be granted to everybody.[1]

Before Law 883/78 healthcare system in Italy can be described as a mutual aid system, where there was no universal coverage, control on expenses, no analytical balance sheet management control and moreover the absence of the integration of the services. Before the tax reform of 1970, the financing of the mutual systems was local and managed by the municipalities or "health funds", each one responsible for a class of workers that had to register compulsorily. At the end the cures were paid by the workers themselves and often the system failed, leaving workers or their relatives without treatments. The 1974 reform extinguished the debts of these organizations and transferred the duties in the health system to the regions. At this point the only financer of the Healthcare system were the state's taxes but this mechanism generated many wastes: "The waterfall-organised method of financing was not holding responsible anyone and worsen the public finance" (Maggi, 2003). The state reimbursed every expenses that the healthcare providers supported. This system maintained the financial situation of the Italian Healthcare System always in debt, also because there was not incentive by the single provider to grow in efficiency and absolutely no forecasting and managing of the expenses. The reimbursements were given ex post. Moreover, there was a strong injustice between the treatment a citizen was able to receive depending on the city of

[1] Art. 32 Of the Constitution of the Italian Republic (2016): The Republic safeguards health as a fundamental right of the individual and as a collective interest, and guarantees free medical care to the indigent. No one may be obliged to undergo any given health treatment except under the provisions of the law. The law cannot under any circumstances violate the limits imposed by respect for the human person.

birth and to the mutualistic system of enrolment. This, once again, was conflicting with the article 32 of the Constitution.

The Law 883/78 actually founded the SSN (NHS). Its inspiring principles are:

- Equality: Every citizen, independently from t occupation, social class or city of residence, can access to standard levels of health services from the SSN. [2]
- Global Cure: In the new organization of the health system must be considered, other than the assistance post symptoms, also the prevention and the rehabilitation.[3]
- Territoriality: For the first time the whole centralized administration of health was divided by region, in which operate the USLs (Unità Sanitaria Locale , Local Unit for Health), to which compete the managing of the single hospital or the local health system.
- Dignity and Freedom of the human being: "The safeguard of the health, physical and psychical, must occur respecting the dignity and liberty of the human being"

The aims of this reform were to overcome the territorial disequilibria of the health condition in the country (through centralized programming and distribution of resources), to provide Health education of all the citizens and the communities, to facilitate the prevention of sickness and injuries in life and in the workplace, to develop the diagnosis and treatment for the invalids, to safeguard the mental health to implement a responsible procreation and safeguard of maternity and childhood and to develop laws for the regulation of sperimentation, production and distribution of drugs.

This reform delegated some functions and created three levels of management where before there was only one attributed to the state:

1. Central Level: The state. It has the functions of the General Programming. Actors are: Govern, parliament, health ministry.
2. Regional Level: The regions. They have the functions of the legislation and programming in the local dimension.
3. Operative Level: Towns, single or associations. This task is executed through ASLs, the new institution that substitute the Usl. The change has occurred due to the spirit of the law, that wanted to underline the concept that Usl (meaning

[2] "..senza distinzione di condizioni individuali o sociali e secondo modalità che assicurino l'eguaglianza dei cittadini nei confronti del servizio.." (Art.1 L.833/78)

[3] "..Il SSN è costituito dal complesso delle funzioni, delle strutture, dei servizi e delle attività destinati alla promozione, al mantenimento ed al recupero della salute fisica e psichica di tutta la popolazione .." (Art.1 L.833/78)

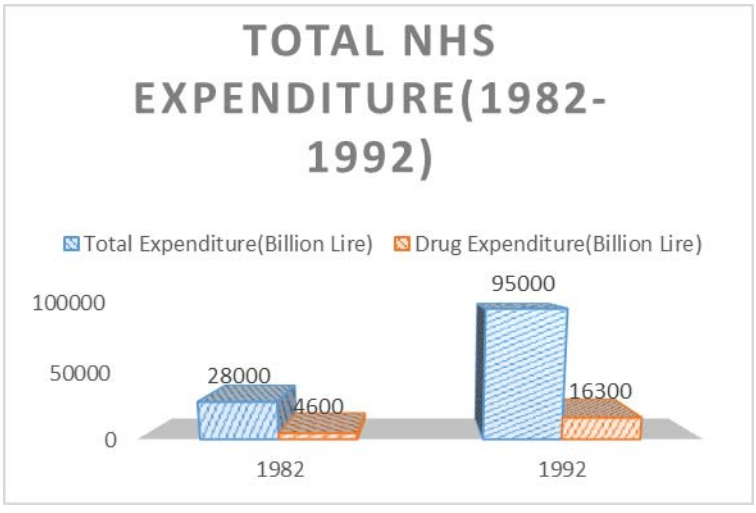
Local Health *Union*) is changed with Asl (Local Health *Firm*), that receive Autonomy and Accountability.

Thanks to this reform the delivery of cures was de-monopolized (by the USL, their structures and the sponsored ones) and put on the same operative level.

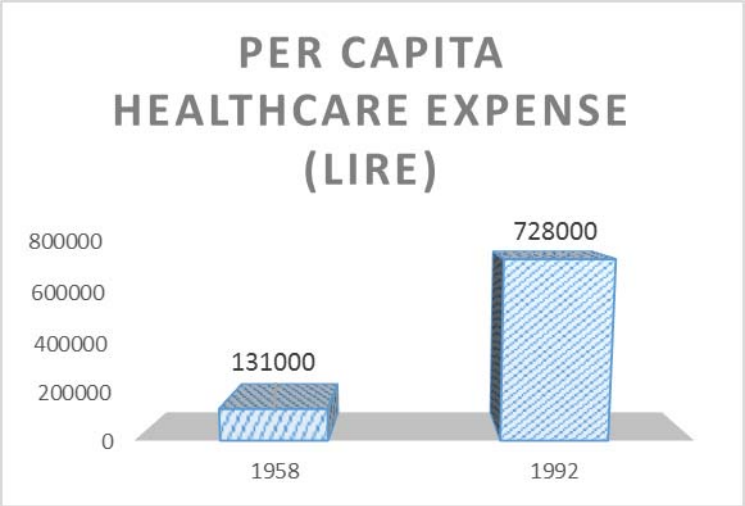
This first attempt to create a modern and manageable national healthcare system had nonetheless its shortcomings. The main were four:

- Missing implementation of the reforms (fiscal, social services, local autonomies, regional empowerment)
- Difficulties in promoting rights and duties in social communities (much moral hazard)
- Obstacles to changes and to accountability policies
- Blasting of the healthcare expenditure due to the expansion of the social demand. The funds, dispensed by the Fondo Sanitario Nazionale (National Health Fund), were managed centrally, and this, not necessary negative, in this case caused the less of the focus on the efficiency. In fact, was not founded on a forecast or budget.

The expenditures of the system were raising year by year: 28.000 MLD in the 1982 and 95.000 in 1992, the drugs expenditure passed form 4.600 MLD to 16.300 MLD and the per-person health expense form 131.000L in 1958 to 728.000 L in 1992 (Coppola, 2008)[4].



[4] 1 Euro = 1936,27 Lire



In short the bureaucratic logics and the vertical decisions suffocated the managerial optic fundamental for a flexible and accountable system, the unions didn't allow the evolution of the professional figures but the most serious factor was the missed emission of the National and regional Plans with the objectives. In this way nobody could really take actions and actuate the reform plans (fiscal, local autonomies, social services, regional management of the state).

1.2 – The reforms of the SSN

1.2.1 - Second Reform of the SSN (Law 502/92 and 517/93) The managerialism optic

Many countries in the 90's had to face the incredible rise up of the health expenses. To face this diffused problem, in the mid-80s, a few American scholars elaborated a new governance style. It is nowadays called New Public Management and is a new approach to the public sector management. The idea was born from the consideration that the stakeholders of the Public firms are many and much differentiated (private, citizens, institutions and other public firm). The solutions that these scholar elaborated led to the definition of new targets to which the public firm must be directed: elasticity and sustainability of the activities, re-organization of the Accounting system, separation from management and politics , technological innovation and focus on quality. In the Healthcare field, the American hospitals followed these new indication creating a quasi-market and starting the process of managerialism in the Healthcare Service. In Italy this process took 3 years to be implemented. Formally is

considered from 1992 to the nomination of the new General Directors of the ASLs in the 1995. Managerialism was necessary for three reasons, between others (E. Menichetti, 2001):

- The failure of the USL, that didn't catch the objectives of Health Outcome and Financial and Economic Sustainability.
- The health was not granted for everyone
- The separation between politics and management (missing regionalization).

Moreover, the expenses were continuing to rise. The reasons were that, as often happens in the healthcare business, the demand pushes the offer, and that the number of citizens accessing the new cure system were rising. An example is that between the 1949 and the 1979 the individual treated passed from 15 to 33 million (Mapelli, 2012) and, effectively, the expense for the healthcare per person had grown of 4.4% in the period 1990-1999 (OASI, 2011).

In general, the Law wanted to touch 2 points, uncompleted by norm 1978/883: the institutional architecture of the system (less politics, delegation in the financial responsibility more autonomy on the single structures) and the introduction of new managing mechanisms.

The new elements were:

- The commitment to the State of the producing of a triennial healthcare planning document
- The identification of the LUA (Livelli Uniformi Assistenza Sanitaria), the minimum levels of assistance that must be granted by the system and defines the sum of resources to allocate for the issuing of this services
- The healthcare system becomes more regional-managed. The regions receive important functions. Programming and controlling the activity that is executed by the new public Health companies (Aziende Opsedaliere, IRCCS, Private Accredited Hospitals)[5].
- The regional agencies for the health (USL) receive legal personality and autonomy over equity and organization.
- The new financing method: reduction of the NHF and addressing of the profit and losses to the regions (see next paragraph)
- Introduction of the DRGs system

[5] Decree 502/92, at article 5 says: The Health Firms are obliged to use an accounting system by cost centres, that allows comparative analysis of costs, revenues and results.

- Managerialism of the USLs (later called ASL) and institution of the AOs with legal personality. The aim was to have someone accountable of the results (and of funds, equipment and indexes) and to grow in efficiency
- Creation of the accreditation system: the institutions that wants to issue healthcare services must pledge an agreements with the ASL(the regional institution) to be in the list of the authorized bodies. Doing so they accept all the norms of health and payments of the SSN[6].
- Creation of Quality indicator that must be compelled by every actor and are controlled by the ASL.
- Freedom for the citizen to choose in which structure receive the cure.

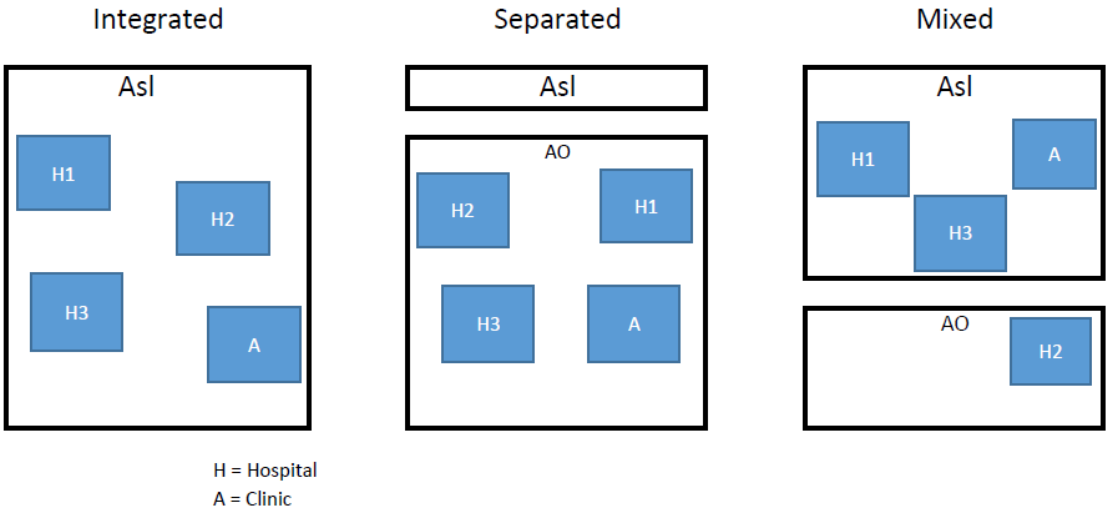
The autonomy of the AO and ASL was actualized by giving them legal personality ad nominating the General Directors with a contract of 5 years and giving legal personality to them. So this Director will be held responsible to the managing of the organization and can be fired (only for severe reasons). He has the power to nominee the Health and Administrative director. The staff organs were reinforced (marketing, accounting management) and created the system of forecasting and controlling based on outputs (also wage adjusted by reached objectives). Was created separation of different responsibility centres and cost centres accountable to the General Director. Also, the single AO and ASL must compile the Atto Aziendale (the firm statute), the true constitution of the body, that expresses the value, the aims and the rules. It is the best expression of its autonomy by the Italian Regulations and is the final fulfilment of the Autonomy principle waited since the 1978 Law.

1.2.2 - Setting Up the Quasi-Market

To give sense to the autonomy and managerial characteristic of the AO and ASL, they needed a market to move and markets pressure to out-perform. On the other hand, a completely free market could not be created because the goods like health and cures are too important, complex and also protected as rights from the constitutions (they can be counted inside the category of "merit goods"[7]), so there has been the need to create some sort of quasi-market. The patients were not anymore forced to go to a certain institution to be treated, but had freedom of choice, the private institution have to be accredited to operate and were introduced

[6] Law 229/99 at article 4, letter b) comma 2, states that having an accounting system for cost centres is a fundamental prerequisite to get the accreditation.
[7] Goods or services (such as education and vaccination) provided free for the benefit of the entire society by a government, because they would be under-provided if left to the market forces or private enterprise (http://www.businessdictionary.com/definition/merit-goods.html)

some fees for certain services. In the Law, the concept of competition inside SSN has not been strictly regulated, letting every Asl decide over the quasi-market configuration. Spontaneously emerged three types of institutional models:



Adaptation from (Mapelli, 2012, p. 190)

The "traditional model" (integrated) is constituted by the complete integration of the ASL and the other institutions. All the hospitals and the Healthcare structures are managed by the Local Health Firm. They are all buyers and providers of services.

The Separated Model, so to have the ASL as insurer and buyer of services and the AO as producers and providers. The Mixed model is present where in the ASL there are both institutions that provide and buy and only buyer/insurer.

In all of the three configuration is possible to pursue the efficiency due to the accountability and the development of the quasi market logic. So to say that there isn't a "always-best" model. This system set up, for some Health Firms, particularly the ASLs, the condition to pursue the logic of "Make or Buy". Also, this law regulated the many private Healthcare Institutions that deliver services to the public. Now they are called "Social-Private" because they must be accredited to the SSN but not follow its plans. It is clear that, having the priced fixed, the actors operate on the margin, and so to reduce the costs. The competition on the costs, more than on the prices, pushes the company to the efficiency and it is good also for the entire fiscal system and the SSN.

To Sum Up ((Sanità, 1996)

	USL by 883/1978 Law	USL/ASL by 502/1992 Law
Definition	Structure managed by the municipality without legal personality	Company with public legal personality
Structure	•General Council •Managing Comitee •Direction Office	General Director, that nominates: •Social Services Coordinator •Administrative director •Health Director . Auditors Council
Organization	Three functional areas: •Base •Integrative •Central	Process managing and not anymore the functional areas: •large autonomy •Spin off of some hospitals to be Aos •Contractual Agreements intra Aos and USLs • Plurality of deliverers
Management	By beds/staying days	DRG tariffs
Reimbursement System	By inputs(a piè di lista)	by numbers of services delivered
Control	Preventive	On management results
Quality		Development of indicators, internal audit, VRQ

1.2.3 - Third Reform (Law 229/1999) – The regionalization

After seven years of debating upon the autonomy of the regions that lamented on the one side the centralism of the decisions by state, and on the other the inability of the state to plan and manage the SSN, the government arrived to the law 229/1999. This law wanted explicitly:" To remove the ambiguities in a chaotic legislation that allowed a passive privatisation of the SSN" (Taroni, 2011). The aim was to conciliate the inspiratory principles of the Law 883/1978 with the new regionalised and managerialised situation. Moreover, was still debated the relationship between SSN and the Universities. The most important article in the first, pointing the ratio of the reform. In substitution of article 1 of the law 502/1992 the SSN receive a new definition: "The complex of the functions and of the assistant activities of the Regional Health Services[8]". These the most relevant manoeuvres:

[8] Art 1 Legge 229/99: La tutela della salute come diritto fondamentale dell'individuo ed interesse della collettivita' e' garantita, nel rispetto della dignita' e della liberta' della persona umana, attraverso il Servizio sanitario nazionale, quale complesso delle funzioni e delle attivita' assistenziali dei Servizi sanitari regionali e delle altre funzioni e attivita' svolte dagli

- The LUA were converted to LEA (Essential Level of Assistance) and were enlarged with the coverage of several integrative funds. They had to be debated and associated to a forecast cost and sustainability plan, before the approval.
- The diffusion of a economic culture within the doctors. They were now prepared to take in consideration the economic implication of a treatment other than the clinical ones (possibility of a second best option in the treatment).
- The municipalities were involved in the designation and removal of the General Directors (Modifying Art. 3 Law 502/1992).
- New contracts for the Doctors to reduce the waiting Lists, inviting private doctors to operate in the public hospitals' structures
- Creation of the Long Term care for the elderlies. Social manoeuvre other than healthcare
- The slowing in the creation of AOs, separated from USL. It was realised by indicating from the top the criteria for a Hospital to be spun off (explained in other chapter).

This reform, due to political convergences and to a change of govern in Italy was not really applied. After the constitutional reform of 2001 anyway, the competences of the region were risen and clarified. In the 2000s there has been a continuous debate around the criteria of the regionalization and the managerialism but having like stepping stone the Autonomy of the region and the SSN as complex of the SSR.

The first phase of the regionalization was contemporaneous to the managerialism, and was adopted form the Regions even if the criteria of the law were unclear. The spin-off of the hospitals from the USL and the constitution of the AOs has been the real sign that the state was delegating power in the choices. The municipalities have lost some influence on the SSN in these reforms. They lost decisional power due to the birth of the General Directors and due to the dimension of the USL, often more extended than the municipality territory. The new layout combines the historic problems of vertical management, and specifically the governance structure overlapping and the horizontal arguing between operators. It generated the model of the "marble cake federalism" (cfr Morton Godzins) in which competences, powers programs s and resources intersect to pursue (different) objectives.

1.2.4 – After 1999

enti ed istituzioni di rilievo nazionale, nell'ambito dei conferimenti previsti dal decreto legislativo 31 marzo 1998, n. 112, nonche' delle funzioni conservate allo Stato dal medesimo decreto.

Despite the continuous reforms the SSN during the 90s continued to accumulate financial deficits around 5% of its funds, this due to the lacking of control by the regions but also by the strategy of the SSN to underfinance the system to integrate resources ex post. This method is used also to have some leverage on the regional management and keep them under stress to grow in efficiency. The law 56/2000 pursued these aims and introduced three new elements:

- The abolition, starting from 2001 of the transfer of funds from the FSN to the regions. The new quota in regional health of the state will be taken from the IVA fund. The institution of a National Fund for the region with scarce taxation capacity (different form the previous NHfund)
- The funds destined to the regions will be calculated in the population through several indexes like resident population (age, distribution, common pathologies), fiscal capacity, health needs and geographical dimension.
- The elimination of the constraints in the destination of the taxes collected by the regions. In fact, the Health Business becomes a service like the others inside the regions and the quantity of funds allocate to it is decided by the regions

On the 18th October 2001 was approved a change in the constitution to determine the competences among the central state and the local institutions. It is attributed to the exclusive competence of the region what is not defined competence of the state like defining the LEAs and creating the Five-Year Plan. To the region is entrusted the operative level. The Last important law concerning the SSN has been the 42/2009 that ensured the coverage of the LEA to those regions with a low tax income. It has been achieved creating an equalization fund that subdivide some taxes through the regions. This law also launched the concept of standard costs in the SSN, but remains still unaccomplished.

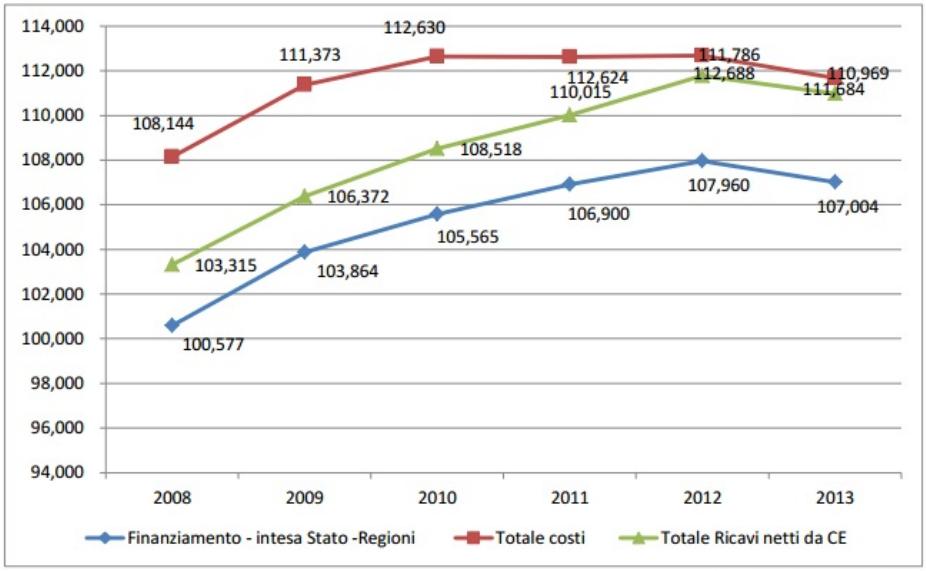
The last tendencies in the SSN regulation have been:

- get closer the hospital and its operators and the citizens
- Implementation of the “gain health” system
- To put at work together managers and doctors, to have an efficient and sustainable SSN
- Create Health Network on the local level

1.3 - SSN: The Financing System

1.3.1 - Some figures

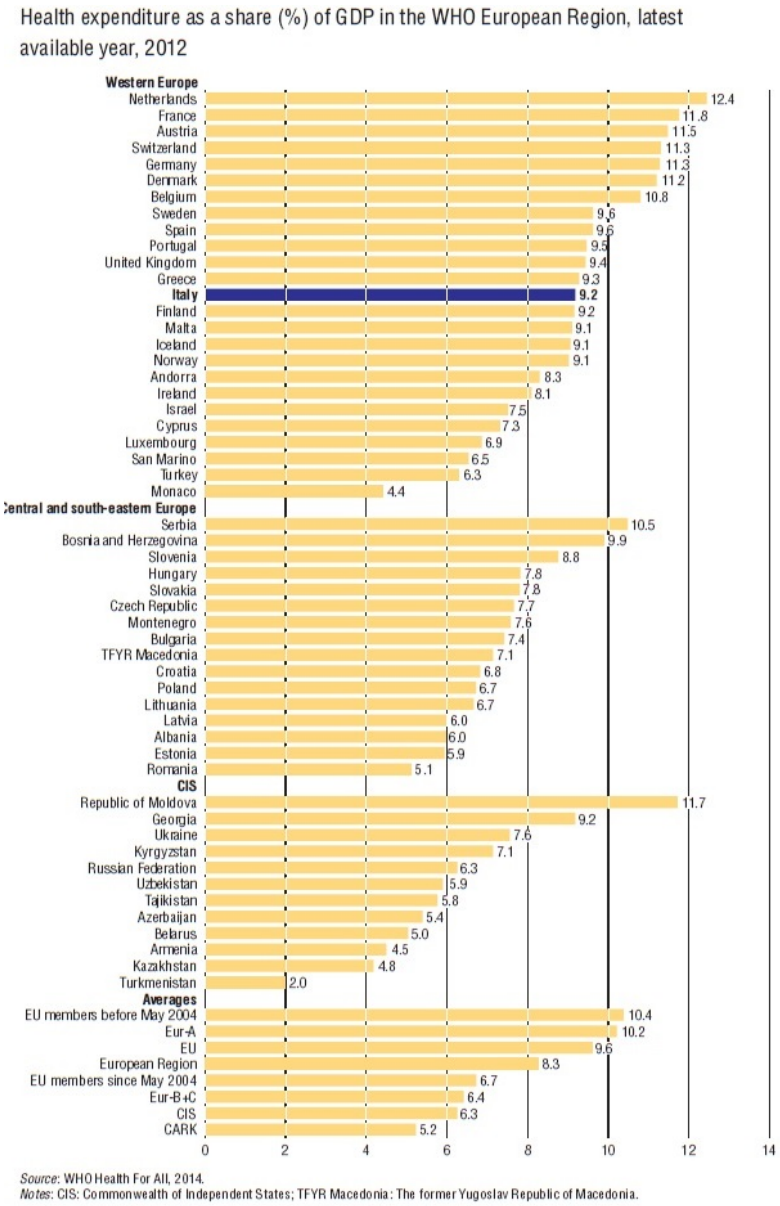
The SSN is funded through national and regional taxes and integrated with co-payments (OOP) for certain services. During the 2012 the total health expenditure was 9.2% of GDP. The taxes and the contributions cover the 78.2% of the total expenses, the rest, the private quota, are covered through OOP payments (17.8%) and private spending in private hospitals (Ferrè, 2014). Before seeing how the money for the Healthcare are collected it must be understood how much money are needed to finance the SSN and if Italy is over or underperforming other similar countries. Italy spent 112.408 million Euro for the Healthcare system in 2014, with a growth of 1% respect to the previous year.



Fonte: NSIS e Intese Stato-Regioni

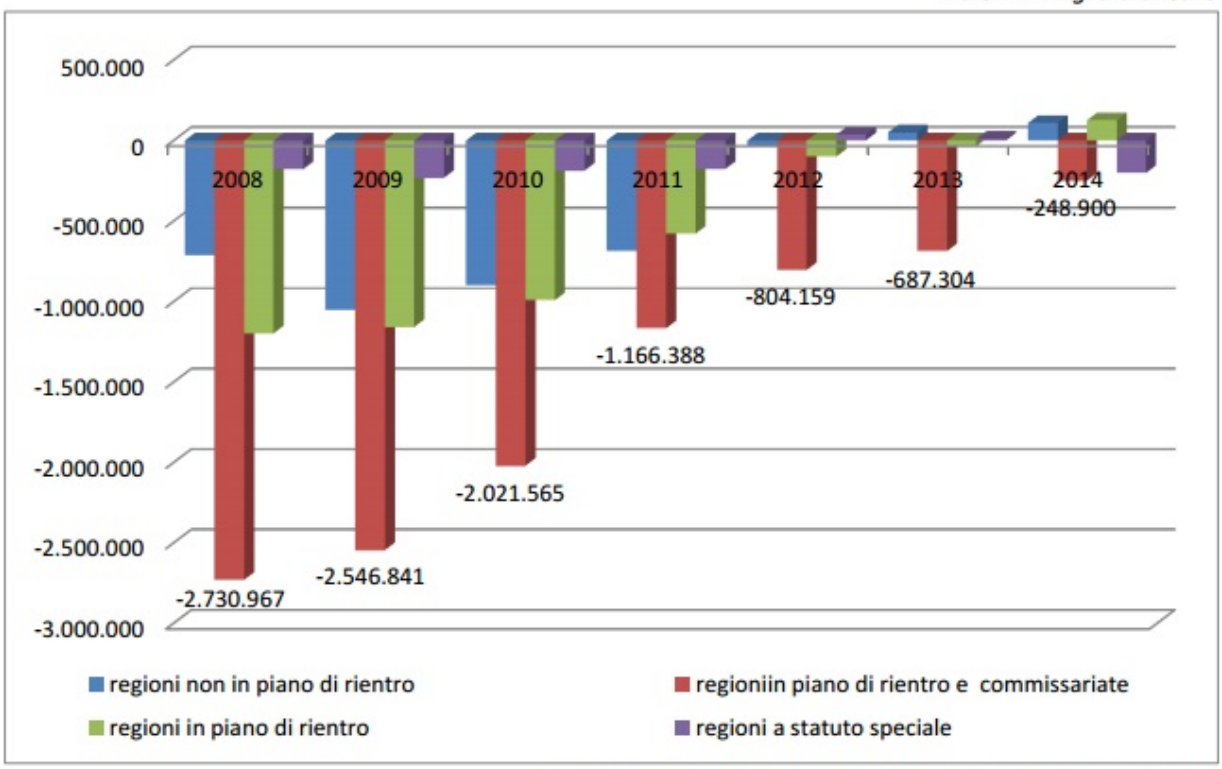
Nota:
Il livello di spesa (Totale costi) è al lordo del saldo di mobilità passiva; il totale ricavi è al lordo del saldo mobilità attivo.
Regioni non in piano di rientro: Lombardia, Veneto, Liguria, Emilia Romagna, Toscana, Umbria, Marche, Basilicata;
Regioni in piano di rientro e commissariate: Lazio, Abruzzo, Molise, Campania, Calabria;
Regioni in piano di rientro: Piemonte, Puglia, Sicilia;
Regioni a Statuto Speciale: Valle d'Aosta, Prov. Aut. Bolzano, Prov. Aut. Trento, Friuli Venezia Giulia, Sardegna.

As a percentage of the GDP Italy has one of the lowest expenditure of the western Europe. The largest part of the expenses is public (77%)



Reflecting the different types of organizations and the autonomy, trough Italy's regions composing the SSN there are substantial differences and problems. In some regions the providing of certain LEA is at risk, or generates many debts. To implement the spending reviews and constraints, many regions have been put under control from the state and the ministry of Health, that created and negotiated many "Financial Recovery plans" to try to make the system sustainable.

Valori in migliaia di euro



Fonte: elaborazione Agenas su dati modelli Ce consuntivi 2008-2014 (NSIS)

Nota: il risultato di gestione rappresentato è quello riportato nel CE delle singole Regioni prima della copertura.

Regioni non in piano di rientro: Lombardia, Veneto, Liguria, Emilia Romagna, Toscana, Umbria, Marche, Basilicata;
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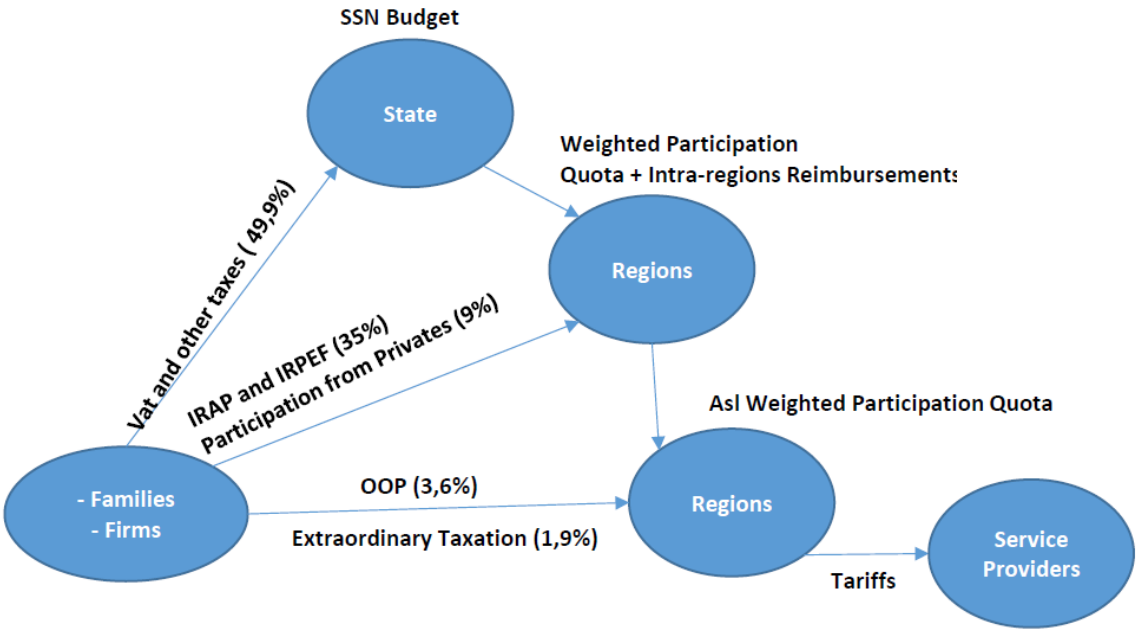
1.3.2 - The Financing System

Like the organization, the financing system has had different phases. The most important are three:

- Between 1978and 1991 the SSN was financed exclusively by the state
- From 1992 to 2000 there has been a gradual fiscal decentralization with the growing autonomy of the regions in managing the funds
- From 2001 until today the aim has been the tax federalism (by law 68/2011)

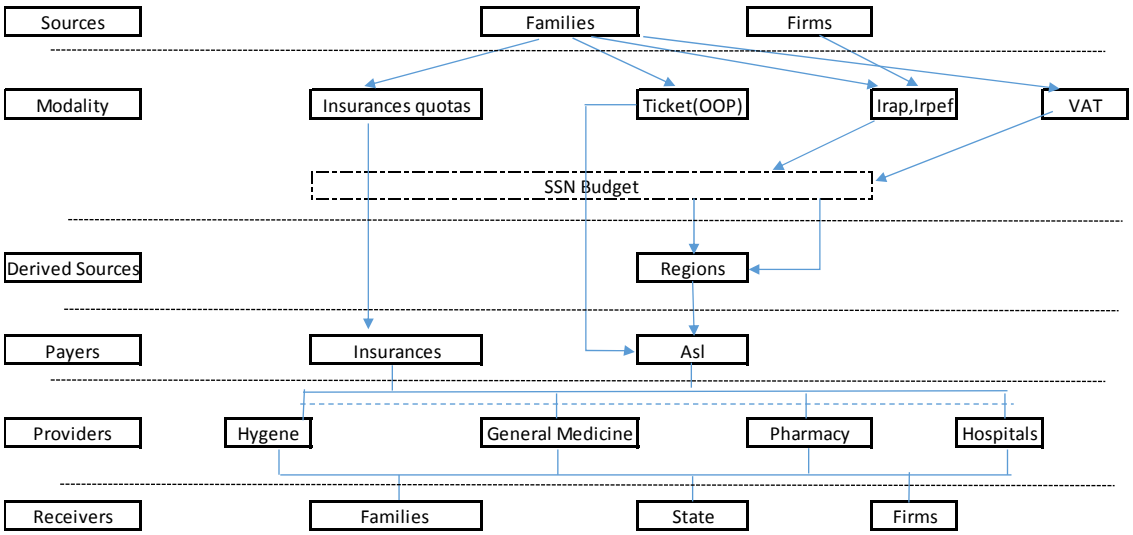
What complicates the financing system of the SSN is that usually who benefits of the service is not the one who pays, or at least not directly. It is called a system with a "third party" payer. So it must be distinct who pays in fact and who stands the price. The difference is between original sources, who puts the money, and who perform the act of paying, the derived sources. The transfer of money in the Healthcare is organised on 4 levels: The withdrawal from the families and the firms, the transfer to the regions, the allocation to the ASL and the payment to the providers of health good and services.



(Rebba, 2015-2016)

The system is financed with taxes and with full payments, only for the non-urgent services. For the services that are not urgent the state puts a "participation" quota, the ticket (OOP), to model the demand and limit the abuse. It is interesting to cite the problem of the third payer, that is debated in the Healthcare financing field. It is clear that not every payer of the SSN receive the counter service. It depends on his tendency to get sick. So it is still open the argument that asks if this system is ethical or not.

From 1st January 1998 the state abolished the centralized health taxes and passed to a system configured like the one in the previous figure. Around 50% of the contributions come from the VAT(IVA) and other state taxes, the other two contributions arrive from the Irap (Regional tax on productive activities) that depend on the employer and the Irpef (tax upon the wages of physical persons) that bundled cover for about the 35%. The autonomy given to the regions allow them to raise this tax of 0.92, raise or low in addition to the 3.9% that they request to the employers and to raise of 0.5% the 1.23% that they request to the employees. It needs to be said that the Healthcare Expenditure covers the biggest quota within the regional expenses.



A critical point in process of money transfer between state-regions-ASLs is the calculation of the single-region quota. Italy's regions are profoundly different, in people number and age distribution, as well as typical illness and lifestyle. So a function to distribute the resources had to be introduced. As first thing the fund is divided in three level: Collective (5%), District (51%) and Hospital (44%) assistance[9]. Then the District assistance is divided in the sub-levels. Some of these sub levels are weighted to divide the fund between the regions. This process ends with a formula that calculate the financial requirements of every region. The idea is to multiply the residing population for a medium value for inhabitant, corrected with health need indexes to keep count of the different medical needs by age (quota capitaria pesata):

$$R_j = P_j * k_{ij} * E_n$$

Where:

R: need of the region "j"

P: people resident in region "j"

K: indicator of health needs "i" in region "j", that is calculated multiplying the age of the regional population for national weighted indexes derived from the consumptive national consumptions

E: pro-capita national expenses

The state delivers the funds to the regions which in turn distribute them between the ASLs by their criteria, that usually are again the weighted per-capita quote. At the end of the chain the

[9] Collective in this case stands for Prevention. For Hospital is considered the Hospitalization expenses and for District the structure inside the Asl's area that grants the first-level of assistance

ASLs, which receive the state funds and the ticket paid by the users to cover their own costs and pay the service providers (single hospital, AOs[10], pharmacy, specialists).
The Italian legislation imposes to every region to grant a minimum level of service that every citizen must be able to receive, these are called the LEA, the minimum level of assistance (Livelli Essenziali di Assistenza). Between regions there are substantial difference and the state, in this phase at least, is delegating to the regions so they are achieving the full independence and the self-managing. Have also been instituted the practice of the inter-regional tariff balance due to numerous citizen accessing to the cure in a region different from the residence's one. Substantially the state moves some funds from one region to another considering where the citizen has been cured and reimburse the region that supported the expenses.

1.4 - DRG system

During the second reform of the SSN, with law 502/1992 and 517/1993, Italy has adopted a fee for service system of financing-against-service to fund the hospitals (AOs). The system is based on DRGs, that stands for Diagnosis Related Group. It is a system to classify illnesses into one of the actual 538 groups in which the catalogue is divided. It was developed by Robert Fetter and Joh Thompson. The original idea was to help the hospitals to consider the cures as products delivered by the hospitals. They had to be someway classified and studied if the hospital wanted to manage their profit/cost ratios. Also, this would have had the effect to operate a change in the attitude of the physicians that were used to act in a risk free world of cost reimbursement.
The system is basically a classification of all the illnesses. The assumption is that similar illnesses require similar ward and consume the same amount of resources and materials. So the illnesses are grouped by the characteristic of the empirical treatments and the resources that consume (labour and not-labour), the length of the hospitalization and partially, the clinic profile. The objective was to create categories that could be exhaustive and derivable from a schematic mechanism, maintaining the numbers of categories under control, at a manageable level. So in this case, every hospitalization, by some characteristics, like age and the presence of other illnesses, can be weighted and reimbursed through a medium tariff issued by the ASL to the AOs.

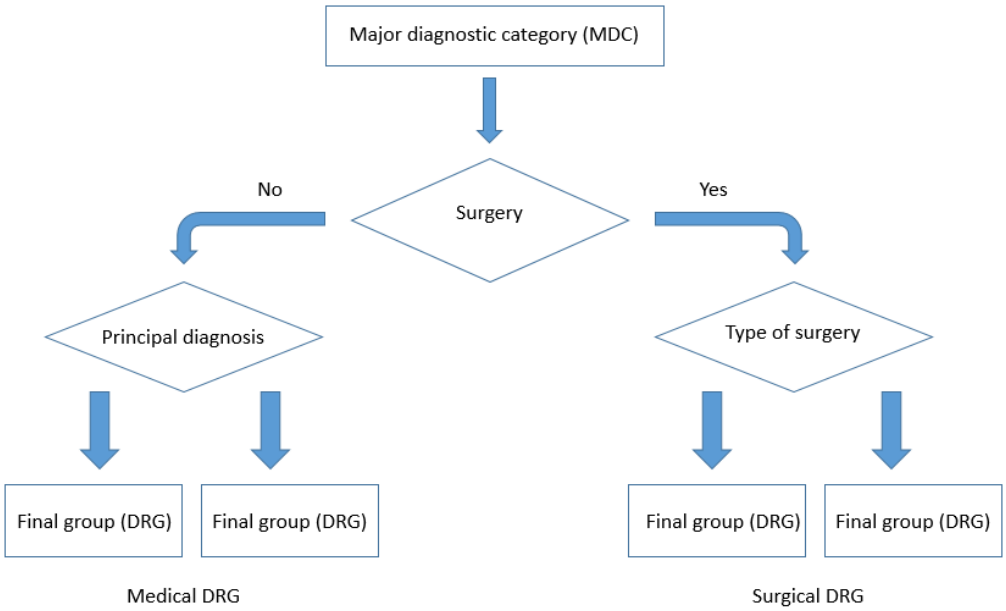
[10] The AOs, as service provider, are paid with the DRG system

The use of this mechanism should help Hospitals and the regions to calculate the effective funds requirements and to keep under control the costs, making the AOs accountable and objective oriented.

The system was first used in the USA, for the Medicare Program, to study the financing mechanism of the Hospitals. It entered in the PPS (Prospect Payment System) as way to calculate the cost of the single patient. Basically, every year an hospital received ex-ante an amount of money as if it would perform the same number of service as the previous year. The amount received, anyway, had nothing to do with the cost sustained to perform that operation. It was calculated through an equation considering three elements: the unit of payment at the dismissal, the DRG tariff and the outliers, those case that could not be compared with the common path of recovery for a certain sickness.

Today the classes of DRGs are 25, called MDCs, from the first, nervous system disturbs, to the 25th HIV infections. The system works through the SDOs (Scheda Dimissione Ospedialiera), introduced in Italy from the USA by the Ministry of Health's Decree of 28/12/1991, that is compiled by the physician at the end of the hospitalization. In it are present all the data useful to define the classes of illnesses and the patient's characteristics (age, diagnosis and surgery performed). Moreover, it contains the cost item that occurred during the hospitalization.

Basically as first the patient is catalogued by an MDC and then, by the case he supports a surgical procedure or not, ends in the category of Medical or Surgical DRG.



The data indicating the procedures provided are then converted into codes, and the final DRG is identified. At this point the output code is useful for the reimbursement from the ASL to the provider, since it is associated with a specific tariff.
The original equation, that has never been updated in Italy since its adoption, created a tariff book that considers the standard cost for stay in the hospital and attribute a weight to every treatment (every DRG code). So every illness receives a tariff, that is the result of:

$$C \times w_i$$

Where C is the medium cost for stay and w_i is the result of c_i / c_m with ci the medium cost for a particular kind of treatment and cm the medium cost of that class of illnesses' cure[11].
At the end has been drafted a Regional Tariff List.

This is the amount that the ASL will reimburse to the provider. The problem, for the AOs is that the costs are often more than the reimbursement. The tariff is underprized, as said before, to push the efficiency and keep costs under control. At the end of the day the deficit of the AOs will be anyway refunded by the region but for the macro-level is important to implement a constantly-improving system.

[11] Some treatments, called outliers receive the reimbursement of the full costs due to the too much deviation from the regular scheme.

Chapter 2 – The Programming & Control Systems in the Healthcare firms

2 .1 – The Programming & Control Cycle

As will be shown better in the third chapter, inside the Healthcare firms, the Cost analysis is made by the Management & Control department. It is a unit that has the task to collect data about the operations inside the firm and help the other units to reach their goals through periodically reports. It is a staff organ, so to say that its clients are inside the firm. It also has the responsibility to prepare the budget and periodically review the performances of the cost centres. Its operative cycle could be divided on three phases: planning (budgeting), controlling and reporting. Usually its cycle lasts a year, but the intermediate controls can be monthly or trimestral. It is an organ, born in the era of the New public management, as already explained in the first chapter, that actuated the need of a more precise and integrated analysis inside the public firms, other than reinforce accountability and reliability. From the General Accounting, Hospitals passed to the accrual accounting. Beside it, a new tool for the Hospitals, and the Health Firm in particular, has been the Cost Centres organization of the departments, aggregated in responsibility centres. This allowed the organizations to adopt an integrative way of measuring costs, and to have someone accountable for the resources' consumption. So now will be shown the tools of the Management control: The Analytical Accounting, the Information System and the costing methods.

2.2 – General Accounting and Analytical Accounting

Due to the continuous growth of the Healthcare's expenses, all around the NHSs have been implemented many techniques of budgeting and management control. Moreover, for the configuration of Healthcare reimbursement system, usually costs are more important, flexible and manageable than revenues within the Health Firms. In fact, a Health firm like the AOP, cannot act on price on the short period, because its services are reimbursed through the tariff mechanism based on the DRGs. The biggest issue for the Hospitals' management is the efficiency, obtainable only through a systematic acquisition of information. In the SSN it has been introduced trough the 502/92 Decree[12], modified with the 517/93 Decree[13] within the

[12] Art 4 Legislative Decree 502/92 paragrafo 1bis punto b):Nell'ambito della riorganizzazione della rete dei servizi conseguente al riordino del sistema delle aziende previsto dal presente decreto, le regioni possono proporre la costituzione o la conferma in aziende ospedaliere dei presidi ospedalieri in possesso di tutti i seguenti

"Managerialism Reform" and integrated in the last years with the Legislative Decree of the 23/06/2011 n°118. The investiture of the Health Firms with the legal personality and the managing autonomy has been possible thanks to the change of the accounting system. Adding the reimbursement through DRG tariffs has been necessary to activate a system that allowed to work on cost margins. The decree 517/93 itself introduced 4 new types of Balance Sheets in the SSN: Plurennials, Previsional, Consumptive and Prospectical on cash[14].

Performing the Analytical Accounting is a task attributed to the Management Control. It is an instrument, mandatory implemented after Decree 286/99 and 229/99, to measure the internal performances that should lead to the responsabilization respect the target parameters. It is a repetitive process, total, systematic, internally oriented, that despite is conducted by a staff organ, is in touch with the line (Roffia, 2002). So to say that it receives and distributes data to the internal organs of the firm and data report that allow integrative analysis, but it is still in touch with the production line. It is part of the larger "Information system", where data are collected and analysed. It can be divided in three parts: General Accounting, Analytical Accounting and Medium/long term plan (Budget and Management Control) (Facchineti, 2007).

The Analytical Accounting has become necessary due to the limits of the General Accounting (the synthetic data results and the focus about the past), when the firms needed an instrument that could help them taking decisions in the short period. The purpose of the Analytical Accounting is to elaborate data useful to strategic and operative choices and to determine the contribution of the single areas and responsibility centres to the generation of costs and profits. In the Healthcare System the Analytical accounting is focused on the costs and revenues in the responsibility cost centres.

2.2.1 - The Information System

As said before the Information System is composed by General Accounting, Special Accountings (between which the Analytical) and the Plan/Budget. The Analytical Accounting and the Budget compose what is called the Management Accounting. The Information System works thanks to the data, that can be of two types: Accounting and Extra-Accounting (Operative Facts) (Facchineti, 2007). Both must be considered when producing the reports on

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requisiti: b) disponibilità di un sistema di contabilità economico patrimoniale e di una contabilità per centri di costo;

[13] Legislative Decree of 07/12/1993, Article 6, comma 1, Point d): Le regioni provvedono ad emanare norme che prevedano la tenuta di una contabilità analitica per centri di costo, che consenta analisi comparative dei costi, dei rendimenti e dei risultati

[14] Art 4 Decree 517/93

the firm's activity (Balance Sheet, Cost-Centre Results, Statistics). The General accounting, the first and most diffused method of analysing the firm's cost and profits is still used, but often is integrated with special methods of registration like the analytical one. It has been necessary to update the system due to the undeniable constraints that this system showed. This situation generated the need of a deeper level of analysis and this must be directed inside the firm. So the Analytical accounting differs from the general one in many characteristics (Facchineti, 2007) (Capodaglio, 2011):

- Objectives: the objectives of the general accounting are limited to the determination of the profit, the working capital and the financial movements. The objectives of the Analytical accounting are multiples and, to obtain useful data, often must be changed also the measurement instruments and the analysis perspective. For example, the Analytical Accounting can be used to investigate the preventive or consumptive determination of cost for products or for class of products, for single operations or single activities (ABC), for the single responsibility centres or cost centres and finally to determine the prices of the products and so o set the budget and the results control.
- Results Destination: The results from the General Accounting, or the balance sheet in its two parts and the integrative note, are usually destined to third parties, outside the firm, and to all the stakeholders. The results from the Analytical Accounting instead, are destined exclusively to the internal bodies of the management, to which are important control and directional instruments.
- Execution manner: In the General Accounting the data collection is performed through the double entry method, while in the Analytical Accounting many instruments are considered (indexes, percentages, times).
- The temporal period of reference: The General Accounting manages the data in a consumptive way, with the synthesis at the end of the year of the past management. In the Analytical Accounting the data collection is both preventive and consumptive, the preventive to obtain info for the decision and the consumptive to analyse the gaps from the budget projections. These operations have frequencies shorter than a year, usually trimestral.
- Spatial Extension of facts: The General Accounting measures only the firm's facts that influence the profit or the capital while the Analytical Accounting detect every fact that is possible to measure and moreover, the costs (there are costs that are detected by

both the Analytical and the General Accounting and costs that are detected by only one of them[15]).

- Detection Moment: The General Accounting attributes importance to the phenomena when they appear trough numbers (financial moment) while for the Analytical Accounting a fact is relevant in the moment it consumes some resources or generates results (technical moment) also not economical.
- Operational Destination: In the General Accounting, revenues and costs are divided by causal criteria, so by nature. In the Analytical Accounting instead, the costs are divided by destination, or in relation with the cause of the operation itself.
- Compulsoriness: The General Accounting is compulsory while the Analytical Accounting not always. In the case of the SSN it has been made compulsory after 1992.

As the purposes of the General have been already showed, so there have to be explained the aims of the Analytical Accounting, that are different from those of the first. They are, the control of the costs in order to reduce them, to verify the firm efficiency, the control of the activity, to verify if they follow the program, to control the prices and to take decisions about marketing, wage policies and sales. Moreover, it must not be forgotten that the two types of accountability are connected, in fact the General furnishes data to the Analytical Accounting.

2.3 - Cost accounting in the Healthcare Firms

As any other firm, in the Health firms the cost analysis is fundamental. For the special nature of the reimbursement system in this kind of firm, the focus on the production efficiency has a predominant role in the short term performance control. Through the DRG tariff in fact, the Health Firm receive a reimbursement that often do not keep count of the cost sustained to produce a certain service. So the Firm must actuate a policy of continuous improvement of the activities and cost reduction. The literature about the cost says that the costs can be divided in categories. And that they behave differently due to their different nature.

2.3.1 - Cost Classification

The first possible cost discrimination is the one that follows the production volumes' variation: the variable, fixed and semi-variable costs distinction. The accountant can

[15] The cost of the resources interests both the AA and GA, the figurative costs are detected only by AA and Accounting expenses are measured only by GA.

distinguish the costs thanks to the movements respect to the units of output produced. The output level is variable is usually due to the demand, the production conditions, the environment and many other external factor, actually, is almost impossible that a firm conserve its output level stable. The firm adjust the level to maintain itself competitive in the market and not generate too much unsold warehouse. This change obviously generates changes on the costs. Maintaining the example of the NHS, the costs change with the more people accessing to the cures. But what costs change?

2.2.1.1 -Variable Fixed and Semi-Variable

Variable Costs

The variable costs, that are those costs that are susceptible to changes of the production level. This class can be sub-divided in three other classes, the proportionally variable, the degressive and regressive proportionally variable. The proportional vary with the same path of the output level, so they are represented by the equation $Tot\ Cost = single\ cost\ x\ N°\ units\ of\ output$

To know the cost for one unit it is sufficient to divide the total cost for the N° of output.
The Degressive costs are those costs that vary less than proportionally, but still in the same direction of the production level. For example, when the N° of output is doubled the sum of the cost increases but less than the double. The equation that represent this cost is:
$Tot\ Cost = b\ x \sqrt{N°\ Units\ of\ Output}$
Progressive costs (more than proportional) are those costs that vary in the same direction of the N° of output but more than them. If the volume doubles the costs are more than double. Usually this happens when in the production the level is over the optimum production quantity. The function is:
$Tot\ Cost = a\ x\ (N°\ Units\ of\ Output)^{\wedge}2$
The fixed costs

Are those costs that do not vary with the output level, they remain stable most of the times. It must be said that could change for very big variation of production level, but in the order of double production, non for small changes. Moreover, they change slightly in long time horizon, due to factors not only productive. The distinction of variable and fixed costs is important only in a short period perspective due to the possibility of affecting of the decision that this data imply.
Fixed cost are characterised, in the short period, by a constant trend. The only thing that varies is the fixed cost portion for unit produced, that is obviously decreasing. To perform a

complete and correct Management Control activity inside a firm it is necessary to understand and detect the distinction among fixed and variable costs, starting from the budget and the production plan, the firm must be able to estimate the costs (fixed variable and semi-variable) and use this data to manage them. The instrument of the flexible budget, with simulation of multiple case-scenario, is based on the cost projection and management. With the consumptive data then the firm will analyse the margins and the gaps.

Semi-Variable Costs

These costs are characterised by no changes within some intervals and changes when the production exceed those limits. These costs are constituted by the sum of fixed and variable components. Their formula is: $Tot\ Cost = K + (b * X)$

With K the fixed component, b the unitary cost and X the variable component used. There are two semi-variable costs categories: the first in which the fixed component is easily separable orm the variable one and the other called "a gradini" (where the separation of fixed and variable components is subjective and an accounting choice) (Amodeo, 1960).

To separate the two cost components there exist various methods, including mathematical and statistical. They are: the method of the two activity volume, the graphic interpolation and the least squares method.

- The two activity volume method consists in calculate the difference between two volume of activity and between two costs. So the unitary cost Cu is given by

  $Cu = (C2 - C1)/(Q2 - Q1)$

  And the fixed cost is obtained multiplying Cu for Q2 and subtracting C2

- The Graphic interpolation method is based on the representation in a Cartesian Diagram of the costs, considering cost in the Y and quantity in the horizontal axe. Then it is sufficient to draw a line crossing the dots drafted, leaving an equal number over and under and then extending to the axes. In this way there appears the fixed cost
- The least squares method is the most precise and reliable one. On the other hand, is more complicated and articulated. The interpolating straight line is represented by an equation, usually y=ax+b. The two variables "a" and "b" are obtained resolving with the equation of the least squares[16].

Special and common

[5] Tot Cost= a + xb, where x= units produced, y= cost sustained, n= number of measurement, a= $(\sum xy - \sum x \sum y)/(n\sum x^2 - (\sum x)^2)$, b= $(\sum x - b\sum y)/n$

Another criterion to determine the cost is to differentiate them between special and common. This distinction has the task to detect whether the costs are relative to a single or to multiple outputs. A cost can be called special if can be referred to a single object, or service and so can be registered in the Information System with no doubt. More difficult to attribute are the Common costs, those costs that participate to various processes or that contribute to many outputs. They need a criterion to be attributed and distributed. These criteria allow to distinguish between specializables and not specializables. The first can be attributed to output factors trough some parameters, on the other hand for the latter is impossible to find adequate parameters if not strictly subjective or discretional. The issue with this kind of costs is they are not manageable if not attributable.

Direct or indirect costs

The Direct costs are those costs that can be attributed to an object directly, not passing through parameters or cost centres. The attribution of the cost to the object follows a functional or physical criterion. The direct costs are always variable. As indirect cost, instead, it is possible to define all of those negative components that cannot be destined to the product directly and need a "overturn"[17] through parameters.

Controllable and Not Controllable Costs

The last classification attributable to costs is about the control the firm can have on them. Some costs are simply not manageable. This distinction is the first to be done in the Management Control process, along with the decision of the controller of that cost, that possibly will stick to the budget. When defined a cost centre, or the centre where the costs are grouped (buy may not be originated there), it is also necessary to define a Responsibility Centre, where are grouped only the cost generated inside it. Inside the responsibility centre is performed the efficiency and the strategic control. Every choices and strategy is here verified and analysed by its cost-profit analysis. Thanks to the budget then will be remunerated through prizes those cost centre that well performed and punished who under performed.
The uncontrollable costs on the other hand, cannot be attributed to the single centre.

2.3.2 - Costing Model in Healthcare

Before talking about costing model, it must be defined what a cost is for an organization and how it is generated and detected. As cost, in management control, is defined everything that

[17] Ribaltamento

consumes resources for a useful purpose (Facchineti, 2007). Some clarification must be made about the cost: it is a nominal value, so it may change with the change of the analysis perspective. Often is an abstract quantity, in the sense that the analyser ignores all the conjunctions that it has with many other components that affect it value. For example, in the General Accounting the cost is something that ends up only in the profit calculation while in the AA the cost is used to calculate the margin on some product and its resource consumption. As said before it is different also the time of the detection (in General Accounting the purchase moment, in Analytical the moment of the consumption). So different way of considering and analysing costs exist, which are called cost-configuration. These configurations follow different criteria, as said before. The cost can be classified as variable, semi-variable or fixed, referred to the object, so they differentiate between special or common, or defined through the modality of attribution, and so they are direct or indirect, controllable or not and as last how they are used, so that can be consumptive or budget (preventive). So every possible analysis, at turn, exclude some elements and include some others.

2.3.2.1 - Full costing and direct costing

Usually the economic literature identifies two costing methods. They both need the Analytical Accounting to be performed.

Full Costing

The full costing method is a pretty simple method of costing that allows to attribute the common costs to the products through some drivers chosen by the Control Management. To the product are allocated all types of costs possibly related to it (direct, indirect, variable, fixed, special or common). The principle adopted by this method is the full absorbing of the costs participating to the process, by the product. The costs are attributed to the object even without a biunivocal relationship between the two. So it will be necessary to elaborate some sharing method to attribute the indirect costs to multiple products. These criteria usually are two: with an unique assigning criteria or with the distribution of the costs to the cost-centres and then moved to the objects. The first method is implemented adding all direct costs to the product and then the fixed costs are divided with the chosen drivers (time, space, operators, value of direct costs). It is an easy method, that is also very subjective so the quality of the calculus is consequential to the strength of the causal link between the cost and the process. It is not possible to elaborate a criterion valid for all the situations, the choice will be different depending by the product and the processes. Before the mechanization, the main criterion

followed was the labour (by the workforce), but with the arrival of machines that do most of the work and with services economy expanding, they had to be changed. To overcome these issues, there exist a method called "Full costing on Multiple Basis". It is applied inside complex firms, usually multiproduct, where an intermediate cost aggregation can be established, in other words to develop a cost centres system. Inside this centres are collected all those cost components that cannot be destined directly to the product. From here they are reversed to the different products or services. The identification of multiple cost bases must stick to the different cost classes of the production factors. For each class of costs can be found the most appropriate base, and obviously the costs that can be grouped are put together. The bases can be mostly two: those which evidence the absorption of services by the final product and those which follow some dimensional criterion to attribute the consumptionss.

Direct costing

Simple direct costing

It is a simple method of cost attribution that put on the product only the variable costs. The fixed, are not considered. They are subtracted at the aggregated contribution margin to develop a BEP analysis. The output product in fact, has to cover the variable costs and leave a portion of margin to cover also the fixed costs. The problem is that, in this method, the fixed costs are not allocated through special and common and so the result is not useful to manage. For example, the special fixed cost portion attributable to a product, if no managed, leads to a missed comprehension of what the product relay cost and do not allow the efficiency reachment.

Evolved direct Costing

This method allows to overcome the limits of the simple direct cost, in fact it is based on the distinction between fixed and variable costs, and split the fixed between special and common. Through this method it is possible to calculate the first level margin and the second one, impossible with the previous system. The fixed costs are not added together but split in special, attributable to the product or service, and common, counted only in the aggregated second level margin. This method is applied on firms multiproduct and multidivisional. This calculus method is the base for the choice of Make or Buy.

2.3.3 – Activity Based Costing: Development and Application

One of the last methods to study costs, and the one I will adopt in the fourth chapter, is the ABC, a new (when it was invented, in the 80's) way to think about cost destination. It was invented and perfectioned by Robert Cooper and Robert S. Kaplan[18] with many articles and case studies[19]. This method was appreciated since its invention by professors and professionals of the field. The idea is that the cost is no more attributed to the Cost Centre but to the Activities. It is a Full costing application, because it considers the Direct costs and the Indirect costs allocated between special and common. It ignores the concept of Production Volume or quantity, but focus on the Activities. The core concept is that the Activities consume resources, and generate costs, on the other hand the products requires activities. So the products generate costs in an indirect way. The problem that this method solves, is that the "old" costing techniques, focusing only on the product production, lose some information on the activities conducted inside the firm, on the other hand, the ABC can study all the activities performed and attribute them to the final product, so it is useful also for the price definition. In the end the costs are attributed to the products through a two steps procedure: as first the costs are attributed to the activities, and second the activities are attributed to the products. This method isn't just a measurement technique, it is also a "Cost Management" instrument, a Management Control tool and a help in the Make or Buy decision. It can be said that the products' production does not generate costs, it generates only activities, that require resources to be performed. The application of this method has been vast thanks to its characteristics. In fact, the ABC, contrary to the classic cost centres configuration, where the cost centres were extremely detailed, but lost all the service distribution activities, allows the Management to overcome this separation between production and activities necessary to it, and to develop an organic view of the firm. Basically the ABC method substitute the cost centres one. This approach consists in allocating the cost to pools, called cost centres, that are operative units that are identified by operative criteria. The cost centre can be: intermediate, if its costs are attributed to other cost centres, final centres, if their costs are attributed to the final products, virtual centres, if created artificially to collect general cost or auxiliary if its cost are attributed to the production support. With this method the calculation of the product cost is developed by a driver that represent the "usage" of that centre in the production of the final product or service. Through this driver, called unitary coefficient, the total cost, attributed to the cost centre, is allocated to the output. This driver usually refers to the

[18] Professors at Graduate School of Business Administration in Harvard University
[19] R Cooper, RS Kaplan - Harvard business review, 1988
Cooper, R. 1990. Implementing an activity-based cost system. Journal of Cost Management (Spring): 33-42 - Cooper, R. and R. S. Kaplan. 1992. Activity-based systems: Measuring the costs of resource usage. Accounting Horizons (September): 1-13.

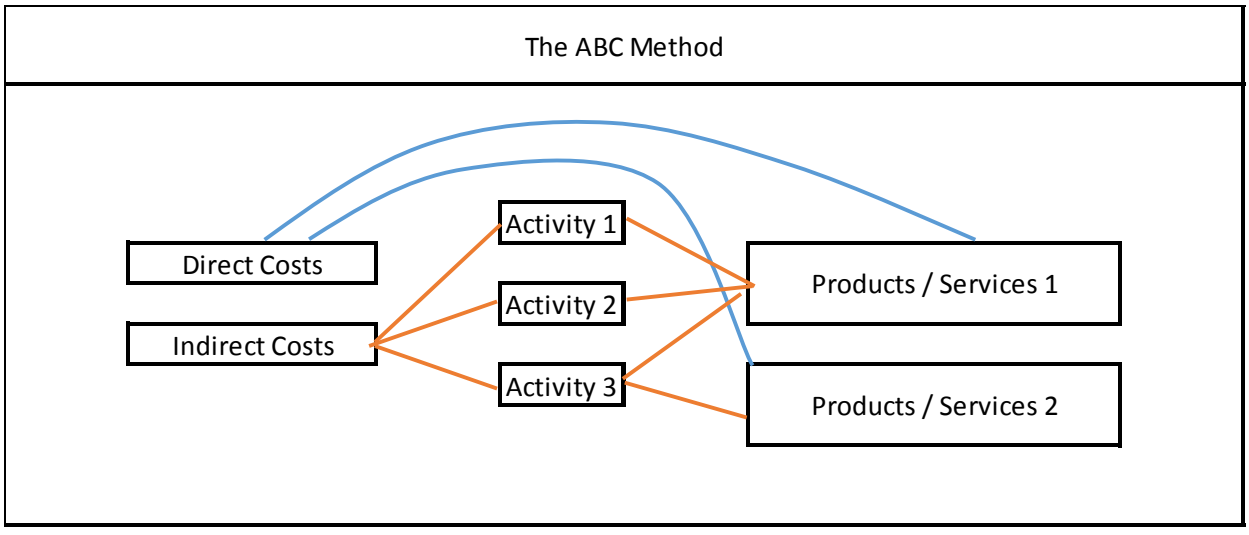
workforce or time consumption. Often, inside the firms, the indirect costs are allocated with indistinction between resource consumption, especially in multiproduct firms where products may require different amount of resource consumptiond. In the end the product cost calculated like this does not allow to study the real resource consumption. With the ABC, instead, some indirect cost can become direct, through the Activity study, so the Product Cost will be more objective.

Identifying the activities allows to identify numerous and more accurate Cost Driver, that will allow the Activity Pool to be better distributed between the costs. A new element is also that the activities are Transversal respect to the Production, some activities can be referable to many products and this is the strength of this Measurement System. At the same time, it is a help for the accounting system, the analytical one, to whom offers information about the activities and the product costs. So in potentially help in increasing margins also in activities disconnected to the physical production.

2.3.3.1 - The ABC phases

The ABC method is characterised by different phases. Some authors group them in three, and other include the phase anticipating the application of the method. I choose to develop the method in 4 phases, as I will do in the case study:

1. Allocate the resource directly to the products, or services (Direct Costs)
2. Identify the activities that are performed in a department or in a firm
3. Allocate the indirect costs, or the resources that are not directly attributable to the final product or service to the activities (Cost Pooling)
4. Allocate the activities to the products, through the cost drivers



If the first step is easy to do, from the second on there are a few conceptual difficulties that the Manager may face. For example, before identifying the activities, it must be kept in consideration that the activities, to be defend, needs some requisites. They consume resources, generate costs and are absorbed by the products. All the indirect costs must be allocated to some activity, even if they are administrative, selling or marketing costs. All the activities inside a firm are addressed to produce products, and for this reason all costs must be absorbed by them. All costs are considered variable, since they are connected to the cost-driver, that are subjective. The attention is focused on the non-productive activities, the most difficult to attribute to the products. They usually vary not with the production volume but with the complexity of that activity, so it need elaborated cost drivers.
It can be said that with the ABC the firm is looked with a horizontal optic, not vertical like the cost centres division. In fact, the activities are all at the same level and the processes run through them. As last the activities allow a systematic analysis of the firm, and overall a study of the steps that really add value to the product, and influence the profit.

2.3.3.2– Identification of the Activities

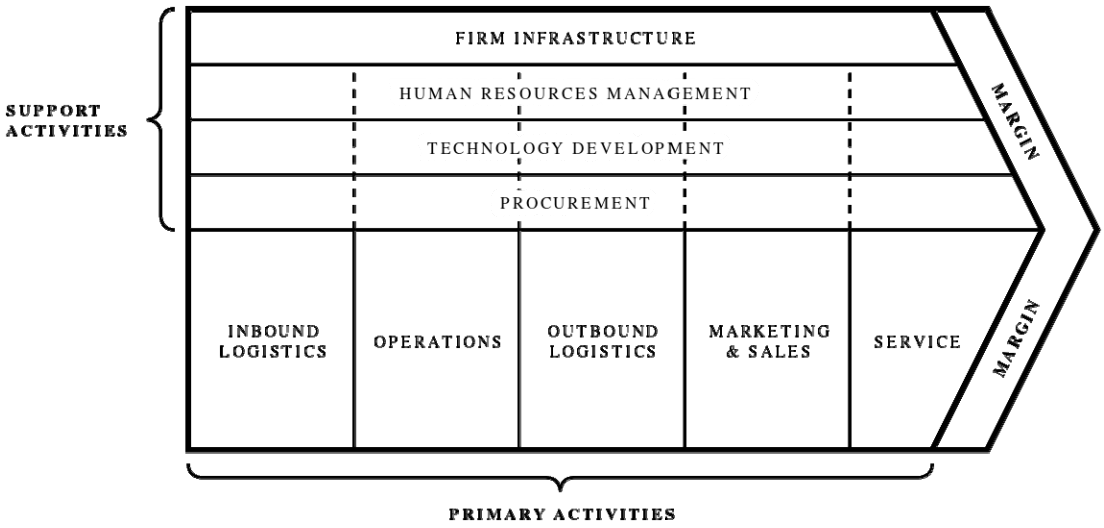
The meaning of Activity, as defined by Porter is: "All those actions that physically, technologically and strategically distinct that a firm implement to project, produce, sell, deliver and assist the products (Porter, 1985). So every activity needs some resources, has an object or client, has a definable output and is measurable with indicators (Roffia, 2002). To identify an activity, according to Roffia, would be sufficient to ask where and how the resources are consumed. Technically they could be almost infinitely subdivided (micro activities, elementary tasks etc.) but this would lead to a too complicate analysis system. It depends how much margin a firm supposes to have on the activities and where it thinks that the value is created or lost.

Activities can be classified like this (Cooper-Kaplan, 1998):

- Unit Level Activities: Those Activities necessary to the realization of the good or service. Usually there exist a quantitative relation between the goods or services produced and the resourced consumed. The cost of these activities can be attributed proportionally to the number of output produced.
- Batch Level Activities: Those Activities that are performed when a batch of product is realized.

- Product Level Activities: Those activities referred to the projecting, engineering, tests, controls, in short all those process that supports the birth of a product.
- Order related Level Activities: Those activities that are referable to the orders by the clients.
- Customer Sustaining Level Activities: Those activities directed to specific clients, like visits to vendors, technical support and assistance. Not connected to products but to clients.
- Channel Level Activities: Those activities performed only in some selling channel, like advertising campaigns for specific channel.
- Product Line Level Activities
- Brand Level Activities: All those Activities relative to the maintenance of the brand, its revitalization and Management
- Facility Level Activities: The category for all the activities that cannot fit in the previous and are indirect. Usually here there are production support, selling support and central structure activities.

With the definition of activity, a firm can proceed to identify the various activities of its organization. Usually the first step is to identify the elementary processes. They are aggregation of activities, and so the best way to identify them is to ask to all the responsible of the cost centres which activity is performed inside it. Keeping in mind the Organizational chart it can be done through a simple survey. The special focus in this phase is on the production support activities, which carry the most of the indirect costs. They can be logistic, balancing (warehouse management), quality control and change (those activities that help to modify the firm structure at the organizational and production level) (Moisello, 2000). As already cited, Porter furnishes a criterion to detect the activities over the survey. It can be done following the Value Chain by Porter (Porter, 1985).



(Porter, 1985)

This is the Activities configuration inside a firm following the Porter's model. They are divided in Primary and Support Activities. The primary are:

- Inbound Logistic, that are about the arrival, warehousing and resource acquisition.
- Operations, all of the transforming activities on the resources that make the product.
- Outbound Logistic, or the management of the final products
- Marketing and Sales, or the activities through which the goods are sold and the management of the channels through which the customers get to know the firm.
- Service, or the activities that aim to better or add value to the product in the market

So can be considered primary all those activities that are implemented in the Physical creation of the product, its selling and transfer to the purchaser, and the post-sell assistance (Porter, 1985).

The support activities are characterised by the act that sustain the primary and furnish themselves inputs, technologies, HR and other functions (Porter, 1985). Porter detect these:

- Procurement, or the activity of input acquisition
- Technology development, or those activities that aim to better the products and the processes[20].
- HR Management, or the research, hiring, training and motivating the workforce

[20] Porter call this activity "Technology" avoiding on purpose the Research & Development name to give a broader meaning, in fact keeping the technology updated means also updating the research method

- Firm Infrastructure, or those activities related to the Direction, Management, Financing, Quality control and relation with stakeholders.

These distinction of activities is helpful to determine those activities that add value to the product or service and eventually improve the efficiency and efficacy. Obviously after the detection of the activities they have to be grouped in homogenous categories to simplify the calculus of the cost ant the cost driver choice.

2.3.3.3– Attribution of Resource Cost to the Activities through the Cost Drivers

The Cost Drivers are tools used to attribute a consumption of resources to an activity. Since not all costs can be directly ascribed to a specific activity, like the workforce that operate in more than one activity, when it is not possible to measure the time of application to a task, or a machinery in which is impossible to define the occupation per job, there is the need to elaborate some criteria to allocate these costs and define the amount of consumption of resource that the single activity needs. These criteria usually are mathematically expressed with some variables, it is the case of time, quantity of production and historical data. These are all subjective decision by the controller, that anyway need a correspondence with the real (causal relationship). These cost drivers must, in any case, allow to establish a direct and proportional relationship between the resource and the activity. The sum of all the cost associated will give a cost following the Full-Cost criterion.

2.3.3.4– Attribution of activity cost to the Objects through the Activity Cost Driver

When all the costs are distributed between the Activities, the next step is to impute the activities, proportionally, to the products. This is possible with Activity Cost Drivers. The important is to detect or create parameters through which link the activity (and its costs) to the final product or services. The innovative point of the ABC, in this case too, as the cost driver, is het the parameters chosen can also not be linked to the production quantity, and the sharing criteria is not proportional to the number of output produced. The decision about the choice of the cost driver are usually two: How many and Which cost driver choose. About the question of how many cost drivers choose, it must be said that higher the number of the cost drivers, more strong the causal link and better the analysis, but to high limits the analysis flexibility and speed. When more activities have homogeneous consumption of resources, they can be grouped in a resource pool and for them can be used only one driver (Roffia, 2002). Usually the choice of the number of cost driver should keep in count three arguments, the umber and

diversification of products, in fact if two objects utilize the activity in two different ways and quantity, it is better to elaborate at least two activity driver. The second element is the cost of aggregating the activities, and the third is the difference in the production quantity. If two products are produced in quantity very different, the N° of output will not be a good criterion and maybe considering two of them are better. The choice about which drivers to choose instead, should be based on the ease of getting the data, the behavioural effect induced by the driver and the correlation between the real consumption of resources and the consume indicated by the cost driver. The ease must be taken in count because the analysis should be economical, and minimize the measurement cost. Should be chosen parameters that are already known inside the firm and of easy access. The behavioural effect can be dangerous because if a worker knows he is measured, he may change his rhythm and efficacy. So the measurement should be taken always in agreement with the worker or letting him know the aim of the research. As last the correspondence of the consumption with the quantity indicated by the parameter. It should be kept in account when the driver expresses the consumption indirectly, so it is not immediately applicable on the real cost.

2.3.3.5– The next step: Time Driven ABC

An evolution of the model ABC is the Time-Driven-ABC. It is a tool, added to the basic ABC, that allow to distribute the indirect costs to activities and to products basing on time, it is clear that require mechanic measurement to be performed. The principal idea is that the costs are transferred to the objects through time criteria, so time is used as cost driver. The advantage is that the cost measurable by time does not need to be elaborated though mathematical operations, if not the calculus of the cost per hour, and then is applicable directly to the activity. Moreover, here is not need to interview the workers, because thanks to the measurement the time dedicated to the activities is clear (Kaplan&ANderson, 2007).
This model requires two type of calculations:

$$Capacity\ Cost\ Rate\ for\ Resource = \frac{Expenses\ Attributable\ To\ Resource}{Available\ Capacity\ of\ the\ Resource}$$

So as numerator it should be considered all the costs associated with supplying the resource (if it is a worker it would be the wage), as denominator the capacity, so the available time[21]. As second, "must be used the capacity cost rate to drive departmental resource costs to cost

[21] In Kaplan and Porter "How to solve The Cost Crisis in Healthcare" (Cooper&Kaplan, 2011) is explained a pretty clear example: Annual compensation of a Physician, divided by month, and this value divided by hours available for him to work in a day multiplied by effective workdays in a month

object by estimating the demand for resource capacity that each cost object requires" (Kaplan&ANderson, 2007). This tool needs only an estimation of the time requested by a client or order to be processed. It is sufficient to catalogue the activities' variability and elaborate equations that give back the time for a certain operation with certain characteristic.

The advantages of the TDABC over the ABC are:

- the major speed and the expense reduction to the measurement
- the more analytical definition of the variables and the availability of the capacity utilisation data
- more access to efficiency analysis
- estimation of the unused capacity

Chapter 3 – AOP

3.1 – Organisation History and Important Numbers

The Azienda Ospedaliera Di Padova (Padova's Hospital) was formally born in 1994 (Regional Law n°56 of 14/09/1994), but its institution type derives from national law 30/12/1992 n° 502 (See chapter 1). However, the History of healthcare in Padova is very long. It starts in the fifteenth century with the Saint Francis Hospital. In the 1764, it became a very innovating institution thanks to the mix of treatments, education and experimentation. The last innovation was in the 1798, when, after a vast funds collection and a new project, the structure in the area that is still used today was completed. Until 1890 it remained Institution of Public Assistance and Charity (by law 17/07/1890 n°6792) and then converted to a public institution in 1968 (law 12/02/1968 n°132). As already explained in the first chapter, the reform of the NHS (SSN in Ialian) created a new type of institution, the Azienda Ospedaliera (Health Firm). This reform interested a few hospitals in Italy, in fact every Hospital that had certain characteristics could pass form a pure public institution to an institution with a particular autonomy and receive the name of Azienda Ospedaliera (i.e Helath Company). With law 16/11/2001 n° 405 the SSN allow every region to institute autonomously AOs, as long as they meet some characteristics. They are:

- To have a departmental organization
- To have a Cost Centres Analytical Accounting
- To have least 3 Operative Units defined as "High Specialization"
- To have a Second Level Emergency Service
- To perform Integrated Regional Projects with the role of central Hospital
- To Hospitalize at least 10% more of the medium hospitalized patients from other regions, respect to the region
- To have a Hospitalization Complexity Index at least 20% more respect to the region [22]
- To have a personal real estate that allow the institution to perform its activities

Thanks to these characteristics the Hospital of Padova could separate from the Local Health Trust and obtain the qualification that led it to have autonomy as long as responsibilities. In

[22] It is an index that allow to confront the complexity of the patients treated. It is calculated through the ratio of the average weight of hospitalization of an Institution over the average weight of the national or regional hospitalization

fact, a General Director was nominated and held responsible for the results, economical and of performances.

Due to the special nature of the core business of the AOP, merit goods, the firm has specified its institutional purposes and its core values. They can be found in the Corporate Deed (AOP, Atto Aziendale AOP, 2015) at article 4 and 5. The 4, states that the AOP helps the Regional Health System to pursue healthcare in the Padova area, and to offer high specialization in all the Padova province and in the Veneto region. The second aim is to contribute to the teaching Medicine in the Università di Padova.

Its core values are (AOP, Atto Aziendale AOP, 2015):

- People Centrality
- Equity
- Quality (of the Assistance and of the Management)
- Teaching and Training
- Innovation & Research
- Ethic
- Full transparency
- Sustainability

In the end the Vision of the AOP (art 6 Corporate Deed) is to be a firm oriented to: Realize the SSSR integration, to be the reference Institution for the Regional Healthcare, to maintain a central scientific role in the National Healthcare System, to promote the birth of assistance institutions in poor areas of the world and to develop a new model of collaboration between the AOP and the Padova University.

These are the numbers that, in short, describes the AOP (AOP, 2016):

Services Produced:
110.388 First Aid ER accesses
60.218 Hospitalizations
61% Emergency Hospitalization
45.044 Surgery Acts
7.118.892 Outpatients Services
5.757.048 Laboratory Tests
6.310 High Complexity Hospitalization
246 Million Euro as Hospitalization Value
258 Organ Transplant

11% Extra-Regional Attraction (as compulsory to maintain AO status)

About the HR:
4733 employees, 960 volunteers
74% women, 26% men
Professional Role: 72% Healthcare, 19% Technic, 8% Administrative, 1% Professional

Student Employees:
2.758 student from Medicine and Surgery School
400 apprentices, 376 in Post-Laurea Apprentice
1.125 Specializing Students

About the Facilitites:
52 Buildings, 250.000 square meters

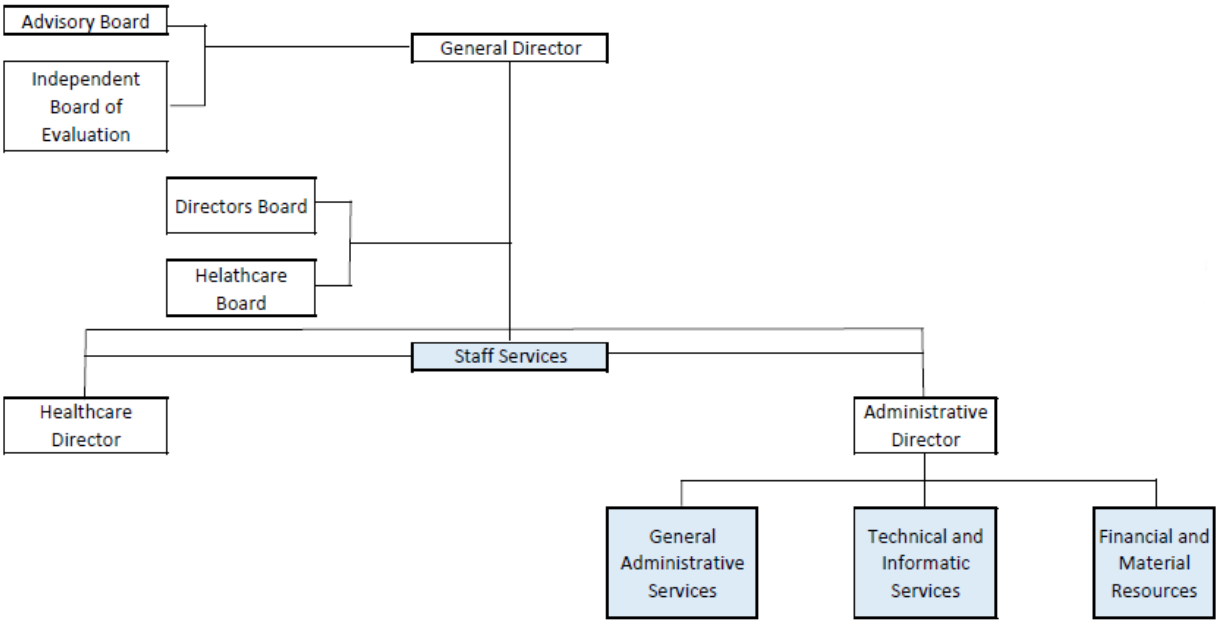
3.2 – Organizational Structure and Management Control System

The organizational structure of the AOP can be derived from the Corporate Deed, the document, required by Regional Law n°56 of 14/09/1994, that give legal personality and management autonomy to this Health Firm. At title 2, page 12 (AOP, Atto Aziendale AOP, 2015), this Act describes the bodies of the AOP, the main three are:

- General Director
- Board of auditors

The general Director, nominated by the Region and the dean of the Padova University, dispose of the Management Power and the legal representation of the firm. He/She is responsible of the achievement of the goals of the organization and of the internal control. The two managers that collaborate with the him are the Health Director and the Administrative Director. They manage the network of all the directors of the departments, the first focusing about the Hygiene and the Healthcare services, the latter about the management aspects.
The Board of Auditors, instituted by Law Decree 502/1992 is a collegiate body, that is responsible of the institutional control of the firm respect to the law and the economic principles. It is nominated by the General Director, and lasts for 3 years. It meets monthly and communicate to the region about the management and the institutional facts.

The Advisory board (Collegio di direzione), instituted by art 17 of Decree 502/1992, is a collective body too, that helps the General Director in the in the management of the clinical activities the programming of the Health activities, the organization and implementation of the services and the management of the human resources. It is composed by the General Director, the Health Director, the administrative director and the director of every Department of the hospital. Its tasks are: to help the General Director, to help elaborating the Activity program of the firm and to support the decisions about the purchasing of operative areas and about the operational plan of the firm.



3.3– Planning & Control Process in the AOP

Due to its special institutional nature, a firm, in the AOP, by regional law 55/1994, all the strategic and operational choices are founded on the National Health Plan and the Regional Plan23. The law says, moreover, that the Hospital must draft a General Plan that:

- Must be consistent with the regional plan
- It must be adopted within the 31 December
- It is annually updated

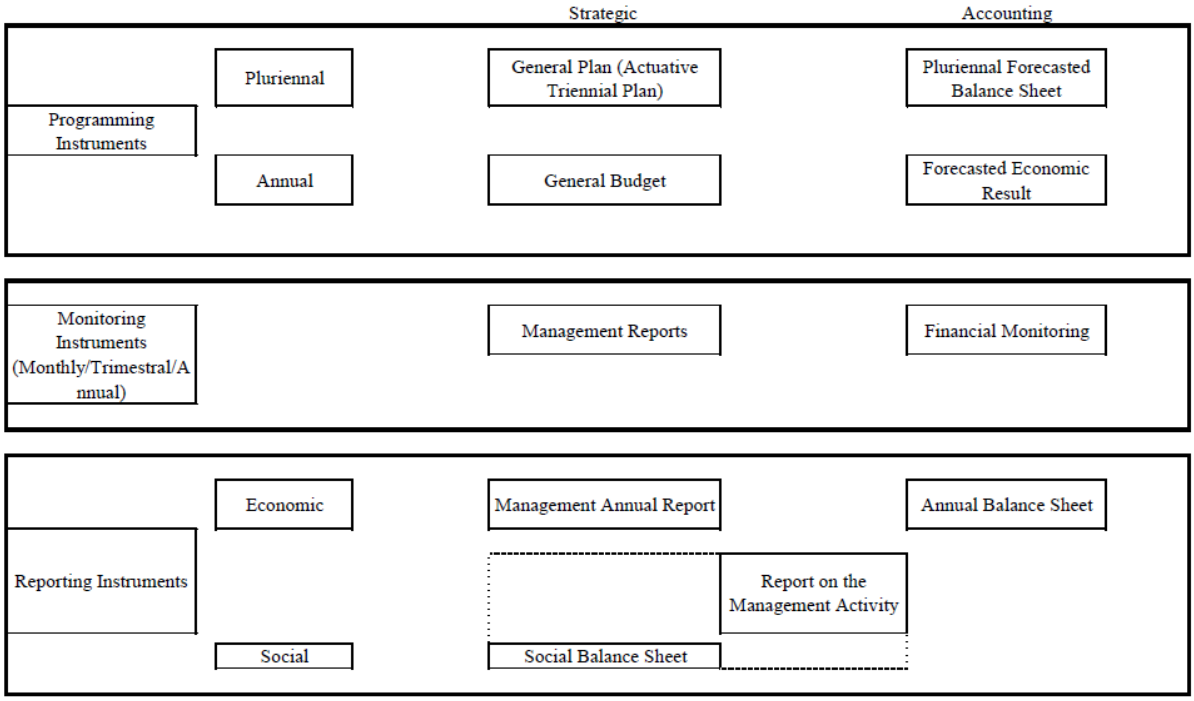
The plan is Economically interpreted through the Preventive Triennial Balance Sheet which is divided in Economical, Financial and Net Assets. At article 13, law 5/94 prescribes also an annual Programming that leads to develop the Preventive Economical Balance Sheet, that, in

[23] Regional Law 14/09/1994 Art 1

turn, is monitored through trimestral or monthly Control reports that evidence the gaps between the budget and the consumptive performances. This activity must be performed by the Management Control. The final prospect about the performances is the Annual Report (ex art 19) that closes the measurement period at the end of every year.

After law 150/2009, another planning document was introduced, the Performance Plan. Since both documents cover a 3-year period and fulfil the same purposes, the Hospital edits and approves only this last one, responding in this way to both legal requirements.

These are documents that the AOP uses to plan and monitor and report its activity (AOP, http://www.sanita.padova.it/sez,3652, 2016):



The pluriennal Performance plan is then contextualized into an annual document called "Documento delle Direttive", which includes the many goals set for the Company by the Regional government.

Beside the Health targets, the Hospital has also balance sheet aims. As known, the Public health firm have not profit goals. Their institutional goal is to produce Health outcome respecting the budget, or in other words, being sustainable and not generating losses. Due to the complex financing system and the planned underfinancing by the central state and the region, this is not always possible, but recently, at state level, have been implemented the so called recouping plans (i.e. Piani di rientro) for the regions to forecast and plan the economic equilibria.

The Budgeted Balance Sheet of the AOP for the 2016 reports an annual Production Value around the 500 mln Euros, which is mostly composed by the revenues for the treatments performed (411 mln), reimbursed through the DRG tariff. The rest is the region Financing (79 mln).

The cost of the production amount to 606 mln. So the year result is a loss of 90 mln Euros that, added to the taxes for 16 mln Euros, brings the economic result of the year to a total loss of 105 mln Euros.

Prospetto di cui all'art. 8, comma 1, DL 66/2014 - enti SSN	
CONTO ECONOMICO	**AZ.OSP. PADOVA** Importi in Euro

SCHEMA DI BILANCIO	Anno 2016
A) VALORE DELLA PRODUZIONE	516.562.434
1) Contributi in c/esercizio	79.002.982
2) Rettifica contributi c/esercizio per destinazione ad investimenti	-27.425.753
3) Utilizzo fondi per quote inutilizzate contributi vincolati di esercizi precedenti	4.454.734
4) Ricavi per prestazioni sanitarie e sociosanitarie a rilevanza sanitaria	411.226.072
5) Concorsi, recuperi e rimborsi	18.092.478
6) Compartecipazione alla spesa per prestazioni sanitarie (Ticket)	8.821.672
7) Quota contributi in c/capitale imputata nell'esercizio	18.199.249
8) Incrementi delle immobilizzazioni per lavori interni	-
9) Altri ricavi e proventi	4.191.000
Totale A)	516.562.434
B) COSTI DELLA PRODUZIONE	606.485.730
1) Acquisti di beni	216.821.291
2) Acquisti di servizi sanitari	53.751.437
3) Acquisti di servizi non sanitari	61.228.876
4) Manutenzione e riparazione	21.671.845
5) Godimento di beni di terzi	4.316.150
6) Costi del personale	209.944.133
7) Oneri diversi di gestione	1.703.704
8) Ammortamenti	25.667.294
9) Svalutazione delle immobilizzazioni e dei crediti	546.000
10) Variazione delle rimanenze	-
11) Accantonamenti	10.834.999
Totale B)	606.485.729
DIFF. TRA VALORE E COSTI DELLA PRODUZIONE (A-B)	-89.923.295
C) PROVENTI E ONERI FINANZIARI	-189.841
Totale C)	-189.841
D) RETTIFICHE DI VALORE DI ATTIVITA' FINANZIARIE	-
Totale D)	-
E) PROVENTI E ONERI STRAORDINARI	465.373
RISULTATO PRIMA DELLE IMPOSTE (A-B+C+D+E)	-89.647.763
Y) IMPOSTE SUL REDDITO DELL'ESERCIZIO	16.247.339
Totale Y)	16.247.339
UTILE (PERDITA) DELL'ESERCIZIO	-105.895.102

More in detail, these tables show how much the constraints act on the final result. The Directive Plan for the 2016 (that is derived from the triennial plan 2016-2018, called general plan) (AOP, www.sanita.padova, 2016) offers a panoramic situation on the AOP economic trend. It illustrates the Budget Constraints that the AOP faced in the 2015 and will face in 2016.

	Constraint 2015	Cosntraint 2016	Gap	Gap %
Workforce	€ 207.922.000,00	€ 208.799.000,00	€ 877.000,00	0,40%
Drugs (no Hepatitis)	€ 100.030.756,00	€ 97.032.967,00	-€ 2.997.789,00	-3,00%
DM	€ 56.200.432,00	€ 53.263.788,00	-€ 2.396.644,00	-5,20%
IVD	€ 22.197.789,00	€ 21.944.413,00	-€ 253.376,00	-1,10%

Respect to the 2015 limits the IVD (In Vitro Diagnostics) is lowered, the personnel expenses are risen and the Drugs and the Medical Devices are lowered. As is possible to see in the next table, even if the costs were less than forecasted, the new constraints for the drugs and the DM are again less than the 2015 expenses.

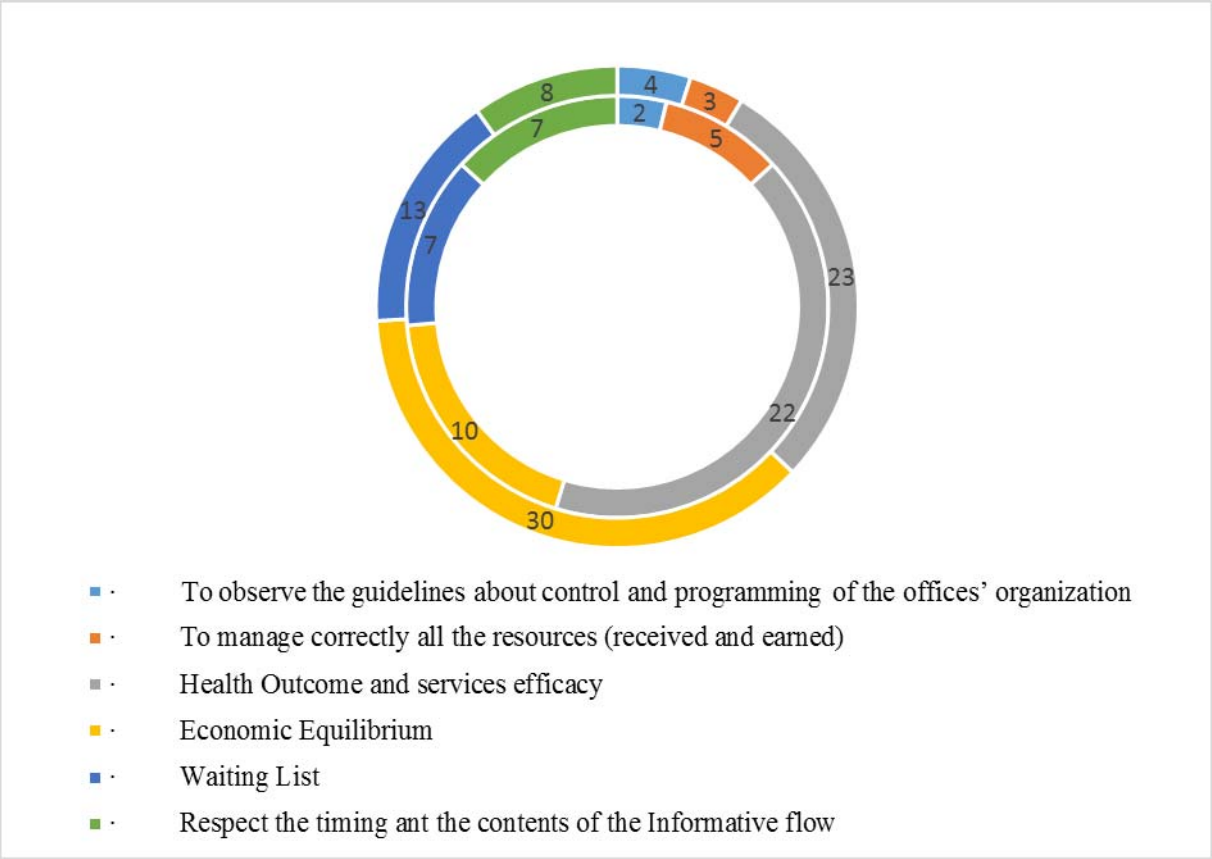
	Consumes 2015	Cosntraint 2016	Gap	Gap %
Workforce	€ 208.068.764,00	€ 208.799.000,00	€ 730.236,00	0,35%
Drugs (no Hepatitis)	€ 96.808.310,00	€ 97.032.967,00	€ 224.657,00	0,23%
DM	€ 54.156.144,00	€ 53.263.788,00	-€ 892.356,00	-1,68%
IVD	€ 21.944.413,00	€ 21.944.413,00	€ 0,00	0,00%

So the AOP administration is again stimulated to pursue efficiency, to develop action of cost reductions and correctness of Healthcare Goods use to respect the new limits.
The AOP management indicates in this letter how the cause of the economic disequilibria is attributable to the underfinancing. This, according to the Direction, is certified and admitted by the fact that the region admits a Loss in the Balance sheet, even if decreasing.

	2013	2014	2015
Budget Funding	€ 62.925.628,00	€ 62.925.628,00	€ 62.925.628,00
Bugdet Result	-€ 38.700.000,00	-€ 34.400.000,00	-€ 28.667.000,00

For the 2016, the Region assigned to AOP 27 objectives, measured by 53 indicators and divided within these areas:

- Observation of the guidelines about control and programming of the offices' organization
- The correct management of the resources (received and earned)
- Health Outcome and services efficacy
- Economic Equilibrium
- Waiting List
- Respect the timing ant the contents of the Informative flow



From this graph, derived from "Documento di direttive 2016", are represented the weight of the objectives (external circle) and the number of them (internal circle). So it is easy to understand how important are the objectives connected to the economic management and the respect of the waiting lists. In addition to the regional objectives the AOP individuated other objectives. Some respond to national laws and some are just internal problems that need to be solved. Among them, one is the transparency (by Law 33/2010) to prevent corruption. Moreover, the AOP is focusing on: credit collection, processes informatization and re-definition of the processes, competences and responsibilities that were traced by the UOC Quality and Accreditation during 2015.

The Regional law 55/94, that converted in procedures what the National Law prescribed, introduced a new model of Accountability for the public institutions, and the AO in particular. The Hospitals passed from a cash to an accrual Accounting System and developed a Cost Centre Accounitng system. Moreover, the regional law 55/94 regards the Management Control System, made compulsory for all the public companies by Law Decree n°286 of the 30/07/1999. In the law it is defined as "the complexity of the criteria, instruments and procedures that aims to activate a process of programming and verifying the achievement of the objectives".

In the AOP, the accountability work by cost centres. Every centre prepares a budget considering the operative units inside it. The Operative unit are grouped in a responsibility centre if:

- Have homogenous activities
- Meaningful consumption of resources
- There exists a person responsible for the management and the result

Inside the firm, there are two categories of centres: utilizer centres (activity centres) and purchaser centres (resource centres).

The purchaser centres have responsibility over the efficacy and the efficiency of the purchasing, warehousing and distribution of the resources necessary to the firm's operations. Moreover, they keep the General Accounting and produce trimestral reports. In 2016 these are the purchaser centres:

- Accounting Centre
- Independent Workers
- Logistic
- Superintendence Office
- Informatics Centre
- Clinic Engineering
- Management of the real estate and implants
- Technic tender
- Relationships with the University Unit
- Legal affairs
- Human resources
- Planning and Management Control
- Pharmacy
- Transfusion Center

The Activity Centres have responsibilities over the consumption of resources in the productive process, respond of the result about efficiency and efficacy. The identification of them is developed through the departmental model, as indicated by Law Decree 229/99 that overcome the Operative Unit model.

They are:

MEDICINE - COMPANY STRUCTURAL DEPARTMENT

UOC Andrology and Reproductive Medicine
UOC Dermatology
UOC Dietetics and Clinical Nutrition
UOC Haematology
UOC Gastroenterology
UOC Geriatrics
UOC Endocrine Diseases
UOC Metabolic and Nutrition Diseases
UOC Infectious Diseases
UOC General Medicine - Quick and Intensive Observation
UOC General Medicine - Endocrine-Metabolic
UOC General Medicine - Haepatology
UOC General Medicine - Gender Specific
UOC Sports and Physical Exercise Medicine
UOC Nephrology
UOC Rheumatology
UOSD Coagulopathies
UOSD Hypertension
UOSD Thrombotic and Haemorrhagic Diseases
UOSD Vascular Medicine
UOSD Clinical Nephrology
UOSD Studio and care of Cerebral Ageing (CRIC)

SURGERY - COMPANY STRUCTURAL DEPARTMENT

UOC General Surgery 1
UOC General Surgery 2
UOC General Surgery 3
UOC Hepatobiliary Surgery and Liver Transplants
UOC Kidney and Pancreas Transplant Surgery
UOC Multidisciplinary Day Surgery
UOC Orthopaedics and Traumatology
UOC Urology
UOSD Spine Surgery
UOSD Endocrine Surgery
UOSD Minimally Invasive Surgery

UOSD Medical Emergencies and Liver Transplants
UOSD Surgical Endoscopy
UOSD Endourology
UOSD Multivisceral Transplant
UOSD Week Surgery

WOMEN AND CHILDREN'S HEALTH - COMPANY STRUCTURAL DEPARTMENT

UOC Paediatric Acceptance and Emergency Room
UOC Paediatric Heart Surgery
UOC Paediatric Cardiology
UOC Paediatric Surgery
UOC Hereditary Metabolic Diseases
UOC Child Neuropsychiatry
UOC Paediatric Oncology
UOC Obstetrics and Gynaecology 1
UOC Obstetrics and Gynaecology 2
UOC Paediatrics
UOC Neonatal Intensive Care
UOSD Food Allergy
UOSD Pelvic, Minimally invasive and Operational Obstetrics Surgery
UOSD Paediatric Nephrology
UOSD Paediatric Orthopaedics
UOSD Paediatric Pulmonology and Allergology
UOSD Paediatric Rheumatology
UOSD Paediatric Hospice, Regional Reference Center for Paediatric Palliative Care
UOSD Paediatric Intensive Care

COMPANY STRUCTURAL DEPARTMENT – LABORATORY MEDICINE

UOC Pathological Anatomy and Histology
UOC Genetics and Clinical Epidemiology
UOC Laboratory Medicine
UOC Microbiology and Virology
UOSD Cytology Diagnostics

COMPANY STRUCTURAL DEPARTMENT – IMAGING DIAGNOSTIC AND INTERVENTIONAL RADIOLOGY

UOC Nuclear Medicine
UOC Neuroradiology
UOC Radiology 1
UOC Radiology 2

COMPANY STRUCTURAL DEPARTMENT – LEGAL AND OCCUPATIONAL MEDICINE TOXICOLOGY AND PUBLIC HEALTH

UOC Occupational Medicine
UOC Forensic Medicine and Toxicology
UOC Preventive Medicine and Risk Assessment
UOSD Poison and Doping Control Centre

COMPANY STRUCTURAL DEPARTMENT – NEUROSCIENCE AND SENSE ORGANS

UOC Maxillofacial Surgery
UOC Plastic Surgery
UOC Major Burns
UOC Neurology
UOC Neurosurgery
UOC Paediatric General Neurosurgery
UOC Ophthalmology
UOC Dentistry and Stomatology
UOC Otolaryngology
UOC Recovery and Functional Rehabilitation
UOSD Apnea and Dysphagias
UOSD Clinical Neurophysiology
UOSD Level 2 Stroke Unit

COMPANY STRUCTURAL DEPARTMENT – CARDIO/THORACO/VASCULAR

UOC Angiology
UOC Heart Surgery
UOC Cardiology
UOC Thoracic Surgery
UOC Vascular Surgery
UOC Respiratory Pathophysiology
UOC Cardiovascular Pathology and Anatomic Pathology
UOC Pneumology
UOSD Cardiac Pathology and Prevention of Sudden Death
UOSD Cardiovascular Day Hospital
UOSD Haemodynamics and Interventional Cardiology
UOSD Pathology of Heart Transplant and Regenerative Medicine
UOSD Cardiology Intensive Care

COMPANY STRUCTURAL DEPARTMENT – EMERGENCY/URGENCY

UOC Acceptance and Emergency Room
UOC Anaesthesia and Intensive Care 1
UOC Anaesthesia and Intensive Care 2
UOC Operational Central Office SUEM
UOSD Short Intensive Observation

INTER-COMPANY STRUCTURAL DEPARTMENT – MENTAL HEALTH

UOC Psychiatry AOP

INTER-COMPANY STRUCTURAL DEPARTMENT – TRANSFUSION MEDICINE

UOC Transfusion Medicine AOP
UOSD Transplant Immunology AOP

INTER-COMPANY FUNCTIONAL DEPARTMENT – REHABILITATION HOSPITAL-TERRITORY

UOC Recovery and Functional Rehabilitation AOP
UOC Recovery and Functional Rehabilitation (ULSS 16)

INTER-COMPANY FUNCTIONAL DEPARTMENT – ONCOLOGY
Reference to Veneto Oncology Network

INTER-COMPANY FUNCTIONAL DEPARTMENT – DRUG POLICIES

UOC Pharmacy AOP
UOC Hospital Pharmacy (ULSS 16)
UOC Territorial Pharmacy (ULSS 16)

INTER-COMPANY STRUCTURAL DEPARTMENT – LEGAL AND OCCUPATIONAL MEDICINE TOXICOLOGY AND PUBLIC HEALTH

UOC Prevention, Hygiene and Safety at the workplace (ULSS 16)
UOC Hygiene and Public Health (ULSS 16)
The staff of the Health Director are the UOC Medical Department "Adults", UOC Medical Department "Mother-Child", UOC Health Professions Department, UOC Pharmacy and UOSD Hospital Psychology.

COMPANY STRUCTURAL DEPARTMENTS LIST

NON MEDICAL AREA

1. GENERAL ADMINISTRATIVE SERVICES DEPARTMENT

- UOC General and Legal Affairs
- UOC Hospital Administrative Department
- UOC Relations with the University and Training
- UOC Human Resources

2. DEPARTMENT OF RESOURCES FOR TECHNICAL AND IT SERVICES

- UOC Tender Management and Technical Area Contracts
- UOC Real Estate and Systems Management
- UOC Information Technology
- UOC Clinical Engineering
- UOC Design and Development of Hospital Construction Interventions

3. DEPARTMENT OF MATERIAL AND FINANCIAL RESOURCES

- UOC Accounting and Financial Statements
- UOC Logistics Management
- UOC Freelance and Binding Loans
- UOC Superintendency and Bursar

4. DEPARTMENT OF STAFF SERVICES

- UOC Communication and Relations with Citizens
- UOC Planning and Management Control Manager
- UOC Quality and Accreditation
- UOSD Projects and Clinical Research

The management control in the AOP is implemented by the department of "Planning and Management control". This department, that is both a purchaser and a utilizer center, has the task of developing the budget process, the most diffused management control tool today. It is, like the management control, compulsory by law 55/94. The Management Control activity is developed through a three phases process: Assignment, Monitoring, Evaluation. The Budget assignment is up to the strategic direction, while the monitoring and the evaluation are up to the management control. This staff organ develops and furnishes the infrastructure for the data collection to the other centers and supervise to the measurement. The Budget method helps in drafting the 3 documents necessary to the management: The directive documents, the General Budget and the responsibility centers' budget.

Usually a firm can assume two approaches to the budget policy, a top down and a bottom-up. In the top-down approach, the budget draft is demanded exclusively to the General Direction. Oppositely, in the bottom up, the drafting is a task assigned to all the department's' directors. In the AOP case, the budget approach is a mix. It is drafted by the General Direction and then negotiated by all the utilizer centers' directors.

The first phase, the Assignment process, is divided in 9 phases:

1. The Direction individuates a responsible for the objectives
2. This person, the spokesman, proposes to the direction a method to convert in budget the objective (specifying the limit value for its UO)
3. The proposals accepted by the General Direction are discussed inside the Budget Committee, that suggest which objective to connect to the wage premium
4. The Management control prepares the Budget proposes for every Utilizer Centre
5. The proposes are discussed with the General Director and the Department Directors

6. The Department Directors set a meeting with the Utilizer Centers' Responsibles and eventually propose some changes to the plan
7. The Direction meets with the Utilizer Centers' Responsibles and negotiate the objectives, the parameters and the wage premium
8. All the Budget proposes are signed by both parts (direction and Utilizer Centers' Responsibles)
9. The Budgets are approved through a deliberation and published

The monitoring phase allows to confront periodically the intermediate results with the budget, and apply the necessary measures. The intermediate data are diffused within the firm by Reportmed and Qlik, two informatics platforms, using reports, synthetic documents that collect all the variables relevant for the management control. The reporting system is taught to furnish to the directors the necessary data to reach to the objectives. More than an accounting tool it is an operative instrument, that has short-term effects on the operations and on the workforce.

The reports must have some characteristics to be useful, like its form, or the way the data are presented, the frequency and timing, to be used to take decisions and the correctness and the simplicity, to be quickly understandable. They can be of various type. The principals are: consumptive (ex-post), pre-consumptive (monthly, trimestral or biannual, that still allow to take corrective actions) or forecasted, with alternative hypothesis. With this reports the manager, or the management control, is able to confront the results with the objectives. Usually this process can be divided in four phases:

1. Confront between budget and results, and elaboration of the *general gap*
2. Decomposition of the global gap in *elementary gaps*
3. Individuation of the gaps' causes
4. Individuation of the responsible and elaborations of the corrective maneuvers

At the end of the year, before the evaluation, are defined the decisional criteria to graduate the final results and the wage assigned to every objective. This system is implemented through the definition of intervals of gap from the objective. With all the collected data the Management Control prepares the final report, that before the publication is sent to the departmental directors to justify the possible incongruence or bad results. All of this process is connected to a salary compensation for the worker or the future budget for the department in the following year.

For example, for the 2016, the targets of the Neuroradiology Operative Unit, that will be taken in consideration in the next chapter, are many and with different points.

Every target in fact, receives some points, with 100 as total. These points are divided by Directors and Operators. At the end of the year the two groups receive a mark thanks to the percentage result given by the sum of points gained (x%)

The major classes of targets are 7, grouped by letters:

- B: prevention of clinic risk (code 3.4), it requires the signalling of incidents on the workplace (10 points)
- C: Number of reports on ADR drugs (code 13.2) (10 Points)
- D: Respecting the cost constraints (infra annual monitoring (code 3) (10 points)

  Respect of the Drugs cost constraint (Daily) (code 3.3) (10 points), the UO[24] consumed resource for 131.449 Euros in 2015, and the limit will be 130.000 Euros for the 2016

  Respect of the cost of the medical Devices (code 3.4) (10 points) The UO consumed 1.143.659 in 2015 and that figure was confirmed as limit for the 2016
- E: Respect of the agreement with the ULSS 16 about the Magnetic resonances to perform tooutpatients (code 2) (10 Points), the UO performed 691 in 2015 and the new limit will be 600 in 2016

  To report the Diagnostic problem in the specialistic prescription (code 3.1) (20 Points). This is a new target and the limit value is at 90%
- I: To perform a Cost Analysis (code 9) (0 Points) This target gave birth to this thesis
- P: To reduce by 5% the vacation day of the previous years (code 1). During the 2015 the remaining vacation days were 1355, the limit for the 2016 is 68 days of the previous years and 1002 days of the current year

At the end of the year the Management Control Unit will produce a report on these points and the Neuroradiology will be marked. As already said this will influence the end-year wages and the next year's budget. To manage better the points scale and not to be too strict, considering also the nature of the operations that have to do with merit goods, has been established a scale with gaps. If an Operative Unit realizes from 0 to 39 points, receive the 0% of the compensation, from 40 to 59 points, receives the 60 %, between 60 to 79 the 80% and over 80 points receive the total compensation.

[24] UO = Operative Unit

4 – AOP's Neuroradiology's Case

Due to the necessity raised by the Neuroradiology Department, to elaborate a tariff for some clinic services, the Management Control of the AOP started a study to analyse some services' cost. The tariffs created will be used to invoice Hospitals or institutions whom patients are treated in the AOP. Moreover, the particularity of this Unit is that it has no beds for Hospitalization, and its patients are dismissed from other units. In this case the department realizes no DRG reimbursement and it is therefore more difficult to perform a Cost-Profit analysis.

4.1 – Neuroradiology Department

The Neuroradiology's Department of the AOP performs diagnostic and operative radiology activity directed to adult and infant patients. In general, the diagnosis are performed in the region of head and the spine while the operative sessions are directed to the endovascular illnesses' treatment on the same districts. It is also a teaching workplace for the Padova University. It performs many procedures, including the ones studied in this thesis, aimed at treating several diseases: among others, stroke, aneurisms, vascular malformations, vascular tumours and carotidal and intracranial stenosis. It is a research centre with national and international studies about the Advanced Imaging with 3T MR Machinery.
During 2015 this Unit performed 18.599 procedures for inpatients and 12.114 for outpatients. The value of these procedures is around 3.000.000 euros for the internals and 2.000.000 for the externals.
The team is composed by 28 people: 4 doctors, 7 nurses, 10 technicians and 8 administrative employees. Their cost is about 1.400.000 Euros per year.

According to Piano Socio Sanitario Regionale 2012-2016, Veneto's health companies are organized into a hub & spoke system. This means that while common services are offered by any Local Health Trust, rare and complex procedures are performed only by major hospitals, where patients are referred to by the web of small hospitals. Le *Schede di Dotazione Ospedaliera* (hospital endowment) issued by Veneto Region in 2013 (DGR/CR 68 of 18/06/2013) plan 6 Neuroradiology Departments, a number which is consistent with the design of Stroke Clinical Path. According to the OMS, in fact, the brain-vascular diseases are the second cause of death and the first of permanent disability. In particular, the stroke, in the

Italian context, appears between 1.5 and 2.9 cases every 1000 inhabitants (6.5% for people between 65 and 84 years). In the Veneto region, there are 9.000 Stroke Hospitalizations that result in a death in the 4.3% of the cases.

Due to the system layout (Hub & Spoke), it happens that patients admitted to other hospitals are transferred to AOP in case they require complex procedures. After the procedure is performed by specialized services, such as Neuroradiology, in most cases the patient remains in AOP, originating a second hospitalization that is reimbursed to AOP according to the DRG tariff. In some cases, however, clinical conditions would allow the patient to go back to the sending hospital right after the procedure. This has several advantages:

- the patients stay nearby his/her domicile;
- bed's occupation of 2nd level Departments is more efficient;
- only one hospitalization is generated, instead of two.

4.2 – Problems with the financing system

For this system to work, a mechanism to reimburse the 2nd level hospital needs to be defined, as the DRG tariff will be earned only by the sending hospital, which dismisses the patient. An "institutional" reimbursement system has not been defined so far, therefore specific agreements between hospitals must be signed. This kind of agreements, besides organizational and clinical aspects, should arrange the economic aspect as well. It happened many times that, missing an institutional tariff for outpatients in the regional Agreements, the staff of the Neuroradiology invoiced services that were similar to the ones performed but often ended up in money loss or a wrong reimbursement. Moreover, the Hospitals that sent in the AOP their patients, after receiving the invoice, always disputed it due to the non-correspondence with the service received. This situation led to several economic and bureaucratic problems for the Neuroradiology Department and the Hospital. Besides this, the doctors of the department operate without knowing how much the procedures cost and cannot aim to the efficiency or perform a cost-benefit analysis. In this study the tariff will not be based on the DRG reimbursement method. The elements on which the tariffs will be based are the real cost that a procedure consumes. The Regional Tariff list in fact, collects the cost of the procedures for outpatients, that allow the treated person to leave the Hospital on its own, last less and usually does not consume resources as the procedures that are really performed. This leads to the fact that the reimbursement is much less than the real cost. I this sense, the AOP, considering that

often the Neuroradiology Department has no official data to invoice the sending institution, or ask a DRG reimbursement, will base the tariff on a real-cost study.

This study was approved as a budget goal for year 2016 for both Neuroradiology Department and Planning and Control Unit. As already seen, this cost analysis will allow the definition of new tariffs, and subsequently the inter-hospital agreements, that will effect of the next year's budget. An analysis of the Neuroradiology services had already been done in the 2010, but the data are now useless due to some cost changes in the resources utilized, to the overcoming of some scientific techniques and to the change of the drugs' and the devices' codes.

4.3 – ABC approach and tariff elaboration

To perform this study, the Planning and Control Unit chose the Activity Base Costing method (Chapter 2) because of its good adaptation in services contexts and to the nature of the activity, that has its better indicator in the time of the performance respect to the output composition. The analysis was conducted together with the Neuroradiology Department Chief Doctor Causin, that I often interviewed in order to obtain the data that cannot be retrieved automatically form the IT systems.

To perform the ABC method, as already seen in the previous chapter, these steps are required:

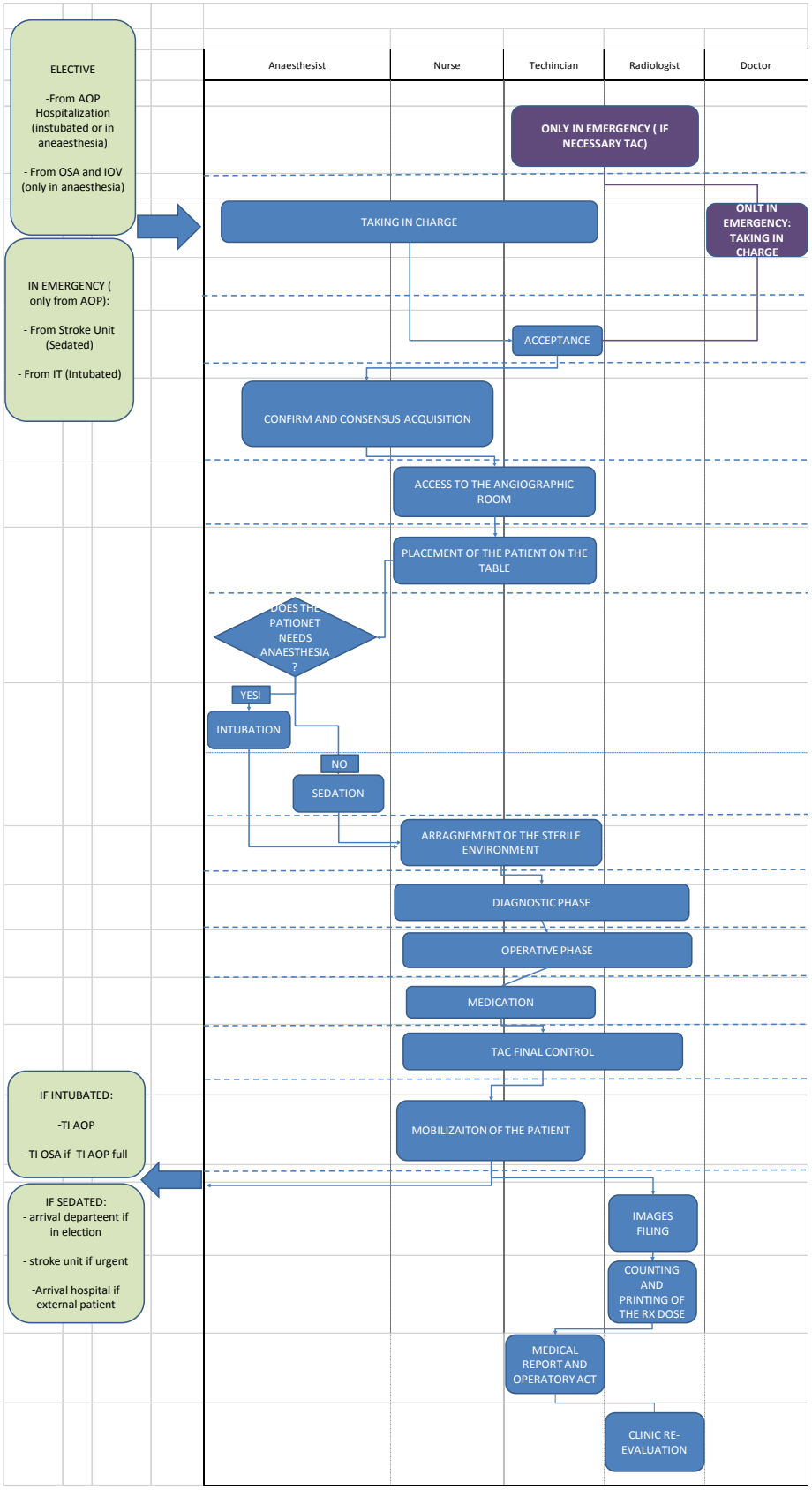
1. describing the activity, and each of its phases;
2. assessing direct and indirect costs;
3. allocating the costs, associating to each phase the type of resources adsorbed and pointing out the best driver for the allocation;

A final step was then added, aimed at checking validity of results through several controls.

4.3.1 – Design of the Activities and its phases

The first step involved studying the Activity, breaking it up into several phases. In the Neuroradiology's case, I have identified 2 groups of activities: the Preparatory and Post Operation Phases and the real procedure phase. While the first group is the same for each type of intervention, the second group varies as to resources consumption depending on the procedure performed, so it requires a more detailed analysis. The combination of them produce the complete services, the final output.

After describing the activities map, I compiled the activity list. The following chart describes the activities under study, along with the HR involved in each phase:



The patient can arrive from:

If Elective Surgery

a) From AOP hospitalization (intubated or sedated)
b) From OSA and IOV (only sedation)

If in Emergency (only form AOP)

c) From Stroke Unit (sedated)
d) From Intensive Therapy (intubated)

After the arrival the procedure is composed by 16 phases. They are[25]:

1. Taking in charge of the patient (nurse and Anaesthetist)
2. Acceptance (Technician and Neuroradiologist)
3. Confirm and Consensus Acquisition (Neuroradiologist and Anaesthetist)
4. Access to the Angiographic Room (Nurse, Operator and Technician)
5. Placement of the Patient on the Table (Neuroradiologist, Anaesthetist, Nurse and Technician)
6. Sedation (Anaesthetist and Nurse)
   6a or Anaesthesia
7. Arrangement of the Sterile Environment (Neuroradiologist, Anaesthetist and Nurse)
8. Diagnostic Phase (Neuroradiologist, Anaesthetist, Nurse and Technician)
9. Operative Phase (28 Procedures) (2 Neuroradiologists, Anaesthetist, Nurse and Technician). Being variable depending on the procedure performed, this phase will be analysed in detail later on.
10. Medication (Neuroradiologist, Anaesthetist and Nurse)
11. TAC final control (Neuroradiologist, Anaesthetist and Technician)
12. Mobilization of the Patient (Anaesthetist, Nurse, Technician and Operator)
13. Transfer of the patient (Nurse and Operator)
    13a in Neuroscience, in anaesthesia
    13b in Neuroscience, intubated or awake
    13c Other Intensive Therapy, in AOP
    13d Other Intensive Therapy, in other firm
    13e Arrival Hospital, if external patient
14. Room rearrangement (Nurse, Technician and Operator)
15. Images Filing
16. Counting and printing of the RX dose (Technician)

[25] In brackets the operators that perform the phase

17. Medical Record and Operatory Act registration (Neuroradiologist)
18. Clinic Re-Evaluation (Other Doctor)

And the relative times:

	Name	Time
1	Taking in Charge	20
2	Acceptance	5
3	Confirm and Consensus Acquisition	10
4	Access to the Angiographic Room	10
5	Placement of the Patient on the Table	10
6	Sedation	5
6.a	General Anesthesia	10
7	Preparation of the Sterile Environment	5
8	Diagnostic Phase	15
9	Operative Phase	
10	Medication	10
11	TAC Final Control	5
12	Mobilizaiton of the patient	5
13	Transfer of the Patient	15
13a	In Neuroscience, in anesthesia	
13b	In Neuroscience, intubated or awake	
13c	Other Intensive Therapy, in AOP	
13d	Other Intensive Therapy, in other Firm	
13e	Arrival Hospital, in other firm	
14	Room Rearrangement	20
15	Images Filing	5
16	Counting and Printing of the RX dose	5
17	Medical Record and Operatory Act Registration	15
18	Clinic Re-Evaluation	15

For assessing the Pre and Post Operations timings, the problem has been that there is not a registry for them. I set them thanks to some consulting with doctor Causin. This is a limit of the Abc method, because sometimes it is based on interviews, that can be biased by personal feelings. Moreover, the inactivity time in the angiographic room must be taken into account, so I added an hour to the time calculations to keep account of them.

The second class of Activities identified are the Medical Procedures, the phase 9 of the previous catalogue. The operative phase, in fact, has not a defined time yet, because it depends on which of the 29 types of procedures are done to the patient:

N°	Name (ITA)	Name (ENG)	Time (mins)
1	Sclero/Embolizzazione angioma	Sclero/Embolization of Vascular Malformation	40
2	Completamento Angiografico	Integrative Angiography	30
3	Stent carotideo	Carotid Stenting	48
3.a	Stent Carotideo in Trombectomia	Carotid Stenting in Thrombectomy	48
4	Stent intracranico	Intracranial Stenting	91
4.a	Stent Intracranico in Trombectomia	Intracranial Stenting in Thrombectomy	91
5	Stent periferico	Peripheral Stenting	68
6	Embolizzazione: FAV Cerebrale	Embolization: Brain AVF	181
7	Embolizzazione: FAV Extracranica	Embolization: Extra-cranial AVF	120
8	Embolizzazione: FAV Spinale	Embolization: Spinal AVF	150
9	Embolizzazione: MAV Cerebrale	Embolization: Brain AVM	163
10	Embolizzazione: MAV Spinale	Embolization: Spinal AVM	130
11	Embolizzazione: MAV Extracranica	Embolization: Extra-Cranial AVM	130
12	Embolizzazione: Aneurisma con spirali	Embolization: Aneurism coiling	99
12.a	Embolizzazione: Aneurisma con pallone	Embolization: Aneurism BAC remodeling	132
12.a.b	Embolizzazione: Aneurisma con stent	Embolization: Aneurism SAC	149
12.a.b.c	Embolizzazione: Aneurisma con Stent FD	Embolization: Aneurism with Stent FD	127
12.a.b.c.d	Embolizzazione: Altro	Embolization: Other	127
13	Test occlusione	Occlusion Test	75
14	Trattamento del vasospasmo	Intracranial Vasospasm Treatment	80
15	Biopsia spinale-Ossea	Spinal-Bone Biopsy	30
16	Ozonoterapia - Infiltrazione faccette	Ozonetherapy - Facets Infiltration	30
17	Vertebroplastica	Vertebroplasty	40
18	Tromboaspirazione Intracranica	Thrombo-aspiration	84
18.a	Trombectomia intracranica	Intracranial Thrombectomy	49
19	Chemioterapia i.a. per RTB	Intra-arterial Chemiotherapy of RTB	133
20	embolizzazione tumori pre-oper.	Tumor Embolization - pre.op.	123
21	embolizzazione tumori spinali-capo-collo	Tumor Embolization Spinal-Head&neck	123
22	embolizzazione traumi	Trauma/bleeding Embolization	115

The length of the Procedures has been defined in a more accurate way, being pulled out from a database that makes up for the lack of a traditional Operation Room's Registry.

4.3.2 – Cost Definition

From the Qlik platform, part of the Information System of the Analytical Accounting of the AOP, I obtained the list of the cost generated by the Neuroradiology Operative Unit. It sustains costs of Devices, Drugs, Services and Stationery Materials.

Year	2014	2015	2016	Change			Change		
Device Category	Value	Value	Value	14-15	15-16	14-16	14-15	15-16	14-16
P-Medical Devices	765.353	714.261	578.294	-51.092	-135.967	-187.059	-7%	-19%	-24%
Q-Prothesical Devices	287.744	429.398	243.058	141.654	-186.340	-44.686	49%	-43%	-16%
F-Drugs with AIC	124.313	126.302	73.674	1.989	-52.628	-50.639	2%	-42%	-41%
X-Drugs without AIC	6.129	5.282	230	-847	-5.052	-5.899	-14%	-96%	-96%
C-Stationery	4.953	4.047	2.411	-906	-1.636	-2.542	-18%	-40%	-51%
H-Technical articles	772	2.631	830	1.859	-1.801	58	241%	-68%	8%
D-In vitro Diagnostic Devices	1.385	1.764	1.608	379	-157	222	27%	-9%	16%
L-Stationery	3.336	776	263	-2.560	-513	-3.072	-77%	-66%	-92%
AB-Other goods	436	612	91	176	-521	-345	40%	-85%	-79%
Z-Chemical Products	264	13	17	-251	4	-247	-95%	31%	-93%
U-Services	36.026	138.691	58.603	102.665	-80.088	22.577	285%	-58%	63%
Total	**1.230.711**	**1.423.777**	**959.079**	**193.066**	**-464.698**	**-271.632**	**16%**	**-33%**	**-22%**

Moreover, this department sustains costs for the Personnel, the machinery (Technology: amortization quotas and maintenance) and for the general expenses (location, cleaning, heat etc.).

The total cost of the personnel:

Personnel Cost		
Role	2014	2015
Doctors	€ 404.790	€ 413.223
Nurses	€ 259.932	€ 257.720
Technicians	€ 363.944	€ 371.987
Admnistratives	€ 286.646	€ 247.970
Taxes	€ 93.585	€ 92.639
Total	€ 1.408.897	€ 1.383.539

The cost for the Machinery (Technology)

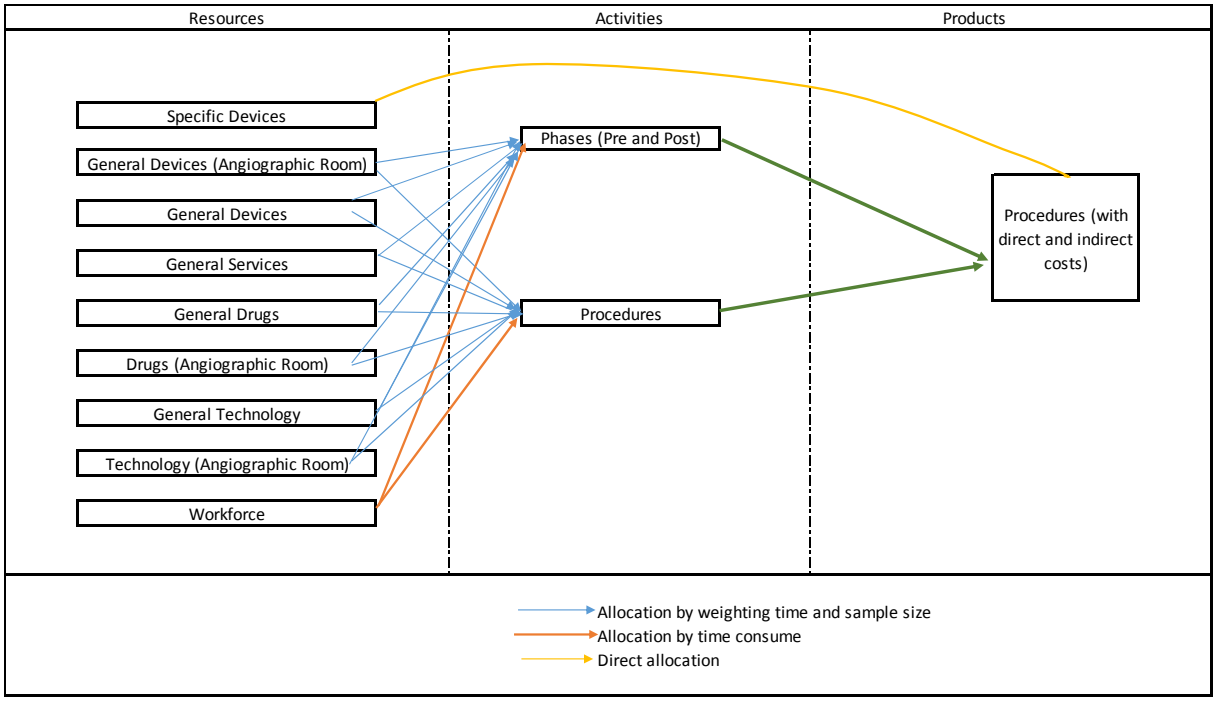
Technology Cost		
Amortization Quotas	72 Objects	€ 555.573
Maintenance	16 Machinery	€ 356.970
Total		€ 912.543

The quota of the general expenses will be considered adding a mark up to the tariff equal to the 30% of the cost.

4.3.3 - Cost Allocation

With many consultations with Doctor Causin, I drew a map of the allocation. It is divided in 5 phases, following the nature of the costs:

1. The devices. They are the only cost objects that can be directly allocated to the final service. The first part of their allocation will consist in attributing each specific device to the procedure or (Preparatory/Post-Operative) phase. The remaining will be allocated proportionally with two criteria (those that are consumed only by the Angiographic Room Activities and those consumed by all the Neuroradiology's procedures).
2. The second class of costs are the services. They will be proportionally allocated, but not only on the procedures studied here, but on all the Neuroradiology's services.
3. The drugs. Some of them are attributed only to the procedure performed in the Angiographic Room, and the rest of them to all the Neuroradiology's services.
4. The technology. Part of it will be allocated only to the procedures performed in the Angiographic Room, the remaining to all the services of the Department.
5. The Personnel. The cost of the workforce will be calculated based on the time consumption of every phase and procedure.



1. Devices

To allocate the Devices I separated them between the ones that are consumed by the preparatory and post-operative phases, those which are consumed in the operative procedures and those that are used generically[26].

Device Category's Name	Count	Allocation	Device Category's Name	Count	Allocation
Generici	268	None	Microcatetere a flusso	3	Procedure
Accessori Cestello Raccolta	1	Pre-Post	Microcatetere Flusso Dipendente	1	Procedure
Adattatore Emostatico	1	Procedure	Microcatetere Idrofilico	1	Procedure
ago aspirazione	1	Procedure	Microcatetere Palloncino	2	Procedure
Ago Biopsia	2	Procedure	Microcatetere per infusioni	1	Procedure
ago cannula venoso	10	Procedure	Microcatetere per navigazione	13	Procedure
ago farfalla	3	Procedure	Microcatetere Rigidezza Variabile	2	Procedure
Ago Vertebroplastica	2	Procedure	Microcatetere Riperfusione	3	Procedure
Attribuito al CdC per errore	4	None	Microguida	2	Procedure
Catetere	13	Procedure	Microguida Idrofila	3	Procedure
Catetere a pallone	13	Procedure	Microguida Idrofilica Hybrid	3	Procedure
catetere angio	2	Procedure	Microguida Idrofilica Mirage	1	Procedure
Catetere distale	8	Procedure	Microguida Neuroscout	2	Procedure
Catetere Guida a Palloncino	2	Procedure	Microguida Transend	2	Procedure
Catetere Palloncino	1	Procedure	monosof	1	Procedure
Catetere Tromboaspirazione	2	Procedure	Pallone Dilatazione	3	Procedure
cavo collegamento	2	Procedure	Premisacca	1	Procedure
Colla	1	Procedure	Salviette	1	None
Dispositivo Emostasi	3	Procedure	Sensore Saturimetro	3	Pre-Post
Dispositivo Gonfiaggio	1	Procedure	Set Embolizzazione	2	Procedure
Dispositivo per embolizzazione Diversor	3	Procedure	Set Occlusioni Temporanee	2	Procedure
Dispositivo Rimozione Meccanica	2	Procedure	siringa	2	Pre-Post
Fase pre e post	37	Pre-Post	Sistema di embolizzazione Web	4	Procedure
Fiala Embolizzante	3	Procedure	sistema distacco	1	Procedure
Guida	1	Procedure	sistema gonfiaggio	1	Procedure
Guida da cambio	2	Procedure	Sistema Protezione Embolica	3	Procedure
Introduttore	8	Procedure	Spirale	46	Procedure
Introduttore	6	Procedure	Spirali Embolizzazion	15	Procedure
Kit Angiografia	2	Procedure	Stent Autoespandibile Carotide	5	Procedure
Kit Angioplastica	1	Procedure	Stent Carotideo	3	Procedure
Kit Cemento Spinale	1	Procedure	Stent Diversore di Flusso FD	7	Procedure
Mandrino	2	Pre-Post	Stent Intracranico	2	Procedure
Maschera	6	Pre-Post	Stent Intracranico Autoespandibile	13	Procedure
Micorcaterere Idrofilico Flessibile	2	Procedure	Stent Intracranico Autoespandibile FD	5	Procedure
Micorcatetere Idrofilo Armato	1	Procedure	Stent Intracranico LVIS	4	Procedure
Microcatetere	1	Procedure	Stent Periferico	1	Procedure
			Stent su pallone	2	Procedure
Total = 584 Devices					

[26] Tag "None"

With these 3 groups I could proceed with the first allocation, the direct one. I built some tables, one for each phase or procedure, that groups all he devices used, the Unitary cost, the quantity utilised and the total cost[27].

Phase 5 chart:

Fase 5 - Posizionalmento Sul Lettino E Preparazione Phase 5 - Placement of the Patient on the Table				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PATE89A-DEFLUSSORE X FLEBO S/ RACCORDO IN PARA L.180 CMFILTRO 15 MICRON S/AGO BIO DRIP (AVTI1/1) IN011060	0,21		2	0,41
PATC613-PROLUNGA IN PE DIAM. INTERNO MM 1,5 LUNGH. CM 50LL/M/F (AVTI6/15) PB3205M	0,27		4	1,07
PATM60C-PROLUNGA PUR D.3MM RACCORDI TERM. LUER LOCK M/FL.100CM LINKSET NO PVC (AVTI5/10) 090600/100/PU	0,43		2	0,85
PATE89L-RACCORDO LUER LOCK DOPPIO MASCHIO(AVTI13/32) IN062001	0,26		1	0,26
PATC609-RAMPA A TRE VIE 5 USCITE FEMMINA(AVTI9/26) RP3000	0,99		1	0,99
PATB79C-RUBINETTO 3 VIE ATTACCO MOBILE FLUSS.CONTEMPORANEOVYCLIC (AVTI10/28) 70876.20	0,24		3	0,71
PATB79K-TAPPO DOPPIO LUER LOCK MASCHIO/FEMMINATAPPO DOPPIO LLM/LLF ROSSO (AVTI12/30) 9888.00	0,04		1	0,04
PIA0916-AGO CANNULA VENOSO PERIFERICO 1 VIA DI INFUSIONES/ALETTE 16G X50MM (28/G105/13) JELCO 4032-INT	0,25		1	0,25
PIA0918-AGO CANNULA VENOSO PERIFERICO 1 VIA DI INFUSIONES/ALETTE 18G X32MM (28/G105/13) JELCO 4035-INT	0,25		1	0,25
DZH3255-ELETTRODO X MONITORAGGIO CARDIACO C/SUPP. IN MEDIPORE DIAM.CM.6 RED DOT 2255 S/LATTICE GOMMA	0,19		3	0,57
PIG3610-GUANTO IN POLIETILENE MONOUSO NON STERILEAMBIDESTRO MISURA UNICA 2901860000 (G102/04)	0,0037		8	0,03
PAVS610-TELO A 3 STRATI STERILE F.TO CM 78X95 C/BORDO ADESIVO TB31300CE	1,06		1	1,06
PATB796-RUBINETTO A TRE VIE - (SOLO PER RADIOLOGIE)INO31301	0,28		1	0,28
PSB3560-LAME RICAMBIO RASOIO ELETTRICO COD.4406	1,51		1	1,51
			Procedure's Devices' Total Cost =	8,28

The first column contains all the devices that have been directly attributed to this phase and for which the consumption is measurable and regular. The unit cost was obtained from the total Unit report, as ratio between the year consumption by value and the year consumption by quantity.

[27] I report here 2 examples, one for the phases and one for the procedures, the rest is in the appendix.

Example for phase 5:

Fase 5 - Posizionalmento Sul Lettino E Preparazione			
Phase 5 - Placement of the Patient on the Table			
Devices	Year Cost	Year Q	Unit Cost
PATE89A-DEFLUSSORE X FLEBO S/ RACCORDO IN PARA L.180 CMFILTRO 15 MICRON S/AGO BIO DRIP (AVTI1/1) IN011060	76,29	370,00	0,21
PATC613-PROLUNGA IN PE DIAM. INTERNO MM 1,5 LUNGH. CM 50LL/M/F (AVTI6/15) PB3205M	306,01	1.140,00	0,27
PATM60C-PROLUNGA PUR D.3MM RACCORDI TERM. LUER LOCK M/FL.100CM LINKSET NO PVC (AVTI5/10) 090600/100/PU	307,45	720,00	0,43
PATE89L-RACCORDO LUER LOCK DOPPIO MASCHIO(AVTI13/32) IN062001	46,13	180,00	0,26
PATC609-RAMPA A TRE VIE 5 USCITE FEMMINA(AVTI9/26) RP3000	113,64	115,00	0,99
PATB79C-RUBINETTO 3 VIE ATTACCO MOBILE FLUSS.CONTEMPORANEOVYCLIC (AVTI10/28) 70876.20	226,01	950,00	0,24
PATB79K-TAPPO DOPPIO LUER LOCK MASCHIO/FEMMINATAPPO DOPPIO LLM/LLF ROSSO (AVTI12/30) 9888.00	25,47	720,00	0,04
PIA0916-AGO CANNULA VENOSO PERIFERICO 1 VIA DI INFUSIONES/ALETTE 16G X50MM (28/G105/13) JELCO 4032-INT	98,09	400,00	0,25
PIA0918-AGO CANNULA VENOSO PERIFERICO 1 VIA DI INFUSIONES/ALETTE 18G X32MM (28/G105/13) JELCO 4035-INT	173,56	700,00	0,25
DZH3255-ELETTRODO X MONITORAGGIO CARDIACO C/SUPP. IN MEDIPORE DIAM.CM.6 RED DOT 2255 S/LATTICE GOMMA	200,01	1.050,00	0,19
PIG3610-GUANTO IN POLIETILENE MONOUSO NON STERILEAMBIDESTRO MISURA UNICA 2901860000 (G102/04)	8,54	2.300,00	0,0037
PAVS610-TELO A 3 STRATI STERILE F.TO CM 78X95 C/BORDO ADESIVO TB31300CE	137,98	130,00	1,06
PATB796-RUBINETTO A TRE VIE - (SOLO PER RADIOLOGIE)INO31301	196,42	700,00	0,28
PSB3560-LAME RICAMBIO RASOIO ELETTRICO COD.4406	302,68	200	1,51

After having allocated all the direct consumptions, the cost table for the phases is:

N°	Phase	Devices
1	Taking in Charge	€ 0
2	Acceptance	€ 0
3	Confirm and Consensus Acquisition	€ 0
4	Access to the Angiographic Room	€ 0
5	Placement of the Patioent on the Table	€ 9
6	Sedation	€ 20
6.a	General Anesthesia	€ 28
7	Preparation of the Sterile Environment	€ 94
8	Diagnostic Phase	€ 60
9	Operative Phase (See following Chart)	/ /
10	Medication	€ 123
11	TAC Final Control	€ 0
12	Mobilizaiton of the patient	€ 0
13	Transfer of the Patient	€ 0
13a	In Neuroscience, in anesthesia	€ 0
13b	In Neuroscience, intubated or awake	€ 0
13c	Other Intensive Therapy, in AOP	€ 0
13d	Other Intensive Therapy, in other Firm	€ 0
13e	Arrival Hospital, in other firm	€ 0
14	Room Rearrangement	€ 0
15	Images Filing	€ 0
16	Counting and Printing of the RX dose	€ 0
17	Medical Record and Operatory Act Registration	€ 0
18	Clinic Re-evlauation	€ 0

For some procedures, on the other hand, there may be some more calculations to do, due to the possibility of use of different models for the same devices (Perfect Alternatives). These variability is not measurable and so for the “alternatives” devices I weighted the values based on the real consumption during a two-year period.

For example, in procedure 12.a.b.c.d, two pair of devices are alternative, the Microcatheteres and the Embolization Systems.

12.a.b.c.d				
Embolizzazione: Aneurisma con Stent altro				
Embolization: Other				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PIT0115-MICROCATETERE X LA NAVIGAZIONE DEL DISPOSITIVO WEBD..027" L.145CM VIA VIA-27-154-01	976	alternatives A		612,81
PITETBC-MICROCATETERE PER INFUSIONE PROWLER SELECT LP-ESE PLUS LUNG.150 CORDIS COD.606-S255FX	597,8	alternatives A		
PIT085A-SISTEMA EMBOLIZZAZIONE ANEURISMA INTRACRANICOMEDINA MEDICAL ED -7-090-FR	6760	alternatives B		9672
PIT0851-SISTEMA DI EMBOLIZZAZIONE ANEURISMI INTRACRANICIIN FILI NITINOL D.8MM L.4MM W2-8-4	10400	alternatives B		
PITSP25-CATETERE ARMATO PER PTA CURVA DIRITTA 6FR90 CM CAROTID SHEATH DESTINATION RSC07	244			244
PITM034-CATETERE PORTANTE PER CATETERISMO COASSIALENAVIEN RFXA072-115-08MP	549			549
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODUTTORE TORQUE	16,47			16,47
PITY115-GUIDA METALLICA 035-260 CM.TIPO ANGOLATO TERUMO RFCOD.RFGA35263M /ESC.R/	115,9			115,9
PITZ27E-GUIDA TRANSEND FLOPPY 300 CM COD.46-815TARGET	439,2			439,2
PITZ72P-GUIDA TRANSEND EX SOFT TIP.014" 205/2CM.TARGET 46-806	439,2			439,2
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALVE 23242	7,32			7,32
			Procedure's Devices' Total Cost =	12095,9

For them I prepared two more tables. For the alternative “A”, the Microcatheteres indicated as alternatives, have been summed by value and by quantity to obtain an average Unitary cost, weighted for the value and use.

Alternative "a"			
Microcatheter			
Devices	Year Cost	Year Q	Unit Cost
PIT0114-MICROCATETERE X LA NAVIGAZIONE DEL DISPOSITIVO WEBD..027" L.145CM VIA PLUS VIA-33-13	976	1	976
PIT0115-MICROCATETERE X LA NAVIGAZIONE DEL DISPOSITIVO WEBD..027" L.145CM VIA VIA-27-154-01	3.904	4	976
PITETBA-MICROCATETERE PER INFUSIONE PROWLER SELECT LP-ESE PLUS LUNG.150 CORDIS COD.606-S25	16.738	28	597,8
PITETBC-MICROCATETERE PER INFUSIONE PROWLER SELECT LP-ESE PLUS LUNG.150 CORDIS COD.606-S25	16.738	28	597,8
PIT0114-MICROCATETERE X LA NAVIGAZIONE DEL DISPOSITIVO WEBD..027" L.145CM VIA PLUS VIA-33-13	0	0	0
PIT0115-MICROCATETERE X LA NAVIGAZIONE DEL DISPOSITIVO WEBD..027" L.145CM VIA VIA-27-154-01	0	0	0
PITETBA-MICROCATETERE PER INFUSIONE PROWLER SELECT LP-ESE PLUS LUNG.150 CORDIS COD.606-S25	20.923	35	597,8
PITETBC-MICROCATETERE PER INFUSIONE PROWLER SELECT LP-ESE PLUS LUNG.150 CORDIS COD.606-S25	17.934	30	597,8
	77.214	126	612,80794

The alternative “b” is the Embolization System:

Alernative "b"			
Embolization System			
Devices	Year Cost	Year Q	Unit Cost
PIT085A-SISTEMA EMBOLIZZAZIONE ANEURISMA INTRACRANICOMEDINA MEDICAL ED -7-090-FR	6.760,00	1,00	6760
PIT0851-SISTEMA DI EMBOLIZZAZIONE ANEURISMI INTRACRANICIIN FILI NITINOL D.8MM L.4MM W2-8-4	10.400	1	10400
PIT0854-SISTEMA DI EMBOLIZZAZIONE ANEURISMI INTRACRANICIIN FILI NITINOL D.10MM L.6MM W2-10	10.400	1	10400
PIT0855-SISTEMA DI EMBOLIZZAZIONE ANEURISMI INTRACRANICIIN FILI NITINOL D.8MM L.6MM W2-8-6	10.400	1	10400
PIT0856-SISTEMA DI EMBOLIZZAZIONE ANEURISMI INTRACRANICIIN FILI NITINOL D.8MM L.5MM W2-8-5	10.400	1	10400
	48.360,00	5,00	9672

The total cost of the devices allocated directly for the procedures is:

N°	Name	**Devices**
1	Sclero/Embolization of Vascular Malformation	17,82
2	Integrative Angiography	21,74
3	Carotid Stenting	2509,20
3.a	Carotid Stenting in Thrombectomy	2266,42
4	Intracranial Stenting	7570,26
4.a	Intracranial Stenting in Thrombectomy	5182,89
5	Peripheral Stenting	1904,68
6	Embolization: Brain AVF	6181,32
7	Embolization: Extra-cranial AVF	5593,91
8	Embolization: Spinal AVF	7065,96
9	Embolization: Brain AVM	8367,71
10	Embolization: Spinal AVM	3518,20
11	Embolization: Extra-Cranial AVM	6419,80
12	Embolization: Aneurism coiling	6185,88
12.a	Embolization: Aneurism BAC remodeling	2020,32
12.a.b	Embolization: Aneurism SAC	5383,93
12.a.b.c	Embolization: Aneurism with Stent FD	13389,85
12.a.b.c.d	Embolization: Other	12079,43
13	Occlusion Test	2374,12
14	Intracranial Vasospasm Treatment	1065,48
15	Spinal-Bone Biopsy	40,97
16	Ozonetherapy - Facets Infiltration	7,32
17	Vertebroplasty	801,96
18	Thrombo-aspiration	4174,82
18.a	Intracranial Thrombectomy	4645,46
19	Intra-arterial Chemiotherapy of RTB	1512,09
20	Tumor Embolization - pre.op.	4732,99
21	Tumor Embolization Spinal-Head&neck	1974,91
22	Trauma/bleeding Embolization	2752,12

At this point, of the overall device consumption, only the non-assigned remain to allocate. As already explained, they will be allocated with two criteria.

The first group, regarding the devices used only for the procedures performed in the Angiographic Room, has a total cost of €26.290.

To prepare the driver for allocating these costs, I obtained the number of procedures per year and considered the 2015 and 2016 data.

		Time	2007	2008	2009	2010	2011	2012	2013	2014	2015	31 ott. 2016
1	Sclero/Embolization of Vascular Malformation	40	14	9	6	12	24	16	27	43	43	48
2	Integrative Angiography	30									26	30
3	Carotid Stenting	48	46	14	26	32	42	41	27	26	24	17
3.a	Carotid Stenting in Thrombectomy	48										
4	Intracranial Stenting	91	0	0	5	6	4	8	7	6	9	1
4.a	Intracranial Stenting in Thrombectomy	91										
5	Peripheral Stenting	68										
6	Embolization: Brain AVF	181	16	18	36	11	10	19	19	10	9	10
7	Embolization: Extra-cranial AVF	120										
8	Embolization: Spinal AVF	150										
9	Embolization: Brain AVM	163				32	24	36	20	26	12	13
10	Embolization: Spinal AVM	130										
11	Embolization: Extra-Cranial AVM	130										
12	Embolization: Aneurism coiling	99				14	16	14	12	13	9	14
12.a	Embolization: Aneurism BAC remodeling	132				9	8	15	16	17	15	14
12.a.b	Embolization: Aneurism SAC	149				7	4	7	6	3	5	3
12.a.b.c	Embolization: Aneurism with Stent FD	127				4	8	11	12	14	14	15
12.a.b.c.d	Embolization: Other	127										
13	Occlusion Test	75	0	0	3	1	1	2	2	1	0	0
14	Intracranial Vasospasm Treatment	80	1	3	4	6	6	4	1	5	5	15
15	Spinal-Bone Biopsy	30	10	12	20	18	16	14	15	10	16	28
16	Ozonetherapy - Facets Infiltration	30	0	0	0	14	11	12	7	12	7	18
17	Vertebroplasty	40	19	17	25	21	24	25	38	38	36	43
18	Thrombo-aspiration	84	0	0	0	0	0	0	0	0	0	33
18.a	Intracranial Thrombectomy	49	3	1	7	13	13	18	21	20	30	22
19	Intra-arterial Chemiotherapy of RTB	133	0	0	0	0	0	0	0	0	0	7
20	Tumor Embolization - pre.op.	123	2	4	2	0	1	7	10	10	10	15
21	Tumor Embolization Spinal-Head&neck	123										
22	Trauma/bleeding Embolization	115				1	3	3	4	6	5	2
		Total	111	78	134	201	215	252	244	260	275	348

With these numbers I produced the table for allocating the Angiography Room's Devices.

		2015 - Total Cost 26.204					2016 - Total Cost 25.175				
Name	t	Q	Q. Weighted	Distribution	Cost for Procedure's Type	Cost Per Procedure	Q	Q weighted	Distribution	Cost for Procedure's Type	Cost Per Procedure
Sclero/Embolization of Vascular Malformation	40	43	1720	9%	2341	54	48	1920	8%	1981	41
Integrative Angiography	30	26	780	4%	1061	41	30	900	4%	929	31
Carotid Stenting	48	24	1152	6%	1568	65	17	816	3%	842	50
Carotid Stenting in Thrombectomy	48	0	0	0%	0	0	0	0	0%	0	0
Intracranial Stenting	91	9	819	4%	1115	124	1	91	0%	94	94
Intracranial Stenting in Thrombectomy	91	0	0	0%	0	0	0	0	0%	0	0
Peripheral Stenting	68	0	0	0%	0	0	0	0	0%	0	0
Embolization: Brain AVF	181	9	1629	8%	2217	246	10	1810	7%	1868	187
Embolization: Extra-cranial AVF	120	0	0	0%	0	0	0	0	0%	0	0
Embolization: Spinal AVF	150	0	0	0%	0	0	0	0	0%	0	0
Embolization: Brain AVM	163	12	1956	10%	2662	222	13	2119	9%	2186	168
Embolization: Spinal AVM	130	0	0	0%	0	0	0	0	0%	0	0
Embolization: Extra-Cranial AVM	130	0	0	0%	0	0	0	0	0%	0	0
Embolization: Aneurism coiling	99	9	891	5%	1213	135	14	1386	6%	1430	102
Embolization: Aneurism BAC remodeling	132	15	1980	10%	2695	180	14	1848	8%	1907	136
Embolization: Aneurism SAC	149	5	745	4%	1014	203	3	447	2%	461	154
Embolization: Aneurism with Stent FD	127	14	1778	9%	2420	173	15	1905	8%	1966	131
Embolization: Other	127	0	0	0%	0	0	0	0	0%	0	0
Occlusion Test	75	0	0	0%	0	0	0	0	0%	0	0
Intracranial Vasospasm Treatment	80	5	400	2%	544	109	15	1200	5%	1238	83
Spinal-Bone Biopsy	30	16	480	2%	653	41	28	840	3%	867	31
Ozonetherapy - Facets Infiltration	30	7	210	1%	286	41	18	540	2%	557	31
Vertebroplasty	40	36	1440	7%	1960	54	43	1720	7%	1775	41
Thrombo-aspiration	84	0	0	0%	0	0	33	2772	11%	2860	87
Intracranial Thrombectomy	49	30	1470	8%	2001	67	22	1078	4%	1112	51
Intra-arterial Chemiotherapy of RTB	133	0	0	0%	0	0	7	931	4%	961	137
Tumor Embolization - pre.op.	123	10	1230	6%	1674	167	15	1845	8%	1904	127
Tumor Embolization Spinal-Head&neck	123	0	0	0%	0	0	0	0	0%	0	0
Trauma/bleeding Embolization	115	5	575	3%	783	78	2	230	1%	237	119

In columns q there are the number of times in which each procedure has been performed in 2015 and 2016. These number, multiplied by the lasting minutes of the procedure, gave me the total number of minutes of procedures performed (Q weighted). Dividing the number of minutes regarding each type of procedure by the total number of minutes, I obtained the share of minutes over the total that every procedure required (Distribution). Multiplying this share for the total cost I obtained the cost regarding every type of procedure (Cost for Procedure's Type). Dividing this value for the number of procedures performed (of each type) the result is the cost per procedure.

The quota of cost of some procedures that have not been performed in the last years is 0, and, according with the Neuroradiology Department, I set the cost of devices equal to the one of the procedure as similar as possible. Where this was not possible, I substituted with the 2016 cost's quota.

The cost of the Angiographic room Devices on the procedures:

Name	Cost Per Procedure
Sclero/Embolization of Vascular Malformation	€ 54
Integrative Angiography	€ 41
Carotid Stenting	€ 65
Carotid Stenting in Thrombectomy	€ 65
Intracranial Stenting	€ 124
Intracranial Stenting in Thrombectomy	€ 124
Peripheral Stenting	€ 124
Embolization: Brain AVF	€ 246
Embolization: Extra-cranial AVF	€ 246
Embolization: Spinal AVF	€ 246
Embolization: Brain AVM	€ 222
Embolization: Spinal AVM	€ 222
Embolization: Extra-Cranial AVM	€ 222
Embolization: Aneurism coiling	€ 135
Embolization: Aneurism BAC remodeling	€ 180
Embolization: Aneurism SAC	€ 203
Embolization: Aneurism with Stent FD	€ 173
Embolization: Other	€ 173
Occlusion Test	€ 173
Intracranial Vasospasm Treatment	€ 109
Spinal-Bone Biopsy	€ 41
Ozonetherapy - Facets Infiltration	€ 41
Vertebroplasty	€ 54
Thrombo-aspiration	€ 87
Intracranial Thrombectomy	€ 67
Intra-arterial Chemiotherapy of RTB	€ 137
Tumor Embolization - pre.op.	€ 167
Tumor Embolization Spinal-Head&neck	€ 167
Trauma/bleeding Embolization	€ 78

The second group of devices are attributable to all the activities of the Neuroradiology. It would generate too high a cost in term of data collection to repeat the ABC analysis as for these procedures for all the procedures performed by the Neuroradiology. For this reason, I chose to divide the cost of general devices for the total number of procedures and apply it to all the studied operations. This method is a simplification because it assumes that all activities consume the same amount of resources, but on the other hand this is a very small part of total costs, therefore it does not alter the analysis result.

Value	N° of Procedures	Cost per Procedure
31398,957	30960	1,014

2. Services

The services that generated costs in this department are of 5 classes:

- Rent of the Photocopier
- Administrative Support
- Private Pratictioners Consulting
- Maintenances
- Cleaning

I chose to allocate the services to all the Neuroradiology's procedure performed in 2015 due to their referral to all the department's activity.

Type	Cost (2015)
UCA00001-CANONI DI NOLEGGIO FOTOCOPIATRICIDA PRIVATO - AREA NON SANITARIA	0
UZS00002-SERV. DI SUPPORTO ALL'ATTIVITA' AMMINISTRATIVADA PRIVATO NON INTERINALE	66.015
UCP00001-SERVIZI DI CONSULENZA SANITARIA DA PRIVATI	72.534
UMA00001-SER. DI MANUT. ATTREZ. SANIT. ESPLORAZ. FUNZION.DI PROPRIETA	0
UPU00001-SER. DI PULIZIA AREE INTERNE/ESTERNE	142
Total	138.691
Number of procedures	30960
Cost per procedure	4,48

3. Drugs

There are three classes of drugs to keep into account, the first can be allocated to all the Neuroradiology's activity, the second only to the one performed in the angiographic room and the third to some Pre and Post Operatory phases.
I obtained the first dividing the total cost of the drugs for all the procedures of the department, not only the considered here. This calculus is basic, but it would have cost too much in term of data collection to repeat a study like this for all the department's activity.

Cost	N° of Procedures	Cost per Procedure
8903	30960	0,29

I allocated the second class of drugs to the Procedures performed in the angiographic room weighting them for time and sample size:

2015 - Tot Cost 109.568						
Name	t	Q	Q. Weighted	Distribution	Cost for Procedure's Type	Cost Per Procedure
Sclero/Embolization of Vascular Malformation	40	43	1720	9%	€ 9.787	€ 228
Integrative Angiography	30	26	780	4%	€ 4.438	€ 171
Carotid Stenting	48	24	1152	6%	€ 6.555	€ 273
Carotid Stenting in Thrombectomy	48	0	0	0%	€ 0	€ 273
Intracranial Stenting	91	9	819	4%	€ 4.660	€ 518
Intracranial Stenting in Thrombectomy	91	0	0	0%	€ 0	€ 518
Peripheral Stenting	68	0	0	0%	€ 0	€ 518
Embolization: Brain AVF	181	9	1629	8%	€ 9.270	€ 1.030
Embolization: Extra-cranial AVF	120	0	0	0%	€ 0	€ 1.030
Embolization: Spinal AVF	150	0	0	0%	€ 0	€ 1.030
Embolization: Brain AVM	163	12	1956	10%	€ 11.130	€ 928
Embolization: Spinal AVM	130	0	0	0%	€ 0	€ 928
Embolization: Extra-Cranial AVM	130	0	0	0%	€ 0	€ 928
Embolization: Aneurism coiling	99	9	891	5%	€ 5.070	€ 563
Embolization: Aneurism BAC remodeling	132	15	1980	10%	€ 11.267	€ 751
Embolization: Aneurism SAC	149	5	745	4%	€ 4.239	€ 848
Embolization: Aneurism with Stent FD	127	14	1778	9%	€ 10.117	€ 723
Embolization: Other	127	0	0	0%	€ 0	€ 723
Occlusion Test	75	0	0	0%	€ 0	€ 455
Intracranial Vasospasm Treatment	80	5	400	2%	€ 2.276	€ 455
Spinal-Bone Biopsy	30	16	480	2%	€ 2.731	€ 171
Ozonetherapy - Facets Infiltration	30	7	210	1%	€ 1.195	€ 171
Vertebroplasty	40	36	1440	7%	€ 8.194	€ 228
Thrombo-aspiration	84	0	0	0%	€ 0	€ 228
Intracranial Thrombectomy	49	30	1470	8%	€ 8.365	€ 279
Intra-arterial Chemiotherapy of RTB	133	0	0	0%	€ 0	€ 279
Tumor Embolization - pre.op.	123	10	1230	6%	€ 6.999	€ 700
Tumor Embolization Spinal-Head&neck	123	0	0	0%	€ 0	€ 700
Trauma/bleeding Embolization	115	5	575	3%	€ 3.272	€ 654

The cost of the Angiographic room drugs on the procedures:

2015 - Tot Cost 109.568	
Name	Cost Per Procedure
Sclero/Embolization of Vascular Malformation	228
Integrative Angiography	171
Carotid Stenting	273
Carotid Stenting in Thrombectomy	273
Intracranial Stenting	518
Intracranial Stenting in Thrombectomy	518
Peripheral Stenting	518
Embolization: Brain AVF	1030
Embolization: Extra-cranial AVF	1030
Embolization: Spinal AVF	1030
Embolization: Brain AVM	928
Embolization: Spinal AVM	928
Embolization: Extra-Cranial AVM	928
Embolization: Aneurism coiling	563
Embolization: Aneurism BAC remodeling	751
Embolization: Aneurism SAC	848
Embolization: Aneurism with Stent FD	723
Embolization: Other	723
Occlusion Test	455
Intracranial Vasospasm Treatment	455
Spinal-Bone Biopsy	171
Ozonetherapy - Facets Infiltration	171
Vertebroplasty	228
Thrombo-aspiration	228
Intracranial Thrombectomy	279
Intra-arterial Chemiotherapy of RTB	279
Tumor Embolization - pre.op.	700
Tumor Embolization Spinal-Head&neck	700
Trauma/bleeding Embolization	654

The third class of Drugs, those allocated directly to the Pre & Post Operatory Phases:

N°	Phase	Drugs
1	Taking in Charge	0
2	Acceptance	0
3	Confirm and Consensus Acquisition	0
4	Access to the Angiographic Room	0
5	Placement of the Patioent on the Table	1
6	Sedation	31
6.a	General Anesthesia	36
7	Preparation of the Sterile Environment	4
8	Diagnostic Phase	10
9	Operative Phase (See following Chart)	0
10	Medication	0
11	TAC Final Control	0
12	Mobilizaiton of the patient	0
13	Transfer of the Patient	0
13a	In Neuroscience, in anesthesia	0
13b	In Neuroscience, intubated or awake	0
13c	Other Intensive Therapy, in AOP	0
13d	Other Intensive Therapy, in other Firm	0
13e	Arrival Hospital, in other firm	0
14	Room Rearrangement	0
15	Images Filing	0
16	Counting and Printing of the RX dose	0
17	Medical Record and Operatory Act Registration	0
18	Clinic Re-evlauation	0

4.Technology

From the analysis it emerged that only some of the machinery of the department are used for the procedures considered in this study. One in particular, the Angiography, is utilised only in the Number 8 of the Preparatory and Post-Operative Phases, the diagnostic phase. Its cost is then given by the sum of Amortization quotas and the maintenance cost. I obtained the number of procedures that required the Angiograph by a Qlik extraction looking for all the angiographies, for external and inpatients.

Name	Type of cost	
ANGIOGRAFIA DIGITALE, SISTEMA	Amortization quota	265.764,88
INIETTORE ANGIOGRAFICO	Amortization quota	5.302,22
ALLURA XPER FD20 BIPLANE	Maintainance	97.600,00
	Tot Cost (A)	368.667,10
	Internal Patients	246
	External Patients	579
	Total Number of Procedures (B)	825
	Cost per operation (A/B)	446,87

The rest of the technology, instead, can be allocated to all the procedures indistinctly. Obviously, the cost for the year contains the Amortization Quotas and the Maintenance Costs.

Cost	N° of Procedures	Cost per Procedure
814942,77	30960,00	26,32

5.Workforce

Each activity that I catalogued generates workforce costs. So I prepared two tables, one for the phases and one for the procedures.

To elaborate a cost per minute I chose the six roles that intervene in the activities. For each role the standard cost has been obtained by dividing the Cost for the FTE (Full Time Equivalent Units). It is an average indicator of how many people works in the Firm yearly. It is calculated assigning a weight to all the class of workers. For example, if a worker is a

student, its weight is 50%, if someone is part time, it is weighted by the weekly hours, if someone in Pregnancy Permission, she weights 0 for the time of the leave. In this way the firm obtains a count of the "Theoretical Productive Units" that better represent the real working capacity. The standard cost, then, is divided by weekly hours, working weeks and by minutes.

(A) Personnel	(B) Equivalent Units	(C) Cost (With IRAP)	(D) STD Cost (With IRAP) (C/B)	(E) Weekly Hours	(F) Working Weeks	(D) / (E) / (F) / (60) Minute Cost	Rounded Minute Cost
1 - Doctor	451,1	€ 48.142.321,56	€ 106.724,71	38	44	1,0638	1,06
1 - Doctor - Anaesthesists	80,9	€ 9.376.197,54	€ 115.921,07	38	42	1,2105	1,21
1 - Doctors - Radiologists	28,9	€ 3.125.648,77	€ 108.320,55	38	42	1,1312	1,13
3 - Nurse	2.104,8	€ 89.428.832,73	€ 42.487,09	36	44	0,4470	0,45
4 - Health Technics - Radiol	87,4	€ 3.716.203,29	€ 42.530,13	36	42	0,4688	0,47
7898 - OSS	583,3	€ 19.390.346,04	€ 33.241,06	36	44	0,3498	0,35

I multiplied the cost per minute of each role by the minutes consumed and for the numbers of workers operating.

The Preparatory and Post-Operative phases:

			Neuroradiologist			Anaesthesist			Nurse		
		t	N°	Minute Cost	Cost	N°	Minute Cost	Cost	N°	Minute Cost	Cost
1	Taking in Charge	20	1	1,13	22,6	1	1,21	24,2	1	0,45	9
2	Acceptance	5	0	1,13	0	0	1,21	0	0	0,45	0
3	Confirm and Consensus Acquisition	10	1	1,13	11,3	1	1,21	12,1	0	0,45	0
4	Access to the Angiographic Room	10	0	1,13	0	0	1,21	0	1	0,45	4,5
5	Placement of the Patioent o on the Table	10	1	1,13	11,3	1	1,21	12,1	1	0,45	4,5
6	Sedation	5	0	1,13	0	1	1,21	6,05	1	0,45	2,25
6.a	General Anesthesia	10	0	1,13	0	1	1,21	12,1	1	0,45	4,5
7	Preparation of the Sterile Environment	5	1	1,13	5,65	1	1,21	6,05	1	0,45	2,25
8	Diagnostic Phase	15	1	1,13	16,95	1	1,21	18,15	1	0,45	6,75
9	Operative Phase		2	1,13	0	1	1,21	0	1	0,45	0
10	Medication	10	1	1,13	11,3	1	1,21	12,1	1	0,45	4,5
11	TAC Final Control	5	1	1,13	5,65	1	1,21	6,05	0	0,45	0
12	Mobilizaiton of the patient	5	0	1,13	0	1	1,21	6,05	1	0,45	2,25
13	Transfer of the Patient	15	0	1,13	0	0	1,21	0	1	0,45	6,75
13a	In Neuroscience, in anesthesia		0	1,13	0	1	1,21	0	0	0,45	0
13b	In Neuroscience, intubated or awake		0	1,13	0	0	1,21	0	0	0,45	0
13c	Other Intensive Therapy, in AOP		0	1,13	0	1	1,21	0	0	0,45	0
13d	Other Intensive Therapy, in other Firm		0	1,13	0	1	1,21	0	0	0,45	0
13e	Arrival Hospital, in other firm		0	1,13	0	0	1,21	0	0	0,45	0
14	Room Rearrangement	20	0	1,13	0	0	1,21	0	1	0,45	9
15	Images Filing	*5*	1	1,13	5,65	0	1,21	0	0	0,45	0
16	Counting and Printing of the RX dose	*5*	0	1,13	0	0	1,21	0	0	0,45	0
17	Medical Record and Operatory Act Registration	*15*	1	1,13	16,95	0	1,21	0	0	0,45	0
18	Clinic Re-evlauatin	*15*	0	1,13	0	0	1,21	0	0	0,45	0

			Technic Radiologist			Other Doctor			OSS		
		t	N°	Minute Cost	Cost	N°	Minute Cost	Cost	N°	Minute Cost	Cost
1	Taking in Charge	20	0	0,47	0	1	1,06	21,2	0	0,35	0
2	Acceptance	5	1	0,47	2,35	0	1,06	0	0	0,35	0
3	Confirm and Consensus Acquisition	10	0	0,47	0	0	1,06	0	0	0,35	0
4	Access to the Angiographic Room	10	1	0,47	4,7	0	1,06	0	1	0,35	3,5
5	Placement of the Patioent o on the Table	10	1	0,47	4,7	0	1,06	0	0	0,35	0
6	Sedation	5	0	0,47	0	0	1,06	0	0	0,35	0
6.a	General Anesthesia	10	0	0,47	0	0	1,06	0	0	0,35	0
7	Preparation of the Sterile Environment	5	0	0,47	0	0	1,06	0	0	0,35	0
8	Diagnostic Phase	15	1	0,47	7,05	0	1,06	0	0	0,35	0
9	Operative Phase		1	0,47	0	0	1,06	0	0	0,35	0
10	Medication	10	0	0,47	0	0	1,06	0	0	0,35	0
11	TAC Final Control	5	1	0,47	2,35	0	1,06	0	0	0,35	0
12	Mobilizaiton of the patient	5	1	0,47	2,35	0	1,06	0	1	0,35	1,75
13	Transfer of the Patient	15	0	0,47	0	0	1,06	0	0	0,35	0
13a	In Neuroscience, in anesthesia		0	0,47	0	0	1,06	0	1	0,35	0
13b	In Neuroscience, intubated or awake		0	0,47	0	0	1,06	0	1	0,35	0
13c	Other Intensive Therapy, in AOP		0	0,47	0	0	1,06	0	0	0,35	0
13d	Other Intensive Therapy, in other Firm		0	0,47	0	0	1,06	0	0	0,35	0
13e	Arrival Hospital, in other firm		0	0,47	0	0	1,06	0	0	0,35	0
14	Room Rearrangement	20	1	0,47	9,4	0	1,06	0	1	0,35	7
15	Images Filing	*5*	1	0,47	2,35	0	1,06	0	0	0,35	0
16	Counting and Printing of the RX dose	*5*	1	0,47	2,35	0	1,06	0	0	0,35	0
17	Medical Record and Operatory Act Registration	*15*	0	0,47	0	0	1,06	0	0	0,35	0
18	Clinic Re-evlauatin	*15*	0	0,47	0	1	1,06	15,9	0	0,35	0

The workforce cost of the Phases:

N°	Name	t	Workforce Cost
1	Taking in Charge	15	77
2	Acceptance	5	2,35
3	Confirm and Consensus Acquisition	10	23,4
4	Access to the Angiographic Room	5	12,7
5	Placement of the Patioent o on the Table	5	32,6
6	Sedation	5	8,3
6.a	General Anesthesia	10	16,6
7	Preparation of the Sterile Environment	5	13,95
8	Diagnostic Phase	15	48,9
9	Operative Phase		0
10	Medication	10	27,9
11	TAC Final Control	5	14,05
12	Mobilizaiton of the patient	5	12,4
13	Transfer of the Patient	15	6,75
13a	In Neuroscience, in anesthesia		0
13b	In Neuroscience, intubated or awake		0
13c	Other Intensive Therapy, in AOP		0
13d	Other Intensive Therapy, in other Firm		0
13e	Arrival Hospital, in other firm		0
14	Room Rearrangement	15	25,4
15	Images Filing	*5*	8
16	Counting and Printing of the RX dose	*5*	2,35
17	Medical Record and Operatory Act Registration	*15*	16,95
18	Clinic Re-evlauatin	*15*	15,9

Workforce Cost of the procedures:

As from the flow chat, in every procedure the following team members are present: 2 Neuroradiologist (1.13 €/Minute), one Nurse (0.46€/Minute) and one Radiology Technician (0.47 €/Minute)

N°	Name	t	Nurse	Technician	Neruoradiologist (2)	Workforce Tot Cost
1	Sclero/Embolization of Vascular Malformation	40	18,4	18,8	90,4	€ 128
2	Integrative Angiography	30	13,8	14,1	67,8	€ 96
3	Carotid Stenting	48	22,08	22,56	108,48	€ 153
3.a	Carotid Stenting in Thrombectomy	20	9,2	9,4	45,2	€ 64
4	Intracranial Stenting	91	41,86	42,77	205,66	€ 290
4.a	Intracranial Stenting in Thrombectomy	20	9,2	9,4	45,2	€ 64
5	Peripheral Stenting	68	31,28	31,96	153,68	€ 217
6	Embolization: Brain AVF	181	83,26	85,07	409,06	€ 577
7	Embolization: Extra-cranial AVF	120	55,2	56,4	271,2	€ 383
8	Embolization: Spinal AVF	150	69	70,5	339	€ 479
9	Embolization: Brain AVM	163	74,98	76,61	368,38	€ 520
10	Embolization: Spinal AVM	130	59,8	61,1	293,8	€ 415
11	Embolization: Extra-Cranial AVM	130	59,8	61,1	293,8	€ 415
12	Embolization: Aneurism coiling	99	45,54	46,53	223,74	€ 316
12.a	Embolization: Aneurism BAC remodeling	132	60,72	62,04	298,32	€ 421
12.a.b	Embolization: Aneurism SAC	149	68,54	70,03	336,74	€ 475
12.a.b.c	Embolization: Aneurism with Stent FD	127	58,42	59,69	287,02	€ 405
12.a.b.c.d	Embolization: Other	127	58,42	59,69	287,02	€ 405
13	Occlusion Test	75	34,5	35,25	169,5	€ 239
14	Intracranial Vasospasm Treatment	80	36,8	37,6	180,8	€ 255
15	Spinal-Bone Biopsy	30	13,8	14,1	67,8	€ 96
16	Ozonetherapy - Facets Infiltration	30	13,8	14,1	67,8	€ 96
17	Vertebroplasty	40	18,4	18,8	90,4	€ 128
18	Thrombo-aspiration	84	38,64	39,48	189,84	€ 268
18.a	Intracranial Thrombectomy	49	22,54	23,03	110,74	€ 156
19	Intra-arterial Chemiotherapy of RTB	133	61,18	62,51	300,58	€ 424
20	Tumor Embolization - pre.op.	123	56,58	57,81	277,98	€ 392
21	Tumor Embolization Spinal-Head&neck	123	56,58	57,81	277,98	€ 392
22	Trauma/bleeding Embolization	115	52,9	54,05	259,9	€ 367

4.3.3 - Activities Allocation

At this point I have the cost of every phase and every procedure.

N°	Phase	t	Drugs	Devices	Technology	Workforce Cost	Tot Cost
1	Taking in Charge	20'	0	0	0	77	€ 77
2	Acceptance	5'	0	0	0	2,35	€ 2
3	Confirm and Consensus Acquisition	10'	0	0	0	23,4	€ 23
4	Access to the Angiographic Room	10'	0	0	0	12,7	€ 13
5	Placement of the Patioent on the Table	10'	1	9	0	32,6	€ 42
6	Sedation	5'	31	20	0	8,3	€ 59
6.a	General Anesthesia	10'	36	28	0	16,6	€ 81
7	Preparation of the Sterile Environment	5'	4	94	0	13,95	€ 112
8	Diagnostic Phase	15'	10	60	447	48,9	€ 565
9	Operative Phase (See following Chart)		0	0	0	0	€ 0
10	Medication	10'	0	123	0	27,9	€ 151
11	TAC Final Control	5'	0	0	0	14,05	€ 14
12	Mobilizaiton of the patient	5'	0	0	0	12,4	€ 12
13	Transfer of the Patient	15'	0	0	0	6,75	€ 7
13a	In Neuroscience, in anesthesia		0	0	0	0	€ 0
13b	In Neuroscience, intubated or awake		0	0	0	0	€ 0
13c	Other Intensive Therapy, in AOP		0	0	0	0	€ 0
13d	Other Intensive Therapy, in other Firm		0	0	0	0	€ 0
13e	Arrival Hospital, in other firm		0	0	0	0	€ 0
14	Room Rearrangement	20'	0	0	0	25,4	€ 25
15	Images Filing	5'	0	0	0	8	€ 8
16	Counting and Printing of the RX dose	5'	0	0	0	2,35	€ 2
17	Medical Record and Operatory Act Registration	15'	0	0	0	16,95	€ 17
18	Clinic Re-evlauation	15'	0	0	0	15,9	€ 16

The total cost of the pre and post phases must be summed up to the procedures' costs, keeping in mind that the procedure 15, 16 and 17 does not have the phase 8, the Diagnostic Phase and that the phases 6 and 6.a are alternatives. This generates 4 possibilities:

	Sedation	General Anestesia
Cost with Phase 8	1145,39	1167,86
Cost without Phase 8	580,13	602,60

In this study I will consider the average value for the combinations with and without the Diagnostic Phase.

Cost with Phase 8	1156,62
Cost without Phase 8	591,36

At this point I can calculate the total cost of every procedure:

N°	Name	Workforce	Devices	Generic Devices (Angiograpghic Room)	General Devices	Angiographic Drugs	General Drugs	General Services	General Technology	Procedure Cost
1	Sclero/Embolization of Vascular Malformation	127,60	17,82	43,42	1,01	227,61	0,29	4,48	26,32	**€ 449**
2	Integrative Angiography	95,70	21,74	32,56	1,01	170,71	0,29	4,48	26,32	**€ 353**
3	Carotid Stenting	153,12	2509,20	52,10	1,01	273,14	0,29	4,48	26,32	**€ 3.020**
3.a	Carotid Stenting in Thrombectomy	153,12	2266,42	52,10	1,01	273,14	0,29	4,48	26,32	**€ 2.777**
4	Intracranial Stenting	290,29	7570,26	98,77	1,01	517,82	0,29	4,48	26,32	**€ 8.509**
4.a	Intracranial Stenting in Thrombectomy	290,29	5182,89	98,77	1,01	517,82	0,29	4,48	26,32	**€ 6.122**
5	Peripheral Stenting	216,92	1904,68	98,77	1,01	517,82	0,29	4,48	26,32	**€ 2.770**
6	Embolization: Brain AVF	577,39	6181,32	196,46	1,01	1029,95	0,29	4,48	26,32	**€ 8.017**
7	Embolization: Extra-cranial AVF	382,80	5593,91	196,46	1,01	1029,95	0,29	4,48	26,32	**€ 7.235**
8	Embolization: Spinal AVF	478,50	7065,96	196,46	1,01	1029,95	0,29	4,48	26,32	**€ 8.803**
9	Embolization: Brain AVM	519,97	8367,71	176,93	1,01	927,53	0,29	4,48	26,32	**€ 10.024**
10	Embolization: Spinal AVM	414,70	3518,20	176,93	1,01	927,53	0,29	4,48	26,32	**€ 5.069**
11	Embolization: Extra-Cranial AVM	414,70	6419,80	176,93	1,01	927,53	0,29	4,48	26,32	**€ 7.971**
12	Embolization: Aneurism coiling	315,81	6185,88	107,46	1,01	563,34	0,29	4,48	26,32	**€ 7.205**
12.a	Embolization: Aneurism BAC remodeling	421,08	2020,32	143,28	1,01	751,13	0,29	4,48	26,32	**€ 3.368**
12.a.b	Embolization: Aneurism SAC	475,31	5383,93	161,73	1,01	847,86	0,29	4,48	26,32	**€ 6.901**
12.a.b.c	Embolization: Aneurism with Stent FD	405,13	13389,85	137,85	1,01	722,67	0,29	4,48	26,32	**€ 14.688**
12.a.b.c.d	Embolization: Other	405,13	12079,43	137,85	1,01	722,67	0,29	4,48	26,32	**€ 13.377**
13	Occlusion Test	239,25	2374,12	98,23	1,01	722,67	0,29	4,48	26,32	**€ 3.466**
14	Intracranial Vasospasm Treatment	255,20	1065,48	86,83	1,01	455,23	0,29	4,48	26,32	**€ 1.895**
15	Spinal-Bone Biopsy	95,70	40,97	32,56	1,01	170,71	0,29	4,48	26,32	**€ 372**
16	Ozonetherapy - Facets Infiltration	95,70	7,32	32,56	1,01	170,71	0,29	4,48	26,32	**€ 338**
17	Vertebroplasty	127,60	801,96	43,42	1,01	227,61	0,29	4,48	26,32	**€ 1.233**
18	Thrombo-aspiration	267,96	4174,82	68,42	1,01	278,83	0,29	4,48	26,32	**€ 4.822**
18.a	Intracranial Thrombectomy	156,31	4645,46	53,19	1,01	278,83	0,29	4,48	26,32	**€ 5.166**
19	Intra-arterial Chemiotherapy of RTB	424,27	1512,09	108,33	1,01	699,91	0,29	4,48	26,32	**€ 2.777**
20	Tumor Embolization - pre.op.	392,37	4732,99	133,51	1,01	699,91	0,29	4,48	26,32	**€ 5.991**
21	Tumor Embolization Spinal-Head&neck	392,37	1974,91	133,51	1,01	654,39	0,29	4,48	26,32	**€ 3.187**
22	Trauma/bleeding Embolization	366,85	2752,12	62,41	1,01	654,39	0,29	4,48	26,32	**€ 3.868**

These costs, summed to the cost of the preparatory and Post Phases will create the base for the tariff (Full Cost).

N°	Name	Pre and Post t	t	Pre Post cost	Procedure Cost	Total Time	Total Cost
1	Sclero/Embolization of Vascular Malformation	115'	40'	€ 1.179	€ 449	155'	**€ 1.627**
2	Integrative Angiography	115'	30'	€ 1.179	€ 353	145'	**€ 1.532**
3	Carotid Stenting	115'	48'	€ 1.179	€ 3.020	163'	**€ 4.199**
3.a	Carotid Stenting in Thrombectomy	115'	48'	€ 1.179	€ 2.777	163'	**€ 3.956**
4	Intracranial Stenting	115'	91'	€ 1.179	€ 8.509	206'	**€ 9.688**
4.a	Intracranial Stenting in Thrombectomy	115'	91'	€ 1.179	€ 6.122	206'	**€ 7.301**
5	Peripheral Stenting	115'	68'	€ 1.179	€ 2.770	183'	**€ 3.949**
6	Embolization: Brain AVF	115'	181'	€ 1.179	€ 8.017	296'	**€ 9.196**
7	Embolization: Extra-cranial AVF	115'	120'	€ 1.179	€ 7.235	235'	**€ 8.414**
8	Embolization: Spinal AVF	115'	150'	€ 1.179	€ 8.803	265'	**€ 9.982**
9	Embolization: Brain AVM	115'	163'	€ 1.179	€ 10.024	278'	**€ 11.203**
10	Embolization: Spinal AVM	115'	130'	€ 1.179	€ 5.069	245'	**€ 6.248**
11	Embolization: Extra-Cranial AVM	115'	130'	€ 1.179	€ 7.971	245'	**€ 9.150**
12	Embolization: Aneurism coiling	115'	99'	€ 1.179	€ 7.205	214'	**€ 8.383**
12.a	Embolization: Aneurism BAC remodeling	115'	132'	€ 1.179	€ 3.368	247'	**€ 4.547**
12.a.b	Embolization: Aneurism SAC	115'	149'	€ 1.179	€ 6.901	264'	**€ 8.080**
12.a.b.c	Embolization: Aneurism with Stent FD	115'	127'	€ 1.179	€ 14.688	242'	**€ 15.866**
12.a.b.c.d	Embolization: Other	115'	127'	€ 1.179	€ 13.377	242'	**€ 14.556**
13	Occlusion Test	115'	75'	€ 1.179	€ 3.466	190'	**€ 4.645**
14	Intracranial Vasospasm Treatment	115'	80'	€ 1.179	€ 1.895	195'	**€ 3.074**
15	Spinal-Bone Biopsy	100'	30'	€ 614	€ 372	130'	**€ 986**
16	Ozonetherapy - Facets Infiltration	100'	30'	€ 614	€ 338	130'	**€ 952**
17	Vertebroplasty	100'	40'	€ 614	€ 1.233	140'	**€ 1.846**
18	Thrombo-aspiration	115'	84'	€ 1.179	€ 4.822	199'	**€ 6.001**
18.a	Intracranial Thrombectomy	115'	49'	€ 1.179	€ 5.166	164'	**€ 6.345**
19	Intra-arterial Chemiotherapy of RTB	115'	133'	€ 1.179	€ 2.777	248'	**€ 3.956**
20	Tumor Embolization - pre.op.	115'	123'	€ 1.179	€ 5.991	238'	**€ 7.170**
21	Tumor Embolization Spinal-Head&neck	115'	123'	€ 1.179	€ 3.187	238'	**€ 4.366**
22	Trauma/bleeding Embolization	115'	115'	€ 1.179	€ 3.868	230'	**€ 5.047**

To obtain the full cost, general cost should be added through a mark-up (Cost + 30%). The 30% quota has been elaborated through a study by the AOP on the Structural Margins. The costs of the firm have been allocated by direct, indirect and general. The indirect in this case have been set as general, because a driver to allocate them was missing. The general amount of cost has been divided by the total consumption of the firm. In 4 years the percentage of the General costs has always been around 30%.

	Consumptive 2012	**Consumptive 2013**	**Consumptive 2014**	**Consumptive 2015**
Firm Total Cost	565.282.153	573.334.853	560.345.300	576.422.238
Direct Costs	433.540.924	435.061.484	423.042.458	450.884.732
General Costs	131.741.229	138.273.369	137.302.842	125.537.506
% General Cost (B/A)	**30%**	**32%**	**32%**	**28%**

So was possible to include the general costs inside the study:

N°	Name	Full Cost (Mark Up 30%)
1	Sclero/Embolization of Vascular Malformation	**€ 2.164**
2	Integrative Angiography	**€ 2.037**
3	Carotid Stenting	**€ 5.584**
3.a	Carotid Stenting in Thrombectomy	**€ 5.261**
4	Intracranial Stenting	**€ 12.885**
4.a	Intracranial Stenting in Thrombectomy	**€ 9.710**
5	Peripheral Stenting	**€ 5.252**
6	Embolization: Brain AVF	**€ 12.231**
7	Embolization: Extra-cranial AVF	**€ 11.191**
8	Embolization: Spinal AVF	**€ 13.276**
9	Embolization: Brain AVM	**€ 14.900**
10	Embolization: Spinal AVM	**€ 8.310**
11	Embolization: Extra-Cranial AVM	**€ 12.169**
12	Embolization: Aneurism coiling	**€ 11.150**
12.a	Embolization: Aneurism BAC remodeling	**€ 6.047**
12.a.b	Embolization: Aneurism SAC	**€ 10.746**
12.a.b.c	Embolization: Aneurism with Stent FD	**€ 21.102**
12.a.b.c.d	Embolization: Other	**€ 19.360**
13	Occlusion Test	**€ 6.178**
14	Intracranial Vasospasm Treatment	**€ 4.088**
15	Spinal-Bone Biopsy	**€ 1.311**
16	Ozonetherapy - Facets Infiltration	**€ 1.266**
17	Vertebroplasty	**€ 2.456**
18	Thrombo-aspiration	**€ 7.981**
18.a	Intracranial Thrombectomy	**€ 8.439**
19	Intra-arterial Chemiotherapy of RTB	**€ 5.261**
20	Tumor Embolization - pre.op.	**€ 9.536**
21	Tumor Embolization Spinal-Head&neck	**€ 5.807**
22	Trauma/bleeding Embolization	**€ 6.712**

4.3.4 – Control of result Coherence

The last step to finish the study is a double check between the results and the initial data[28].

For the devices the total consumption registered in the management accounting system amounts to €1.145.860 for the 2015 and € 994.711 for the 2016 until October. If the study is correct, I expect the sum of the costs of the devices for the Phases and the Procedures to be almost equalt to the total consumption in the same period. It cannot be perfectly similar due to some stocks of materials in the warehouse. To bypass the "stock bias" we choose to consider a two-year period.
To obtain the devices' cost for the phases we need to multiply the total cost of the devices for all the phases (they are the same in every service) for the number of procedures in the 2015 and 2016.

Devices' Cost in the Phases		
Cost per Phase	N° of Procedure 2015	N° of Procedure 2016
€ 333	275	348
Tot Cost	€ 91.575	€ 115.884

[28] I will not perform the check for the Technology and the Services because they have been allocated without weight, only dividing the total cost for the number of procedures.

The cost of devices for the procedures (Sum of the devices cost multiplied by number of procedures in the 2015 and 2016):

N°	Name	Devices	Generic Devices (Angiograpghic Room)	General Devices	N° of Procedures 2015	N° of Procedures 2016	Device Cost 2015	Device Cost 2016
1	Sclero/Embolization of Vascular Malformation	17,82	43,42	1,01	43	48	€ 2.677	€ 2.988
2	Integrative Angiography	21,74	32,56	1,01	26	30	€ 1.438	€ 1.659
3	Carotid Stenting	2509,20	52,10	1,01	24	17	€ 61.495	€ 43.559
3.a	Carotid Stenting in Thrombectomy	2266,42	52,10	1,01	0	0	€ 0	€ 0
4	Intracranial Stenting	7570,26	98,77	1,01	9	1	€ 69.030	€ 7.670
4.a	Intracranial Stenting in Thrombectomy	5182,89	98,77	1,01	0	0	€ 0	€ 0
5	Peripheral Stenting	1904,68	98,77	1,01	0	0	€ 0	€ 0
6	Embolization: Brain AVF	6181,32	196,46	1,01	9	10	€ 57.409	€ 63.788
7	Embolization: Extra-cranial AVF	5593,91	196,46	1,01	0	0	€ 0	€ 0
8	Embolization: Spinal AVF	7065,96	196,46	1,01	0	0	€ 0	€ 0
9	Embolization: Brain AVM	8367,71	176,93	1,01	12	13	€ 102.548	€ 111.093
10	Embolization: Spinal AVM	3518,20	176,93	1,01	0	0	€ 0	€ 0
11	Embolization: Extra-Cranial AVM	6419,80	176,93	1,01	0	0	€ 0	€ 0
12	Embolization: Aneurism coiling	6185,88	107,46	1,01	9	14	€ 56.649	€ 88.121
12.a	Embolization: Aneurism BAC remodeling	2020,32	143,28	1,01	15	14	€ 32.469	€ 30.305
12.a.b	Embolization: Aneurism SAC	5383,93	161,73	1,01	5	3	€ 27.733	€ 16.640
12.a.b.c	Embolization: Aneurism with Stent FD	13389,85	137,85	1,01	14	15	€ 189.402	€ 202.931
12.a.b.c.d	Embolization: Other	12079,43	137,85	1,01	0	0	€ 0	€ 0
13	Occlusion Test	2374,12	98,23	1,01	0	0	€ 0	€ 0
14	Intracranial Vasospasm Treatment	1065,48	86,83	1,01	5	15	€ 5.767	€ 17.300
15	Spinal-Bone Biopsy	40,97	32,56	1,01	16	28	€ 1.193	€ 2.087
16	Ozonetherapy - Facets Infiltration	7,32	32,56	1,01	7	18	€ 286	€ 736
17	Vertebroplasty	801,96	43,42	1,01	36	43	€ 30.470	€ 36.395
18	Thrombo-aspiration	4174,82	68,42	1,01	0	33	€ 0	€ 140.060
18.a	Intracranial Thrombectomy	4645,46	53,19	1,01	30	22	€ 140.990	€ 103.393
19	Intra-arterial Chemiotherapy of RTB	1512,09	108,33	1,01	0	7	€ 0	€ 11.350
20	Tumor Embolization - pre.op.	4732,99	133,51	1,01	10	15	€ 48.675	€ 73.013
21	Tumor Embolization Spinal-Head&neck	1974,91	133,51	1,01	0	0	€ 0	€ 0
22	Trauma/bleeding Embolization	2752,12	62,41	1,01	5	2	€ 14.078	€ 5.631

The Sum:

Total 2015	Total 2016
€ 842.310	€ 958.719

The total cost of the devices, during years 2015 and 2016 was € 2.140.572. The sum of the devices' cost from the study is:

Devices' Cost	
From Study	€ 2.008.488
From Management Accounting System	€ 2.140.572
Coverage (not considering Warehouse)	94%

The coverage stops at 94%, that anyway can be considered a good result, because of the stock in the warehouse and a part of cost of the devices that has been allocated to all the Neuroradiology's activity, also the diagnostic one. That cost is around €26.000 and would, with the warehouse, lead the percentage of coverage closer to 100%.

The check of the Personnel costs is more difficult, as the team works not only in the angiographic room, but also in the diagnostic section of the Department, which is not considered in this study. For this reason, we need to estimate the percentage of workforce working for the angiographic room, which in not easy due to the frequent emergencies. To perform this calculation with effective precision I would have needed the turns registry of the department and the operatory Registries. Unfortunately, I couldn't elaborate this data and I adopted an ABC approach.

With a series of consulting with some Doctors of that department we estimated that the percentage of time and personnel on the procedures studied here, could be around 20-25% of the total time-personnel consumption. Moreover, here I take in account an hour, called factor "K" to consider the inactive time that the personnel of the Angiographic Room usually waits between 2 procedures

Personnel Cost							
From Study							
Procedures							€ 61.423
Pre and Post Phases							€ 100.375
"K" Factor							
	Euro/min	min	tot	N° Prest	Tot		
Doctor	1,13	60	68	275	18.645		
OSS	0,35	60	21	275	5.775		€ 32.175
Technician	0,47	60	28	275	7.755		
From Study						**Tot**	**€ 193.973**
From Budget						**Tot**	**€ 1.100.000**
Coverage							18%

As estimated, the personnel cost is around 20-25%. It would be useful to go deeper with this analysis,

The drug Cost Coverage:

As first I multiply the Drugs consuming of the procedure for the numbers of procedures performed in the 2015[29].

N°	Name	General Drugs	Angiographic Drugs	N° of Procedures 2015	Drug cost 2015
1	Sclero/Embolization of Vascular Malformation	0,29	227,61	43	€ 9.800
2	Integrative Angiography	0,29	170,71	26	€ 4.446
3	Carotid Stenting	0,29	273,14	24	€ 6.562
3.a	Carotid Stenting in Thrombectomy	0,29	273,14	0	€ 0
4	Intracranial Stenting	0,29	517,82	9	€ 4.663
4.a	Intracranial Stenting in Thrombectomy	0,29	517,82	0	€ 0
5	Peripheral Stenting	0,29	517,82	0	€ 0
6	Embolization: Brain AVF	0,29	1029,95	9	€ 9.272
7	Embolization: Extra-cranial AVF	0,29	1029,95	0	€ 0
8	Embolization: Spinal AVF	0,29	1029,95	0	€ 0
9	Embolization: Brain AVM	0,29	927,53	12	€ 11.134
10	Embolization: Spinal AVM	0,29	927,53	0	€ 0
11	Embolization: Extra-Cranial AVM	0,29	927,53	0	€ 0
12	Embolization: Aneurism coiling	0,29	563,34	9	€ 5.073
12.a	Embolization: Aneurism BAC remodeling	0,29	751,13	15	€ 11.271
12.a.b	Embolization: Aneurism SAC	0,29	847,86	5	€ 4.241
12.a.b.c	Embolization: Aneurism with Stent FD	0,29	722,67	14	€ 10.121
12.a.b.c.d	Embolization: Other	0,29	722,67	0	€ 0
13	Occlusion Test	0,29	722,67	0	€ 0
14	Intracranial Vasospasm Treatment	0,29	455,23	5	€ 2.278
15	Spinal-Bone Biopsy	0,29	170,71	16	€ 2.736
16	Ozonetherapy - Facets Infiltration	0,29	170,71	7	€ 1.197
17	Vertebroplasty	0,29	227,61	36	€ 8.204
18	Thrombo-aspiration	0,29	278,83	0	€ 0
18.a	Intracranial Thrombectomy	0,29	278,83	30	€ 8.373
19	Intra-arterial Chemiotherapy of RTB	0,29	699,91	0	€ 0
20	Tumor Embolization - pre.op.	0,29	699,91	10	€ 7.002
21	Tumor Embolization Spinal-Head&neck	0,29	654,39	0	€ 0
22	Trauma/bleeding Embolization	0,29	654,39	5	€ 3.273
				Total	€ 109.647

[29] For the Drugs I consider only the 2015 because the data for the 2016 is too limited

The overview on the Drugs cost:

Tot Cost 2015		Total
Procedure	€ 109.647	€ 109.647
Cost per Phase	N° of Procedure 2015	
€ 81	275	€ 22.275
Total Drugs Cost		€ 131.922
From IT extraction		€ 131.603
Coverage		100%

To sum up on the coverages:

Cost	Devices	Personnel	Drugs
Coverage	94%	18%(as forecasted)	100%

4.4 – Possible Applications

The definition of the procedures' costs can be helpful for the AOP by many point of views. The first regards the efficiency pursuing. With this data, the Department and the Hospital management can analyse if there is (and where) time waste, excessive material consumption and maybe personnel misallocation. It helps also, and this is confirmed by Doctor Causin, to grow in Doctors the awareness of the value they hold in their hands. This discourse may have ethical implications; in fact, I am not suggesting to treat patients differently considering the value of the material used, but to grow in awareness may benefit also in efficiency and efficacy.

Several are then the pure economic implications for the AOP revenue management. Knowing the cost of a procedure, and knowing the DRG resulting, a cost-revenue comparison can be done.

As an example we can compare the different procedures which are catalogued under DRG 453: "Craniotomy with implant, or principal diagnosis of severe pathology of the Neural System". It is the possible DRG deriving from some of the procedures studied here.

N°	Name	Tot Cost	Cost With Mark Up	DRG	Tariff	Gain/Loss
3.a	Carotid Stenting in Thrombectomy	€ 3.866	€ 5.142	543	€ 11.695	€ 6.553
4	Intracranial Stenting	€ 9.688	€ 12.885	543	€ 11.695	-€ 1.190
4.a	Intracranial Stenting in Thrombectomy	€ 7.074	€ 9.409	543	€ 11.695	€ 2.286
6	Embolization: Brain AVF	€ 9.196	€ 12.231	543	€ 11.695	-€ 536
9	Embolization: Brain AVM	€ 11.203	€ 14.900	543	€ 11.695	-€ 3.205
12	Embolization: Aneurism coiling	€ 8.383	€ 11.150	543	€ 11.695	€ 545
12.a	Embolization: Aneurism BAC remodeling	€ 4.547	€ 6.047	543	€ 11.695	€ 5.648
12.a.b	Embolization: Aneurism SAC	€ 8.080	€ 10.746	543	€ 11.695	€ 949
12.a.b.c	Embolization: Aneurism with Stent FD	€ 15.866	€ 21.102	543	€ 11.695	-€ 9.407
12.a.b.c.d	Embolization: Other	€ 14.556	€ 19.360	543	€ 11.695	-€ 7.665
18	Thrombo-aspiration	€ 6.001	€ 7.981	543	€ 11.695	€ 3.714
18.a	Intracranial Thrombectomy	€ 6.345	€ 8.439	543	€ 11.695	€ 3.256

Knowing that the DRG are the results of groups of treatments, and that they should cover the average expense for those procedures, it is possible to perform a cost-revenue analysis with the sample size of this study. The result of the gain/loss for each procedure (in the chart), multiplied for the real yearly mix of procedures should result in a positive or at least 0 result. It is a pure theoretical application, considering that other procedures performed by Units different from the Neuroradiology department generate DRG 543, but such analysis gives a sense of the ordinary effect of the DRG reimbursement system on Hospital's revenues:

N°	Name	Mark Up (Full cost + 30%)	DRG	Tariff	Gain /Loss	Q 2015	Procedure's result
3.a	Carotid Stenting in Thrombectomy	€ 5.142	543	€ 11.695	€ 6.553	0	€ 0
4	Intracranial Stenting	€ 12.885	543	€ 11.695	-€ 1.190	9	-€ 10.712
4.a	Intracranial Stenting in Thrombectomy	€ 9.409	543	€ 11.695	€ 2.286	0	€ 0
6	Embolization: Brain AVF	€ 12.231	543	€ 11.695	-€ 536	9	-€ 4.822
9	Embolization: Brain AVM	€ 14.900	543	€ 11.695	-€ 3.205	12	-€ 38.461
12	Embolization: Aneurism coiling	€ 11.150	543	€ 11.695	€ 545	9	€ 4.905
12.a	Embolization: Aneurism BAC remodeling	€ 6.047	543	€ 11.695	€ 5.648	15	€ 84.717
12.a.b	Embolization: Aneurism SAC	€ 10.746	543	€ 11.695	€ 949	5	€ 4.744
12.a.b.c	Embolization: Aneurism with Stent FD	€ 21.102	543	€ 11.695	-€ 9.407	14	-€ 131.704
12.a.b.c.d	Embolization: Other	€ 19.360	543	€ 11.695	-€ 7.665	0	€ 0
18	Thrombo-aspiration	€ 7.981	543	€ 11.695	€ 3.714	0	€ 0
18.a	Intracranial Thrombectomy	€ 8.439	543	€ 11.695	€ 3.256	30	€ 97.695
Total							**€ 6.363**

Looking at this table it is possible to say that the DRG 543, for the Neuroradiology Department, reported a gain for the AOP of € 6.363. According to this example, the tariff set for the DRG 543 makes the related procedures economically sustainable.
This is not true for any DRG tariffs, as many studies show that some procedures, on the other hand, present severe losses in the tariff reimbursement, and it being not modifiable in the short period, this, in some situations and if an operator would want to cheat, could open the way for opportunistic behaviours, like patient selection by DRG profitability.

The focus of this study is on the costs, but the goal is to arrive to a tariff list. The difference between the two is that the cost has an internal focus, and moreover, an internal use. The tariff, on the other hand, is for the external institutions or people. The term tariff, may lead to think that there exists a sort of market, and that the AOP could modify its tariff for outpatient at its will. This is true in part, because the system is organised to be a quasi-market, but also to operate as an integrate entities. Especially for the Stroke treatment this is true, with the new system of the Hub & Spoke, that allow the patients to obtain the best service thanks to the different specialization of the Hospitals for different treatments. In fact, each Hospital does not aim to perform everything at the best level, but to specialize in some treatments. The specialization is the base of the clinic profession. The tariff elaboration that the AOP will develop from this study may have different goals: one could be to look at the profit, and this maybe would lead to a tariff that covers the full cost. Another could be to leave the general cost coverage to other procedures and not to report the full mark up, this to favour the arrival of more patients to the AOP. The latter method is based on a Break Even point optic, that should allow the Hospital to cover its own production cost. Moreover, developing this tariff would offer the chance to other Hospitals, that have daily exchanges of patients with the AOP, to perform Make or Buy choices. This does not consider the episodically necessity to send the patient to a specialized centre, but give an idea of how an Hospital's management could take some choices in making the agreements, especially in the Hub & Spoke system.
Considering, instead, the whole Veneto's Hospitals as an integrated system, the aim should be to ensure to the citizens the best possible service, and so this cost analysis should be seen as a starting point for the improvement of the Hub & Spoke System.

The step further, for this study, would be the integration of these procedures into the regional, or even national, tariff list. As far as I know, this is the one of the few studies in Italy for these procedures, and they are not even present on the regional tariff lists. This led, in the past, to a wrong invoicing and wrong reimbursement. The adoption of the future tariff list, based on

real costs, would mean a better economically comprehension of these procedures and a possible National standardization. This, anyway, requires a long bureaucratic path, but could eventually lead to more realistic reimbursements and a better system accuracy.

Conclusions

During my internship at the AOP, to compose my thesis, I have analysed the birth of the Italian National Health System, its development, its actual situation and its financing system. After this, I had the chance to study and experience the daily tasks, the structure and the economical concepts and techniques that are applied by the Programming & Control Operative Unit. Through the ABC method, I studied the cost of some Neuroradiology's operative procedures performed in the Angiographic Room. Thanks to this method, I had the chance to interview Doctors and Administrative operators. With them, I went very deep in the analysis of the medical procedures, with their Clinic and Economical consequences. The output of this work has been the assessing of the Full Cost of certain procedures, and its possible use for the development of a tariff list. This work has been very interesting to me due to the very deep level of analysis and to the ethical consequences of the activities studied. Moreover, it has very concrete development possibilities. In fact, it is already programmed by the AOP to create the tariff list, and it will have this study as starting point.

N°	Name	Total Time	Full Cost (Mark Up 30%)
1	Sclero/Embolization of Vascular Malformation	155'	**€ 2.164**
2	Integrative Angiography	145'	**€ 2.037**
3	Carotid Stenting	163'	**€ 5.584**
3.a	Carotid Stenting in Thrombectomy	163'	**€ 5.261**
4	Intracranial Stenting	206'	**€ 12.885**
4.a	Intracranial Stenting in Thrombectomy	206'	**€ 9.710**
5	Peripheral Stenting	183'	**€ 5.252**
6	Embolization: Brain AVF	296'	**€ 12.231**
7	Embolization: Extra-cranial AVF	235'	**€ 11.191**
8	Embolization: Spinal AVF	265'	**€ 13.276**
9	Embolization: Brain AVM	278'	**€ 14.900**
10	Embolization: Spinal AVM	245'	**€ 8.310**
11	Embolization: Extra-Cranial AVM	245'	**€ 12.169**
12	Embolization: Aneurism coiling	214'	**€ 11.150**
12.a	Embolization: Aneurism BAC remodeling	247'	**€ 6.047**
12.a.b	Embolization: Aneurism SAC	264'	**€ 10.746**
12.a.b.c	Embolization: Aneurism with Stent FD	242'	**€ 21.102**
12.a.b.c.d	Embolization: Other	242'	**€ 19.360**
13	Occlusion Test	190'	**€ 6.178**
14	Intracranial Vasospasm Treatment	195'	**€ 4.088**
15	Spinal-Bone Biopsy	130'	**€ 1.311**
16	Ozonetherapy - Facets Infiltration	130'	**€ 1.266**
17	Vertebroplasty	140'	**€ 2.456**
18	Thrombo-aspiration	199'	**€ 7.981**
18.a	Intracranial Thrombectomy	164'	**€ 8.439**
19	Intra-arterial Chemiotherapy of RTB	248'	**€ 5.261**
20	Tumor Embolization - pre.op.	238'	**€ 9.536**
21	Tumor Embolization Spinal-Head&neck	238'	**€ 5.807**
22	Trauma/bleeding Embolization	230'	**€ 6.712**

Deepening this economical field, that groups severe Law constraints, many ethical consequences and a limited budget, I realised that the spirit of the Managerialism reforms is still alive, and, even after huge steps, it is only at its initial stages of application. The lack of studies like this one shows how much there is still to do to really give accomplishment to that period's reforms.

On the other hand, the managerial aspect of an Hospital management necessarily steps back when a life is at stack, but this does not mean that a Managerial approach to Healthcare could not advantage the system.

Bibliography

Amodeo, D. (1960). *Le Gestioni Industriali produttrici di beni.* Torino: Unione Tipografico.

AOP. (2015). Atto Aziendale AOP. Padova: AOP.

AOP. (2016, 10 31). *http://www.sanita.padova.it/sez,3652*. Tratto da www.sanita.padova.it: http://www.sanita.padova.it/sez,3652

AOP. (2016, 10 31). *www.sanita.padova.* Tratto da www.sanita.padova: http://www.sanita.padova.it/all/Documento_di_Direttive_2016_versione_pubblicazione.pdf

Cambieri. (1997). La definizione del contesto organizzativo e le nuove competenze dello specialista ospedaliero. *Managment Per La nuova Sanità*, 202.

Capodaglio, G. (2011). *Manuale Di Contabilità Analitica.* Bologna: Maggioli Editore.

Cooper&Kaplan. (2011). *How to solve cost crisis in Helathcare.* Harvard: Harvard Business Review.

Coppola, F. S. (2008). Profili Evolutivi del SSN Italiano: Analisi e Sintesi della Produzione Normativa Dal 1978 a Oggi. *Economia Della Tassazione.* Pavia.

E. Menichetti. (2001). *L'aziendalizzazione del Servizio Sanitario Nazionale: profili di organizzazione e della dirigenza.* MIlano: Giuffrè.

Facchineti, I. (2007). *Manuale Di Contabilità Analitica.* MIlano: Il sole 24 Ore.

Ferrè, F. (2014). Itlay: Health System review. *Health System in Transition*, 41.

Kaplan&ANderson. (2007). *Time-Driven ABC.* Harvard: Business School Press.

Kaplan, C. &. (1998). *Cost & Effect.* Boston: HBS Press.

Maggi, D. (2003). *Sistemi di controllo di gestione nelle aziende sanitarie.* Giuffrè.

Mapelli, V. (2012). *Il Sistema Sanitario Italiano.* Il Mulino.

MIller, S. J. (2012). *The Method of the Least Squares.* Tratto il giorno 10 26, 2016 da web.williams.edu: https://web.williams.edu/Mathematics/sjmiller/public_html/BrownClasses/54/handouts/MethodLeastSquares.pdf

Moisello, A. (2000). *I costi di Prodotto.* Milano: Egea.

OASI, R. (2011). *L'aziendalizzazione della sanità in Italia.* EGEA.

Porter, M. (1985). *Competitive Advantage.* New York: McMIlan.

Rebba, V. (2015-2016). Lezioni Di Economia Sanitaria. Padova: Uiversità Di Padova.

Roffia, P. (2002). *Il controllo di Gesitone Activity Based.* Torino: G. Giappichelli Editore.

Sanità, M. (1996). Linee guida . *2/96*.

Taroni, F. (2011). *Politiche Sanitarie In Italia.* Il Pensiero Scientifico.

Appendix

Fase 6 - Sedazione Phase 6 - Sedation						
Devices	Year Cost	Year Q	Unit Cost	Average	Q. Utilized	Tot Cost
PIA613L-SIRINGA CONO LUER ECCENTRIC S/AGO ST.20 ML 3 PEZZIINJ/LIGHT (L27/GR) 20LE	32,28	540	0,05978		1	0,05978
PIA613H-SIRINGA CONO LUER ECCENTRIC S/AGO ST.10 ML 3 PEZZIINJ/LIGHT (L27/GR) 10LE	181,54	4.800	0,03782		2	0,07564
PIA613G-SIRINGA CONO CENTRALE S/AGO STERILE 5 ML 3 PEZZIINJ/LIGHT (L27B/GR) 55LC	12,75	500	0,025498		1	0,025498
PIT210F-CATETERE VESCICALE FOLEY IN SILICONE DUE VIE CH 16CM 41 MONOUSO STERILE RUSCH-170605 (GAV/18)	45,02	30	1,5006		1	1,5006
PAAME11-ELETTRODI MONOUSO PER ECG RADIOTRASPARENTIF9069RM - (GR/4)	57,10	1.200	0,04758		3	0,14274
DCPS090-SENSORE X SATURIMETRO NELLCOR D25- MAX-A-I - ADULTI	1.476	6	10,248169		1	10,248169
PAVC951-UROMETRO - DISPOSITVO STERILE PER LA DIURESIORARIA 158101110190 (GAV/7)	416,02	55	7,564		1	7,564
F21D000-FENTANEST INIETT 5F 2ML 0,1MGFENTANIL CITRATO	133,76	320	0,418		1	0,418
F22A650-DIPRIVAN 20 MG/ML 50 ML SIRINGA PRONTAPROPOFOL	7.732,92	290	26,665241		1	26,665241
F25A209-MIDAZOLAM ACC*10F 3ML 5MG/MLMIDAZOLAM CLORIDRA	77,42	220	0,3519		1	0,3519
F22A322-KETAMINA MOLT*5F 2ML 50MG/MLKETAMINA	16,39	5	3,278		1	3,278
					Procedure's Devices' Total Cost =	50,329569

Fase 6.1 - Intubazione Phase 6.1 - General Anesthesia						
Devices	Year Cost	Year Q	Unit Cost	Average	Q. Utilized	Tot Cost
ADULTISTERILE MM. 5,5 IN-TUBE (L6G103/16) 80400055	2,44	5	0,49		1	0,49
70,00 MMSTERILE (G103/11) 900 0070 1	0,90	4	0,23		1	0,23
PAVD083-FILTRO ANTIBATTERICO ANTIVIRALE X ANESTE	83	100	0,83		1	0,83
PAVD13R-CIRCUITO PER LA SOMMINISTRAZIONE MANUA	232	30	7,75		1	7,75
PAVD012-CATETERE MOUNT GIREVOLE IN PVC CM 10 SPA	13	20	0,67		1	0,67
PAVD159-CIRCUITO BASE PER VENTILATORI PER ANESTE	28	10	2,78		1	2,78
ML 3 PEZZIINJ/LIGHT (L27/GR) 10LE	181,54	4.800	0,04		1	0,04
BORDO GONFIABILETIPO BAMBINO N. 3 (G103/11) 683T	51,09	29	1,76		1	1,76
LOCK TREPEZZI SENZA AGO 50/60ML (L23F/G101/12)	66,21	300	0,22		2	0,44
LUER LOCK M/FL.100CM LINKSET NO PVC (AVTI5/10)	0,43	2,00	0,21		1	0,21
A0603-SACCHE E SISTEMI DI RACCOLTA LIQUIDI	416,02	55	7,56		1	7,56
VIE CH 16CM 41 MONOUSO STERILE RUSCH-170605	45,02	30	1,50		1	1,50
DCPS090-SENSORE X SATURIMETRO NELLCOR D25- MAX-A	1.476	6	245,96		1/24	10,25
PAAM931-NASO CANNULA RILEVAMENTO ETCO2 ADT/INF	305	25	12,20		0,5	6,10
F23B620-NIMBEX 2 5F 5ML 2MG/MLCISATRACURIO BESILAT	996,16	645,00	1,54		6	9,27
F22A650-DIPRIVAN 20 MG/ML 50 ML SIRINGA PRONTAPROP	7.732,92	290,00	26,67		1	26,67
F22A650-DIPRIVAN 20 MG/ML 50 ML SIRINGA PRONTAPROP	7.733	290			1	0,00
F21D000-FENTANEST INIETT 5F 2ML 0,1MGFENTANIL CITRA	133,76	320,00	0,42		1	0,42
					Procedure's Devices' Total Cost =	76,96

Fase 7 - Preparazione Campo Sterile						
Phase 7 - Preparation of the Sterile Environment						
Devices	Year Cost	Year Q	Unit Cost	Average	Q. Utilized	Tot Cost
PIA1818-AGO IPODERMICO MONOUSO CONO LUER G 18X1,10X40 MMBD MICROLANCE 3 (L1A/GR) 304622	35,64	3.000,00	0,01		1	0,01
PATE91B-DEFLUSSORE A 2 VIE IN PVC S/FTALATI C/FILTRO 0,45MICRON LUNGH. CM. 350 BIO DRIP IN011521	2.292,99	1.050,00	2,18		3	6,55
PITY310-INTRODUTTORI VALVOLATI ANGIOGRAFICI 6FR L10CMCOD. RSB60N10MQ /AR35/	1.366,40	70,00	19,52		1	19,52
PIG3265-GUANTO LATTICE S/POLVERE XCHIR.GEN. N. 7,5 STERILEPAIA (GR/L1) INTOUCH PF INTW1075	315,37	1.100,00	0,29		2	0,57
PIA1822-AGO IPODERMICO MONOUSO CONO LUER G 22 0,70X40 MMBD MICROLANCE 3 (L1A/GR) 301000	5,90	500,00	0,01		1	0,01
PSB3511-LAME PER BISTURI MONOUSO - FIG. 11 - BB 511(CF. DA 100 PZ.)	36,17	5,00	7,23		1	7,23
PAT9061-PREMISACCA DA ML 1000ART. 5001.11.011	359,96	6,00	59,99		1	59,99
F46F093-SODIO CLORURO 0,9% 1000ML BAXTER VIAFLO 10SACCHESODIO CLORURO	707,71	1.010,00	0,70		3	2,10
FB-SANGUE ED ORGANI EMOPOIETICI	87,78	60,00	1,46		1	1,46
F46L071-LIDOCAINA CLOR. MNC 2% 200 MG/10 ML F.LELIDOCAINA (CARRELLO EMERGENZE-ANTIAR)	49,25	250,00	0,20		1	0,20
					Procedure's Devices' Total Cost =	97,66

Fase 8 - Fase Diagnostica						
Phase 8 - Diagnostic Phase						
Devices	Year Cost	Year Q	Unit Cost	Average	Q. Utilized	Tot Cost
PITT299-RUBINETTO A T VIA-ALTA PRESSIONE-A SCATTO ATTACCOLUER-LOCK 44-201	175,68	48,00	3,66		1	3,66
PATB796-RUBINETTO A TRE VIE - (SOLO PER RADIOLOGIE)INO31301	196,42	700,00	0,28		1	0,28
PITC256-CATETERE PER ANGIOGRAFIA SELETTIVA NYLON5F 100CM 451-514H0	4184,60	350,00	11,96		1	11,96
PIT152A-GUIDA ANGIOGRAFICA IDROFILA STANDARDD.0.035 180CM M00146152B1	10462,24	240,00	43,59		1	43,59
PMM5251-FILM TRASPARENTE IN PUR STERILE CM 10X12TEGADERM 1626W (MS14A/13)	164,70	750,00	0,22		1	0,22
DZEI620-OMNIPAQUE 300MG I/ML FL 100MLIOEXOLO	1467,28	150,00	9,78		1	9,78
					Phase's Devices' Total Cost =	69,49

Fase 10 - Medicazione						
Phase 10 - Medication						
Devices	Year Cost	Year Q	Unit Cost	Average	Q. Utilized	Tot Cost
PITZ710-DISPOSIT. X EMOSTASI ARTERIOSA ANGIOSEAL V.I.P.8 FR. 610133	8.625,40	70	123,22		1	123,22
PMC2116-MEDICAZIONE PREPARATA POST-OPERATORIA ADESIVA CON TAMPONE CM 7X5 (4AMPS13) 22670000000	8,80	440	0,02		1	0,02
					Phase's Devices' Total Cost =	123,24

1					
Sclero/Embolizzazione angioma (MV)					
Sclero/Embolization of Vascular Malformation					
Devices	Unit Cost	Average	Q. Utilized	Tot Cost	
PIA0922-AGO CANNULA VENOSO PERIFERICO 1 VIA USO PEDIATRICOS/ALETTE 22G X25MM (28/G	0,25			0,25	
PAV1413-CARTUCCIA MONOUSO DA 1,5 LITRI CF 50 PEZZIMEDIVAC FLEX ADVANTAGE COD. 65	1,74			1,74	
PIA1423-AGO EPICRANICI A FARFALLA STERILI MONOUSOPIC MIRAGE G23X20 (4/G101/12) 03 044	0,07			0,07	
PIA1641-AGO EPICRANICO A FARFALLA 25G X 19 MMCHEMIL FLY (L6/G101/12) FLY25G	0,05			0,05	
			Procedure's Devices' Total Cost =	2,10	

2				
Completamento Angiografico				
Integrative Angiography				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PITC229-CATETERE PER ANGIOGRAFIA SELETTIVA NYLON4F 65CM 451-415V0	12			11,96
PITT612-CATETERE PER ANGIOGRAFIA PANORAMICA PIGTAILD.E.5F 90CM 31-521	9			8,54
PITU162-INTRODUTTORE VALVOLATO ANGIOGRAFICO CON GUIDA5F .035" 11CM 402-605X	10			9,76
PITU164-INTRODUTTORE VALVOLATO ANGIOGRAFICO CON GUIDA6F .035" 11CM 402-606X	10			9,76
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7			7,32
			Procedure's Devices' Total Cost =	47,34

3				
Stent carotideo				
Carotid Stenting				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PITBD3X-SISTEMA GONFIAGGIO PRIORITY (INDEFLATOR+COPILOT+ INTRODUTTORE+TORQUE				18,30
PITY316-INTRODUTTORI VALVOLATI ANGIOGRAFICI 7 FR L25CMCOD. RSB70N25AQ /AR35/				42,09
PITY115-GUIDA METALLICA 035-260 CM.TIPO ANGOLATO TERUMO RFCOD.RFGA35263M /ESC.R/				115,90
PIT2860-SISTEMA DI PROTEZIONE DA EMBOLO A FILTRO GUIDA 190 CM FILTER WIRE EZ COD. 20				915,00
PITET7I-CATETERE GUIDA AMPIO LUME CON VALVOLA E DILATATOREVISTA BRITE TIP 8F 90CM				79,30
PIA9009-SIRINGA X INIETTORE ANGIOGRAFICO MARK V PKUSART. 200 FT Q				5,49
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODU				16,47
PITRB51-CATETERE X PTA PICCOLI VASI 150CM 3.1FR 5,0-20ULTRA-SOFT SV M0013895050200				108,58
PIT003T-CATETERI A PALLONCINO MONORAIL SU FILO GUIDA 0.014D.2,50 14MM 145CM FALCON				92,56
PITS96Y-STENT AUTOESPANDIBILE PER CAROTIDE ACCIAIO7/30MM SCH-64707	alternatives			
PITC92H-STENT CAROTIDEOTIPO NITINOL 7MMX30MM 5F 135CMPRECISE PRO RX PC0730XCE	alternatives	1.108		1108,20
QPAFR32-STENT CAROTIDEO 9 MM X 30 MM MONOREIL 5 FRCASPER CPR-0930-143RX	alternatives			
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV				7,32
			Procedure's Devices' Total Cost =	2509,21

3.a				
Stent carotideo in corso di trombectomia				
Carotid Stenting with Thrombectomy				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PITBD3X-SISTEMA GONFIAGGIO PRIORITY (INDEFLATOR+COPILOT+ INTRODUTTORE+TORQUE	18			18,3
PIT2860-SISTEMA DI PROTEZIONE DA EMBOLO A FILTRO GUIDA 190 CM FILTER WIRE EZ COD. 20	915			915
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODU	16			16,47
PITRB51-CATETERE X PTA PICCOLI VASI 150CM 3.1FR 5,0-20ULTRA-SOFT SV M0013895050200	109			108,58
PIT003T-CATETERI A PALLONCINO MONORAIL SU FILO GUIDA 0.014D.2,50 14MM 145CM FALCON	93			92,56
PITS96Y-STENT AUTOESPANDIBILE PER CAROTIDE ACCIAIO7/30MM SCH-64707	1.199			
PITC92H-STENT CAROTIDEOTIPO NITINOL 7MMX30MM 5F 135CMPRECISE PRO RX PC0730XCE	882	1108,19		1108,19
QPAFR32-STENT CAROTIDEO 9 MM X 30 MM MONOREIL 5 FRCASPER CPR-0930-143RX	1.019			
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7			7,32
			Procedure's Devices' Total Cost =	2266,42

4				
Stent intracranico				
Intracranial Stenting				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PITZ27E-GUIDA TRANSEND FLOPPY 300 CM COD.46-815TARGET	439			439
PIT506A-PALLONE DA DILATAZIONE STENOSI INTRACRANICA OTWSEMICOMPLIANTE 9X3,0MM	769			769
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODU	16			16
PITBD3X-SISTEMA GONFIAGGIO PRIORITY (INDEFLATOR+COPILOT+ INTRODUTTORE+TORQUE	18			18
QPAE462-STENT INTRACRANICO AUTOESPANDIBILE NITINOL CONPUNTA DISTALE D.4MM 23MM	3.604			3.604
PITETBC-MICROCATETERE PER INFUSIONE PROWLER SELECT LP-ESE PLUS LUNG.150 CORDIS C	598			598
PITSP25-CATETERE ARMATO PER PTA CURVA DIRITTA 6FR90 CM CAROTID SHEATH DESTINATIO	244			244
PITM034-CATETERE PORTANTE PER CATETERISMO COASSIALENAVIEN RFXA072-115-08MP	549			549
PITNE02-GUIDA ORIENTABILE RIVEST. IDROFILICO NEUROVASCULARD.0.014 205CM SOFT NEUR	427			427
PITY318-INTRODUTTORI VALVOLATI ANGIOGRAFICI 8FR L25CMCOD. RSB80N25AQ /AR35/	42			42
PIT5082-PALLONE DA DILATAZIONE STENOSI INTRA/EXTRA CRANICASCAMBIO RAPIDO D.2.00MI	854			854
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7			7
D8CP513-HE077515 TEST ACT-LR -S10-(CONF. DA 45 PZ) (JACT - LR)	3			3
			Procedure's Devices' Total Cost =	7.570

4.a				
Stent intracranico				
Intracranial Stenting in Thrombectomy				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PITZ27E-GUIDA TRANSEND FLOPPY 300 CM COD.46-815TARGET	439			439
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODU	16			16
PITBD3X-SISTEMA GONFIAGGIO PRIORITY (INDEFLATOR+COPILOT+ INTRODUTTORE+TORQUE	18			18
QPAE462-STENT INTRACRANICO AUTOESPANDIBILE NITINOL CONPUNTA DISTALE D.4MM 23M	3.604			3.604
PITSP25-CATETERE ARMATO PER PTA CURVA DIRITTA 6FR90 CM CAROTID SHEATH DESTINATIO	244			244
PIT5082-PALLONE DA DILATAZIONE STENOSI INTRA/EXTRA CRANICASCAMBIO RAPIDO D.2.00M	854			854
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7			7
			Procedure's Devices' Total Cost =	5.183

5				
Stent periferico				
Peripheral Stenting				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODU	16,47			16
PITZ710-DISPOSIT. X EMOSTASI ARTERIOSA ANGIOSEAL V.I.P.8 FR. 610133	123,60			124
PAT4060-KIT RILEVAMENTO PRESSIONE A 1 VIA C/TRASDUTTOREMONOUSO T100209A (G4M/04)	8,86			9
PIT005T-CATETERI A PALLONCINO MONORAIL SU FILO GUIDA 0.014D.2,00 10MM 145CM FALCON	92,56			93
PITBD3X-SISTEMA GONFIAGGIO PRIORITY (INDEFLATOR+COPILOT+ INTRODUTTORE+TORQUE	18,30			18
QPAPB09-PERIFERICO PREMONTATO ESPANSIONE PASSIVAD.E. 4MM 12MM PALMAZ BLUE PB	686,40			686
PITMC85-GUIDA X ANGIOPLASTICA CORONARICA PUNTA RAD.PREFOR.J D.0.14 190CM 1010480-I	62,40			62
PITY318-INTRODUTTORI VALVOLATI ANGIOGRAFICI 8FR L25CMCOD. RSB80N25AQ /AR35/	42,09			42
PIT5083-PALLONE DA DILATAZIONE STENOSI INTRA/EXTRA CRANICASCAMBIO RAPIDO D.2.50M	854,00			854
			Procedure's Devices' Total Cost =	1904,68

6				
Embolizzazione: FAV Cerebrale				
Embolization: Brain AVF				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PITM001-SET X EMBOLIZZAZIONE LIQ.DO 2 FIALE ONYX 18 LD P+DMSO + 3 APPOSITE SIRINGHE	967		4	3868,80
PITM00A-MICROCATETERE FLUSSO DIPENDENTE D.2.7F 1.3F 25CM170CM MARATHON 105-5055	610			610,00
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODU	16			16,47
PITC21D-CATETERE GUIDA X NEURORADIOLOGIA ENVOYMULTIPURPOSE C 5 F 90CM 556-256-9	146			146,40
PITM006-MICROGUIDA IDROFILA MIRAGE GUIDEWIE .008"COD. 103-0608	317			317,20
PITY733-MICROCATETERI 2 MARKERS HEADWAY DUO MC162156S	610			610,00
PITZ72P-GUIDA TRANSEND EX SOFT TIP.014" 205/2CM.TARGET 46-806	439			439,20
PITPN21-CATETERE ACCESSO INTRACRANICO LONG SHEAT6F 90/4 MPNEURON MAX PNML6F08	341	alternatives		518,26
PITM034-CATETERE PORTANTE PER CATETERISMO COASSIALENAVIEN RFXA072-115-08MP	549	alternatives		
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7			7,32
D8CP513-HE077515 TEST ACT-LR -S10-(CONF. DA 45 PZ) (JACT - LR)	3			2,88
Procedure's Devices' Total Cost =				6536,53

7				
Embolizzazione:FAV Extracranica				
Embolization: Extra-cranial AVF				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PITT299-RUBINETTO A 1 VIA-ALTA PRESSIONE-A SCATTO ATTACCOLUER-LOCK 44-201	3,7			3,7
PITM001-SET X EMBOLIZZAZIONE LIQ.DO 2 FIALE ONYX 18 LD P+DMSO + 3 APPOSITE SIRINGHE	967,2		4	3868,8
PITSP25-CATETERE ARMATO PER PTA CURVA DIRITTA 6FR90 CM CAROTID SHEATH DESTINATIO	244,0			244,0
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODU	16,5			16,5
PITC21D-CATETERE GUIDA X NEURORADIOLOGIA ENVOYMULTIPURPOSE C 5 F 90CM 556-256-9	146,4			146,4
PITY733-MICROCATETERI 2 MARKERS HEADWAY DUO MC162156S	610,0			610,0
PITZ72P-GUIDA TRANSEND EX SOFT TIP.014" 205/2CM.TARGET 46-806	439,2			439,2
PITM034-CATETERE PORTANTE PER CATETERISMO COASSIALENAVIEN RFXA072-115-08MP	549,0			549,0
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7,3			7,3
D8CP513-HE077515 TEST ACT-LR -S10-(CONF. DA 45 PZ) (JACT - LR)	2,9			2,9
			Procedure's Devices' Total Cost =	5887,73

8				
Embolizzazione:FAV Spinale				
Embolization: Spinal AVF				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PITM001-SET X EMBOLIZZAZIONE LIQ.DO 2 FIALE ONYX 18 LD P+DMSO + 3 APPOSITE SIRINGHE	967		2	1.934
PITM00A-MICROCATETERE FLUSSO DIPENDENTE D.2.7F 1.3F 25CM170CM MARATHON 105-5055	610			610
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODU	16			16
PITC21D-CATETERE GUIDA X NEURORADIOLOGIA ENVOYMULTIPURPOSE C 5 F 90CM 556-256-9	146			146
PITBL66-MICROGUIDA IDROFILICA NITINOL .007 L.210CM CURVAD HYBRID 2/HYBRID007D	549			549
PITY733-MICROCATETERI 2 MARKERS HEADWAY DUO MC162156S	610			610
PITZ72P-GUIDA TRANSEND EX SOFT TIP.014" 205/2CM.TARGET 46-806	439			439
PITSP25-CATETERE ARMATO PER PTA CURVA DIRITTA 6FR90 CM CAROTID SHEATH DESTINATIO	244			244
PITM034-CATETERE PORTANTE PER CATETERISMO COASSIALENAVIEN RFXA072-115-08MP	549			549
PAVD391-COLLA CHIRURGICA GLUBRAN 2 ML 1 A FIALAG-NB-2 (*D.D.185/07)	122			122
DZEI111-LIPIODOL ULTRA FLUIDE # ACIDO ETIODATO ML 10 F.(ESTERO)	195			195
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7			7
D8CP513-HE077515 TEST ACT-LR -S10-(CONF. DA 45 PZ) (JACT - LR)	3			3
			Procedure's Devices' Total Cost =	5425,38

9				
Embolizzazione: MAV Cerebrale				
Embolization: Brain AVM				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PITT299-RUBINETTO A 1 VIA-ALTA PRESSIONE-A SCATTO ATTACCOLUER-LOCK 44-201	3,7			3,7
PITM001-SET X EMBOLIZZAZIONE LIQ.DO 2 FIALE ONYX 18 LD P+DMSO + 3 APPOSITE SIRINGHE	967,2		2	1.934,4
PITM00A-MICROCATETERE FLUSSO DIPENDENTE D.2.7F 1.3F 25CM170CM MARATHON 105-5055	610,0			610,0
PIT152A-GUIDA ANGIOGRAFICA IDROFILA STANDARDD.0.035 180CM M00146152B1	44,3			44,3
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODU	16,5			16,5
PITC21G-CATETERE GUIDA X NEURORADIOLOGIA CORDIS ENVOY-6F90 CM COD 670-256-90	146,4			146,4
PITBL73-CATETERE IDROFILICO PUR SIL MORBIDEZZA 1,2 F 15 CMBALT EXTRUSION COD. 2/MAGI	912,6		4	3.650,2
PITBL66-MICROGUIDA IDROFILICA NITINOL .007 L.210CM CURVAD HYBRID 2/HYBRID007D	549,0			549,0
PAVD391-COLLA CHIRURGICA GLUBRAN 2 ML 1 A FIALAG-NB-2 (*D.D.185/07)	122,0		2	244,0
DZEI111-LIPIODOL ULTRA FLUIDE # ACIDO ETIODATO ML 10 F.(ESTERO)	194,7			194,7
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7,3			7,3
D8CP513-HE077515 TEST ACT-LR -S10-(CONF. DA 45 PZ) (JACT - LR)	2,9			2,9
			Procedure's Devices' Total Cost =	7403,4

10				
Embolizzazione: MAV Spinale				
Embolization: Spinal AVM				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PITM00A-MICROCATETERE FLUSSO DIPENDENTE D.2.7F 1.3F 25CM170CM MARATHON 105-5055	610			610,00
PIT152A-GUIDA ANGIOGRAFICA IDROFILA STANDARDD.0.035 180CM M00146152B1	44,3			44,30
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODU	16,5			16,47
PITC21G-CATETERE GUIDA X NEURORADIOLOGIA CORDIS ENVOY-6F90 CM COD 670-256-90	146,4			146,40
PITBL73-CATETERE IDROFILICO PUR SIL MORBIDEZZA 1,2 F 15 CMBALT EXTRUSION COD. 2/MAGI	912,6		2	1825,12
PITBL66-MICROGUIDA IDROFILICA NITINOL .007 L.210CM CURVAD HYBRID 2/HYBRID007D	549,0			549,00
PAVD391-COLLA CHIRURGICA GLUBRAN 2 ML 1 A FIALAG-NB-2 (*D.D.185/07)	122,0			122,01
DZEI111-LIPIODOL ULTRA FLUIDE # ACIDO ETIODATO ML 10 F.(ESTERO)	194,7			194,70
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7,3			7,32
D8CP513-HE077515 TEST ACT-LR -S10-(CONF. DA 45 PZ) (JACT - LR)	2,9			2,88
			Procedure's Devices' Total Cost =	3518,20

11				
Embolizzazione: MAV Extracranica				
Embolization: Extra-Cranial AVM				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PITM001-SET X EMBOLIZZAZIONE LIQ.DO 2 FIALE ONYX 18 LD P+DMSO + 3 APPOSITE SIRINGHE	967,20		2	1934,40
PITM00A-MICROCATETERE FLUSSO DIPENDENTE D.2.7F 1.3F 25CM170CM MARATHON 105-5055	610,00			610,00
PIT152A-GUIDA ANGIOGRAFICA IDROFILA STANDARDD.0.035 180CM M00146152B1	44,30			44,30
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODU	16,47			16,47
PITC21G-CATETERE GUIDA X NEURORADIOLOGIA CORDIS ENVOY-6F90 CM COD 670-256-90	146,40			146,40
PITBL73-CATETERE IDROFILICO PUR SIL MORBIDEZZA 1,2 F 15 CMBALT EXTRUSION COD. 2/MAGI	912,56		2	1825,12
PITBL66-MICROGUIDA IDROFILICA NITINOL .007 L.210CM CURVAD HYBRID 2/HYBRID007D	549,00			549,00
PAVD391-COLLA CHIRURGICA GLUBRAN 2 ML 1 A FIALAG-NB-2 (*D.D.185/07)	122,01			122,01
DZEI111-LIPIODOL ULTRA FLUIDE # ACIDO ETIODATO ML 10 F.(ESTERO)	194,70			194,70
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7,32			7,32
D8CP513-HE077515 TEST ACT-LR -S10-(CONF. DA 45 PZ) (JACT - LR)	2,88			2,88
			Procedure's Devices' Total Cost =	5452,60

12				
Embolizzazione: Aneurisma con spirali				
Embolization: Aneurism coiling				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PITZ72P-GUIDA TRANSEND EX SOFT TIP.014" 205/2CM.TARGET 46-806	439,20			439,2
PIT1442-EXCELSIOR SL 150CM 2 TIP MARKERSCOD.M0031681890	880,84			880,8
PITZ876-VALVOLA EMOSTATICA A Y PER MICROCATETERIBOSTON-TARGET COD. 4212421	34,07			34,1
PITC21D-CATETERE GUIDA X NEURORADIOLOGIA ENVOYMULTIPURPOSE C 5 F 90CM 556-256-9	146,40			146,4
PITC21G-CATETERE GUIDA X NEURORADIOLOGIA CORDIS ENVOY-6F90 CM COD 670-256-90	146,40			146,4
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODU	16,47			16,5
PITT299-RUBINETTO A 1 VIA-ALTA PRESSIONE-A SCATTO ATTACCOLUER-LOCK 44-201	3,60			3,6
PITZA0A-SISTEMA DI DISTACCO PER SPIRALI INZONE 2.0 MONOUSOM00345100950	0,00			0,0
PITZ875-CAVO DI COLLEGAMENTO GDC-TARGET 451102-4(EX 451101)	0,00			0,0
PITZA0B-CAVO COLLEGAMENTO IZDS PER DISTACCATORE INZONE 2.0DISTACCO SPIRALI GDC	0,00			0,0
PIT152A-GUIDA ANGIOGRAFICA IDROFILA STANDARDD.0.035 180CM M00146152B1	44,30			44,3
PITNE02-GUIDA ORIENTABILE RIVEST. IDROFILICO NEUROVASCULARD.0.014 205CM SOFT NEURO	427,00			427,0
PITEJ50-SPIRALI PER EMBOLIZZAZIONI TRUFILL DCS ORBITGALAXY 3MM X 8CM 640CX0308	707,20	alternatives		673,38
PITZA17-SPIRALE TARGET 360 ULTRA 3MM X 6CM M0035423060	655,20	alternatives		
PITG709-SPIRALE GUGLIELMI GDC-18 360 STANDARD18MM X 40CM COD. 3481840	655,20	alternatives		
PITMB8N-SPIRALE PLATINO NON MEDICATA NON FIBERED DISTACCOCONTROLLATO 10MM X 3	644,80	alternatives		
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7,32			7,32
			Procedure's Devices' Total Cost =	2818,98

12.a				
Embolizzazione: Aneurisma con pallone				
Embolization: Aneurism BAC remodeling				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PITZ72P-GUIDA TRANSEND EX SOFT TIP.014" 205/2CM.TARGET 46-806	439,2			439,2
PITC21D-CATETERE GUIDA X NEURORADIOLOGIA ENVOYMULTIPURPOSE C 5 F 90CM 556-256-9	146,4			146,4
PITC21G-CATETERE GUIDA X NEURORADIOLOGIA CORDIS ENVOY-6F90 CM COD 670-256-90	146,4			146,4
PITY744-CATETERE A PALLONE PER OCCLUSIONE NEUROVASCOLAREEXTRA COMPLIANT SCEPT	1464	alternatives		1281
PITBL79-MICROCATETERE A PALLONCINO X OCCLUSIONI INTRACER.TEMPORANEE L. 160CM 9M	1012,6	alternatives		
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7,32			7,32
			Procedure's Devices' Total Cost =	2020,32

12.a.b				
Embolizzazione: Aneurisma con stent				
Embolization: Aneurism SAC				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PITC21D-CATETERE GUIDA X NEURORADIOLOGIA ENVOYMULTIPURPOSE C 5 F 90CM 556-256-9	146,40			146,40
PITC21G-CATETERE GUIDA X NEURORADIOLOGIA CORDIS ENVOY-6F90 CM COD 670-256-90	146,40			146,40
PITZ27E-GUIDA TRANSEND FLOPPY 300 CM COD.46-815TARGET	439,20			439,20
PITZ72P-GUIDA TRANSEND EX SOFT TIP.014" 205/2CM.TARGET 46-806	439,20			439,20
PITETBC-MICROCATETERE PER INFUSIONE PROWLER SELECT LP-ESE PLUS LUNG.150 CORDIS C	597,80			597,80
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODU	16,47			16,47
QPAE462-STENT INTRACRANICO AUTOESPANDIBILE NITINOL CONPUNTA DISTALE D.4MM 23MM	3603,60	alternatives		3591,14
QPAR5021-LVIS JUNIOR - STENT INTRACRANICO 3,5 X 28 MM172530-CASJ	3120,00	alternatives		
PIT5038-STENT INTRACRANICO AUTOES.LE NITINOL CELLE APERTE3X21MM NEUROFORM ATLAS	2652,00	alternatives		
QPAE560-STENT INTRACRANICO PHENOX PCONUSMIS. 4X25 DIAM.LOOPS 6 - PCON-4-25-6-F	6760,00	alternatives		
PIT5072-STENT INTRACRANICO AUTOESPANDIBILE IN NITINOLOBARREL VRD BV-4065	5720,00	alternatives		
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7,32			7,32
			Procedure's Devices' Total Cost =	5383,93

12.a.b.c				
Embolizzazione: Aneurisma con Stent FD				
Embolization: Aneurism with Stent FD				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PITSP25-CATETERE ARMATO PER PTA CURVA DIRITTA 6FR90 CM CAROTID SHEATH DESTINATIO	244			244
PITM034-CATETERE PORTANTE PER CATETERISMO COASSIALENAVIEN RFXA072-115-08MP	549			549
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODU	16,47			16,47
PITY115-GUIDA METALLICA 035-260 CM.TIPO ANGOLATO TERUMO RFCOD.RFGA35263M /ESC.R/	115,9			115,9
PITZ27E-GUIDA TRANSEND FLOPPY 300 CM COD.46-815TARGET	439,2			439,2
PITZ72P-GUIDA TRANSEND EX SOFT TIP.014" 205/2CM.TARGET 46-806	439,2			439,2
QPAFR11-FRED - STENT DIVERSORE DI FLUSSO FRED3516	10400	alternatives		10965,9
QPAE50H-STENT INTRACRANICO AUTOESPANDIBILE NITINOL2/SILK2.5X20	12480	alternatives		
QPAE656-DISPOSITIVO PER EMBOLIZZAZIONE 3,50 MM 18 MMPIPELINE FLEX PED-350-18	10400	alternatives		
PITY73B-MICROCATETERE HEADWAY 27 3,1/2,6FR.MC272156S	610			610
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7,32			7,32
D8CP513-HE077515 TEST ACT-LR -S10-(CONF. DA 45 PZ) (JACT - LR)	2,8792			2,8792
			Procedure's Devices' Total Cost =	13389,9

12.a.b.c.d				
Embolizzazione: Aneurisma con Stent altro				
Embolization: Other				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PIT0115-MICROCATETERE X LA NAVIGAZIONE DEL DISPOSITIVO WEBD..027" L.145CM VIA VIA-	976	alternatives A		612,81
PITETBC-MICROCATETERE PER INFUSIONE PROWLER SELECT LP-ESE PLUS LUNG.150 CORDIS C	597,8	alternatives A		
PIT085A-SISTEMA EMBOLIZZAZIONE ANEURISMA INTRACRANICOMEDINA MEDICAL ED -7-090-	6760	alternatives B		9672
PIT0851-SISTEMA DI EMBOLIZZAZIONE ANEURISMI INTRACRANICIIN FILI NITINOL D.8MM L.4MM	10400	alternatives B		
PITSP25-CATETERE ARMATO PER PTA CURVA DIRITTA 6FR90 CM CAROTID SHEATH DESTINATIO	244			244
PITM034-CATETERE PORTANTE PER CATETERISMO COASSIALENAVIEN RFXA072-115-08MP	549			549
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODU	16,47			16,47
PITY115-GUIDA METALLICA 035-260 CM.TIPO ANGOLATO TERUMO RFCOD.RFGA35263M /ESC.R/	115,9			115,9
PITZ27E-GUIDA TRANSEND FLOPPY 300 CM COD.46-815TARGET	439,2			439,2
PITZ72P-GUIDA TRANSEND EX SOFT TIP.014" 205/2CM.TARGET 46-806	439,2			439,2
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7,32			7,32
			Procedure's Devices' Total Cost =	12095,9

13				
Test occlusione				
Occlusion Test				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PIT506A-PALLONE DA DILATAZIONE STENOSI INTRACRANICA OTWSEMICOMPLIANTE 9X3,0MM	768,6			768,6
PITBL79-MICROCATETERE A PALLONCINO X OCCLUSIONI INTRACER.TEMPORANEE L. 160CM 9M	1012,6			1012,6
PITZ72P-GUIDA TRANSEND EX SOFT TIP.014" 205/2CM.TARGET 46-806	439,2			439,2
PITC21G-CATETERE GUIDA X NEURORADIOLOGIA CORDIS ENVOY-6F90 CM COD 670-256-90	146,4			146,4
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7,32			7,32
			Procedure's Devices' Total Cost =	2374,12

14				
Trattamento del vasospasmo				
Intracranial Vasospasm Treatment				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PITZ72P-GUIDA TRANSEND EX SOFT TIP.014" 205/2CM.TARGET 46-806	439,2			439,2
PITETBC-MICROCATETERE PER INFUSIONE PROWLER SELECT LP-ESE PLUS LUNG.150 CORDIS C	597,8			597,8
PUNU258-MONOSOF 2-0 45 CM NERO 3/8 TD 26 MM SN-764	11,886867			11,8869
F08E950-NIMOTOP PER INFUSIONE 10 MG FLACONENIMODIPINA	9,2736286			9,27363
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7,32			7,32
			Procedure's Devices' Total Cost =	1065,48

15				
Biopsia spinale-Ossea				
Spinal-Bone Biopsy				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PSB3511-LAME PER BISTURI MONOUSO - FIG. 11 - BB 511(CF. DA 100 PZ.)	7,88			7,88
PIAS43A-AGO X BIOPSIA OSTEOMIDOLLARE SISTEMA ANTI-LUSSAZ.13 G 15 CM FULLY REMOVE	32,94			32,94
DZG1574-CONTENITORE 60 ML RIEMPITO A 30 ML DI FORMALINAPRONTO USO (TAPPO ROSSO)	0,15			0,15
			Procedure's Devices' Total Cost =	40,97

16				
Ozonoterapia - Infiltrazione faccette				
Ozonetherapy - Facets Infiltration				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PIASA35-AGO X ASPIRAZIONE CITOLOGICA TIPO CHIBA 20G X 15CM(7/G105/13) CHIBELL CH2015	3			3
PAV0036-FILTRO PER OZONO PER TRATTAMENTO OZONOTERAPIA11101046	5			5
			Procedure's Devices' Total Cost =	7

17				
Vertebroplastica				
Vertebroplasty				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PSB3511-LAME PER BISTURI MONOUSO - FIG. 11 - BB 511(CF. DA 100 PZ.)	7,88			7,88
PIAS43G-AGO PER VERTEBROPLASTIC INPUGNATURA IN ABS13G X 15CM KVT1315201C-A	46,116			46,12
PIE997-CONFIDENCE KIT CEMENTO SPINALE ALTA' VISCOSITA'7CC SENZA AGHI 283907000	747,968			747,97
			Procedure's Devices' Total Cost =	801,96

18				
Tromboaspirazione Intracranica				
Thrombo-aspiration				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PITY318-INTRODUTTORI VALVOLATI ANGIOGRAFICI 8FR L25CMCOD. RSB80N25AQ /AR35/	42,09			42,09
PITPN21-CATETERE ACCESSO INTRACRANICO LONG SHEAT6F 90/4 MPNEURON MAX PNML6F08	340,75			340,75
PITZ72P-GUIDA TRANSEND EX SOFT TIP.014" 205/2CM.TARGET 46-806	439,2			439,2
PITY73C-CATETERE PER TROMBOASPIRAZIONE INTRACRANICA6F 131 DRITTA SOFIA PLUS DAC	2013	alternatives		1738,5
PIT0841-CATETERE PER TROMBOASPIRAZIONE EMBOLI O TROMBI0.060" L.132 CM AXS CATALYST	1464	alternatives		
PIT011W-CATETERE GUIDA A PALLONCINO SIST.RIMOZIONE TROMBIMERCI 9F 90074	1004,06			1004,06
PIA6406-SIRINGA INFUSIONE IRRIGAZIONE CONO LUER LOCK TREPEZZI SENZA AGO 50/60ML (L	0,2215317			0,22153
PITY73D-MICROCATETERE HEADWAY 21 2,5/2,0FR.HEADWAY MC212156S	610			610
			Procedure's Devices' Total Cost =	4174,82

18.a				
Trombectomia intracranica				
Intracranial Thrombectomy				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PITZ72P-GUIDA TRANSEND EX SOFT TIP.014" 205/2CM.TARGET 46-806	439,2			439,2
PITY738-ERIC - DISPOSITIVO RIMOZIONE MECCANICA ENDOVASC TROMBI 4MM X 30MM ER1740	3660	alternatives		3556
QPAE601-STENT INTRACRANICO AUTOESP. X REMODELING NEUROVAS4MM X 20MM SOLITAIRE	3328	alternatives		
PITCNV1-DISPOSITIVO PER TROMBECTOMIA STERILE MONOUSOREVIVE SE FRS21452299 COMP	3904	alternatives		
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODU	16,47			16,47
PITY73D-MICROCATETERE HEADWAY 21 2,5/2,0FR.HEADWAY MC212156S	610			610
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODU	16,47			16,47
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VAL	7,32			7,32
			Procedure's Devices' Total Cost =	4645,46

19				
Chemioterapia i.a. per RTB				
Intra-arterial Chemiotherapy of RTB				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PITC227-CATETERE PER ANGIOGRAFIA SELETTIVA BERENSTEIN II0,38" 100CM 5F COD. 451-515HO	11,96			11,96
F01A620-ALKERAN 1FL 50MG LIOFILO+FL 10MLMELFALAN (1 fiala costa 148 euro, la Neuroradiologia ha	23,68			23,68
F01G933-TOPOTECAN TEVA*EV 5FL 4MG/4MLTOPOTECAN CLORIDRATO	7,57			7,57
PITBLX2-MICROCATETERE IDROFILICO FLESSIBIL.PROGRESSIVAPROSSIMALE RIGIDA 2.7X135 L.	912,56			912,56
PITBL66-MICROGUIDA IDROFILICA NITINOL .007 L.210CM CURVAD HYBRID 2/HYBRID007D	549,00			549,00
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7,32			7,32
			Procedure's Devices' Total Cost =	1512,09

20				
Embolizzazione Tumori Pre-Oper.				
Tumor Embolization - pre.op.				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PITM001-SET X EMBOLIZZAZIONE LIQ.DO 2 FIALE ONYX 18 LD P+DMSO + 3 APPOSITE SIRINGHE	967,20		2	1934,4
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODU	16,47			16,47
PITC21D-CATETERE GUIDA X NEURORADIOLOGIA ENVOYMULTIPURPOSE C 5 F 90CM 556-256-9	146,40			146,4
PITY731-MICROCATETERE 2 MARKERS21 HEADWAY 21 MC212150S	610,00			610
PITETBC-MICROCATETERE PER INFUSIONE PROWLER SELECT LP-ESE PLUS LUNG.150 CORDIS C	612,00			612
PITZ72P-GUIDA TRANSEND EX SOFT TIP.014" 205/2CM.TARGET 46-806	439,20			439,2
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7,32			7,32
			Procedure's Devices' Total Cost =	3765,79

21				
embolizzazione tumori Spinali/Capo-collo				
Tumor Embolization Spinal-Head&neck				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PAVI052-FIALA EMBOLIZZANTE CONTOUR 355-500 MICRON760045	71,76		2	143,52
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODU	16,47			16,47
PITC21D-CATETERE GUIDA X NEURORADIOLOGIA ENVOYMULTIPURPOSE C 5 F 90CM 556-256-9	146,40			146,4
PITY731-MICROCATETERE 2 MARKERS21 HEADWAY 21 MC212150S	610,00			610
PITETBC-MICROCATETERE PER INFUSIONE PROWLER SELECT LP-ESE PLUS LUNG.150 CORDIS C	612,00			612
PITZ72P-GUIDA TRANSEND EX SOFT TIP.014" 205/2CM.TARGET 46-806	439,20			439,2
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7,32			7,32
			Procedure's Devices' Total Cost =	1974,91

22				
embolizzazione tumori endocr.				
Trauma/bleeding Embolization				
Devices	Unit Cost	Average	Q. Utilized	Tot Cost
PAVD391-COLLA CHIRURGICA GLUBRAN 2 ML 1 A FIALAG-NB-2 (*D.D.185/07)	122,01			122,009
PIT0404-KIT X ANGIOPLASTICA CONNETTORE A Y VALVOLA SCATTOPROLUNGA AGO INTRODU	16,47			16,47
PITC21D-CATETERE GUIDA X NEURORADIOLOGIA ENVOYMULTIPURPOSE C 5 F 90CM 556-256-9	146,40			146,4
PITY731-MICROCATETERE 2 MARKERS21 HEADWAY 21 MC212150S	610,00			610
PITETBC-MICROCATETERE PER INFUSIONE PROWLER SELECT LP-ESE PLUS LUNG.150 CORDIS C	612,00			612
PITZ72P-GUIDA TRANSEND EX SOFT TIP.014" 205/2CM.TARGET 46-806	439,20			439,2
PAVI052-FIALA EMBOLIZZANTE CONTOUR 355-500 MICRON760045	71,76		2	143,52
PIT0405-VALVOLA EMOSTATICA ROTANTE 2 VIE D.INTERNO 0.096"ROTATING HEMOSTATC VALV	7,32			7,32
			Procedure's Devices' Total Cost =	2096,92