*Health*BASKET Project

WORK PACKAGE 9

COSTING OF CASE-VIGNETTES

ITALY

prepared by

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Summary

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1. Introduction

The present report concerns the third phase of the Health*BASKET (Health Benefits and Service Costs in Europe)* Project. The primary aim of this project phase was to identify a methodology which allows comparisons of the costs of individual health services across EU Member States, and which allows to explore the reasons underlying the variations in costs of individual services between or within countries. The scope of this report (WP9) for Italy is to calculate the actual costs associated with the delivery of care for ten defined episodes of care and to analyse differences between cases provided by different providers. In addition, costs are compared to regional tariffs that each provider receives as reimbursement.

In the following section the overall methodology is described. More specifically, the approach adopted for selection of providers for 10 case vignettes is described first. Section 2 provides a summary of the general procedures followed to estimate costs; more details are presented in section 3, where we discuss methods and some general results results vignette by vignette. In section 4 we suggest some conclusions about this challenging exercise on costing healthcare services across providers. Then, the methods used for estimating full costs per case are presented. The results are described in the third section, while some overall comments are provided in the conclusions.

Detailed data are reported in the excel files listed in appendix A (and mentioned in section 3). Thus, for any further information regarding the costs of specific vignetees please refer to those files.

2. METHODOLOGY

2.1. Selection of providers

No national or regional databases are available in Italy to estimate costs at the level of individual patient. Cost analysis has been performed for a purposive sample in which hospitals have been selected according to the following criteria:

- Inclusion of general hospitals only (selected hospitals had to care all the patients illustrated by the relevant vignettes);
- Mix of independent hospitals (Hospital Trusts) and hospitals managed by Local Health Units;
- 3 Italian regions represented, including Lombardy region for which, in the previous report we detailed the approach used to determine tariffs
- Interest in and availability to collaborate to the HealthBasket project;
- Availability of the data required to calculate direct costs and overheads of the cases illustrated in the vignettes.

Private providers of secondary and tertiarly level of care play an important role in the Italian NHS. Consequently, we wanted to include one private hospital in our sample. Unfortunately, the provider we contacted did not authorise us to collect cost data. From this and other private providers we have understood that these data are considered very sensitive as the may signal potential and maybe (excessive) profits.

Data from hospitals were used for vignettes number 1, 2, 3, 4, 5, 6 and 8 (in-patient, day surgery and ambulatory care). Three hospitals and two private independent providers were used to cost vignette number 10 (Table 1). The main characteristics of selected hospital providers are outlined in Table 2.

For vignette 7 and 9 we selected a sample of practitioners in such a way to represent some basic characteristics that we deemed important to provide a relevant picture of the Italian situation (dimension and public/private mix).

Table 1. Distribution of case vignettes between selected providers

Case Vignette	H1	H2	H3	H4	H5	H6	P1	P2
Appendectomy	■	■	■	■	■			
Normal delivery	■	■	■	■	■			
Hip replacement	■	■	■	■	■			
Cataract operation	■	■	■		■	■		
AMI	■	■	■	■	■			
Stroke	■	■	■	■	■			
Colonoscopy	■	■	■	■	■			
Physiotherapy	■	■				■	■	■

H1-H6 = hospital providers
P1, P2 – private rehabilitation clinic

Table 2. Characteristics of the participating hospitals: organizational features and activity

	H1	H2	H3	H4	H5	H6
N. of beds						
inpatient	530	530	1040	434	939	272
day hospital	66	91	178	69	96	28
N. of inpatient cases (2005)	16977	22602	33527	20308	39307	13440
Average Length Of Stay (days)	9.96	5.32	10.24	6.65	6.9	6.9
Personnel						
Physicians	373	346	755	282	609	114
Nurses	729	657	1562	651	1506	317
technicians (lab, X ray..ecc)	124	152	329	159	245	45
Physiotherapist	49	14	47		41	17
auxiliary (health care)	192	103			271	61
auxiliary (non health care)	127	153	767	161	293	90
administration staff	180	204			191	19
N. of cases per vignette						
Appendectomy	20	74	69	15	67	
Normal delivery	547	1.314	1161	886	468	
Hip replacement	135	150	101	171	169	
Cataract	898	1.149	1052	.	474	732
AMI	168	110	307	213	990	
Stroke	134	289	610	334	148	
Colonoscopy	471	471	761	327	847	
Physiotherapy*	13771	49351				19394

** These numbers refer to ALL ambulatory services provided by the hospital rehabilitation ward, and not only knee rehabilitation (not available)*

2.2. Data collection

For each provider and for each vignette we interviewed at least one clinician who routinely sees the patient described in the vignettes. For each hospital we also identified the office in charge with collecting and analysing cost and activity data, reviewed documents and interviewed the people who were more familiar with the date we needed.

In order to get access to data required by this phase of the Project, we contacted either the General Manager or the Health Director of each selected hospital and we sent him/her a headed letter of CERGAS-Bocconi explaining the *Health*Basket project, the data we needed and the persons/units that we requested to contact. Upon this formal request the General Manager or the Health Director authorised us to contact the personnel of the hospitals and alert the individuals that we wanted to interview. In each hospital, we worked with controllers (personnel of the administrative offices) and clinicians. Overall, both controllers and clinicians were very collaborative and expressed their interest in the project.

2. 3. Overall methodology for calculating the costs of case-vignettes

A) Cases treated in the hospitals

As reported in the previous reports, Italian cost accounting systems do not record cost data at the level of individual patient. Generally, the "cost object" of cost accounting systems in Italian hospitals is the ward. In other words, cost data are identified, collected and attributed to the each ward of the hospital and it is not available a direct attribution of cost items to individual patients. This is because the main purpose of cost accounting in Italian hospitals is "responsibility accounting". Responsibility accounting focuses on attributing an overall responsibility about costs in a unit and make possible to use cost information for performance evaluation. Italian clinicians, in fact, are hold accountable for the whole functioning of the ward (e.g. Responsibility Centre) that is for the costs they incur and the relationship between costs, volume of care and case mix of the patients.

A general model for determining the costs of case vignettes in the present research was that of estimating the ***full costs*** of outputs, defined as "the treated patient". The methodology differed for two gross categories of costs: direct costs and indirect costs. It is worth

mentioning, that the definition of what cost components fall into category of direct or indirect costs is strictly correlated with the definition of the final cost object. In the present analysis, the final "cost object" is defined as the patient. Thus, direct costs are defined as those costs which can be specifically traced to, or identified with, a specific patient. Indirect costs, on the other hand, are those costs which can not be specifically traced to a patient but need to be allocated to it.
The general full costing model is based on the following:

Full costs of output =
Direct costs for each output
+ Share of Responsibility *Centre's Indirect Costs* assigned to each output (direct to the Responsibility Centre)
+ Share of *Indirect Costs* allocated to the Responsibility Centre

Identifying direct and indirect costs depends not only on the definition on cost object, but also on the sophistication of the organization's information system. Thus, conditioned upon the availability of cost data from the accounting systems we adopted some general rules in calculating the full costs of each case.

2.3.1 Direct costs – measurement and evaluation

The majority of direct cost components was identified from the interviews with a physician and included the following items:

1. time spent by health professionals (for direct care, distinguished for different settings and phases)
2. drugs
3. medical devices
4. procedures
5. diagnostic, imaging and lab exams
6. other medical supplies
7. time spent in the operating room (if relevant)

In order to estimate overall direct costs, the physical units (quantity) of services/products were multiplied by their *unit costs* obtained from the accounting departments.
More specifically, cost per minute of each category of health professional (point 1) was directly provided by the accounting office of the Hospital Trust or the Local Health Unit. We

have kept these values even if the algorithms used were not the same across providers (the greatest difference was observed in the denominator i.e. number of working hours). In addition, the level of detail of the available information in this respect greatly varied. Two of the hospitals provided unit costs for an extensive list of professional categories, while others gave us aggregated data (e.g. physicians, nurses, other health professionals).

For medical devices, drugs and other medical supplies (points 2, 3 and 6) we used acquisition costs that are prices paid by the providers to purchase the item. These costs do not include maintenance and storage costs.

For diagnostic procedures (5) and laboratory exams we used the transfer prices used by the providers to re-allocate costs between departments. In four of the five hospitals these transfer prices are substantially equivalent to the regional tariffs used by their region to fund these services when provided on an outpatient basis. In one case (a major metropolitan hospital) transfer prices where calculated on the basis of a detailed cost analysis conducted in the hospital.

Operating Theatre (OT) running costs (7) were the hardest data to obtain. None of the hospitals had detailed data available and thus we estimated cost values when feasible. The method applied varied slightly across the providers due to the variety of data available. According to the accounting principles of the providers, OT costs are accounted for at the ward level in two cost categories: direct ward costs (for example specific drugs, medical devices) and indirect ward costs (allocated on the basis of number and/or duration of surgical interventions). The distinction between “direct” and “indirect” OT cost compnent, may slightly differ between the providers and their accountig practices.

In 4 out of the 5 hospitals we were able to estimate total costs of OT (inclusive of personnel – except surgeons-, disposables, other materials, depreciation of equipment). For one hospital any estimate was impossible and thus we decided to include OT running costs in the overhead category.

Operating Theatre costs at the ward level were further analysed in order to exclude the direct cost components estimated in the interview (i.e. personnel, disposables, drugs used in a procedure). The remaining costs were allocated to each case on the basis of the time duration of intervention. Four hospitals made available the number of interventions while only two recorded and made available the time durations of the interventions. For the other two hospitals we estimated the OT running costs per minute on the basis of the number of interventions performed and an estimate of the duration, based on the time the that OT theatre is expected to be used.

Thus, to calculate OT running costs per case we multiplied total costs of OT per minute by the duration of the intervention of the case illustrated by the vignette (obtained in the interview).

In summary , direct personnel time spent for the patients, diagnostic procedures, laboratory exams, drugs, medical devices and (in 4 hospitals) OT running costs are the direct costs of the present analysis. To apply a full costing procedure, to these costs we added a fair share of indirect costs (overheads).

2.3.2. Methodology for allocating overhead costs

Overheads costs must be allocated to the individual patient in order to determine the full costs of providing that service. The allocation process requires two inputs: the set of costs to be allocated and criteria to allocate the costs.
As it was mentioned above, the general full costing model approach includes a share of indirect costs. For 4 out of 5 hospitals it was possible to distinguish between two types of overheads: ward overheads and hospital overheads. For one hospital, cost data available did not make possible to separate the overheads in the two categories.
The detailed list of the cost elements included in the overheads costs for each provider is presented in the table 3.

In general, *ward overheads* refer to resources attributed to the ward (e.g. cleaning, supervision time, meals, maintenance) that are not attributed to individual patients and thus need to be indirectly allocated to patients. They are relevant as a significant part of working time of nurses and doctors are not directly spent with individual patients. We kept separate personnel cost overheads (labelled “personnel indirect care cost”) from the other ward overheads (see below). This distinction may be useful because personnel costs are direct costs and overheads at the same time, and a clear distinction between the two categories is problematic. *Hospital overheads* refer to costs that are not directly associable to final activities for the patients but that contribute anyway to the overall functioning of the hospital. These include the cost for the administration (personnel, accounting etc.), commercial costs, janitorial activities, central health activities (e.g. prevention of infections) and costs of other resources that are not traced to individual wards or intermediate organisation units.

Table 3. Overhead costs of hospital case vignettes (gray areas indicate included items per provider)

OVERHEAD COSTS	H1	H2	H3	H4	H5	H6
WARD LEVEL						
Non medical goods (goods for food, wardrobe, cleaning, fuel, stationery,…)						
Agreements/conventions						
Technical/building maintenance and repairing (facilities, equipment, furniture,..)						
Amortization						
Supporting services (anesthetics, ambulatory services, sterilization, disinfection, supply of food and drinks, pharmacy, necroscopy)						
Supply food and drinks, laundry, waste management, cleaning, patient transportation						
Utilities (electricity, gas, water, telephone and switchboard)						
Use of third party goods, rental fees, leasing						
Other costs						
HOSPITAL LEVEL						
Personnel: administrative and central staff of the direction						
General management, HR management, Marketing, Religious Services, Library, Planning and MC, Desk officers, Medical charts service, Training						
Utilities (electricity, gas, water, telephone and switchboard)						
Other general services (general janitorial activities, gardening)						

a) Ward overheads

Allocation of overheard costs from the ward level to the final cost object (i.e. case vignette), carries the risk of double counting. In order to avoid this we used the following approach:

a) We excluded all costs categories for which we attributed direct values on the basis of the interview with clinicians (personnel, drugs, devices, ecc)
b) We calculated a rate of overheads to be allocated by dividing total overheads of the ward by a driver:
    a. for hospital care the driver is the day of stay (in the ward or in the intensive care unit) or Operating Theatre time (for the overheads to be attributed to the surgical intervention);
    b. for ambulatory cases the driver is the number of services provided in ambulatory regime

Basically, to obtain the share of overheads in the case of the number of days as a driver, we divided total annual ward overheads by the number of days spent in the ward during the year and then we multiplied this rate by the average length of stay reported by the clinician.
In case of out-patient service (day surgery Cataract operation) the overheads were allocated on the basis of the duration of the intervention. This approach was deemed to be more appropriate then the one based on the number of interventions, to account into account that cataract surgery is a relatively simple intervention. Finally, in case of ambulatory care (Colonoscopy, Knee Rehabilitation), a fixed amount of overheads was allocated to each intervention, since no hospital could provide data on the duration of these services.

A major problem with this approach is the allocation of the time of the personnel working in the ward. As mentioned above, nurses and doctors spend part of their time for direct care and part of their time for supervision, coordination, training or activities to make possible the function of the ward. This time needs to be allocated indirectly as it is not absorbed by any final output. According to estimates provided by 4 different consultants we assumed that 50% and 70% of time of personnel is spent on direct patient care for in-patient and outpatient cases, respectively. This is a critical element of the analysis: however, without the inclusion of these indirect costs full costs of services would be underestimated because they would have not included an important component of costs incurred by the providers. Once

calculated for the ward level, the personnel costs for "indirect care" were allocated to each case on the number of days/ number and/or duration of interventions.

The overview of the approach used for allocating overheads costs is presented in Table 4.

b) *Hospital overheads*

To allocate general hospital overheads to each case we used a similar approach.
In 4 out of 5 hospitals all wards had a portion of general hospital overheads allocated to their accounts. The list of the items included in the hospital overheads slightly varies from hospital to hospital (Table 3) and various criteria are used to allocate each of these items to organisational units. These criteria are mainly based on volume of care. In addition, these criteria are not homogenous across providers. We opted for accepting the allocation of general overheads to organisational units (wards, intensive care units, ambulatory care units) decided by each provider included in the sample. In other words, we simply used the share of the general overheads attributed to the organisational units as defined by the accounting rules of the providers that we investigated.
The hospital overheads were attributed to each case by the number of days, or the duration of the intervention as presented in Table 4.

Table 4. Overhead cost allocation for all cases treated in the hospital (inpatient, outpatient and ambulatory care)

ALLOCATED COSTS	ALLOCATION BASE	CASE VIGNETTES
WARD overheads *(=total ward costs – direct cost components)*	number of days duration of intervention number of interventions	1,2,3,5,6 4 8,10
PERSONNEL "indirect care" costs *(=50% (30%) of ward personnel costs for inpatient (outpatient) cases)*	number of days duration of intervention number of interventions	1,2,3,5,6 4 8,10
HOSPITAL overheads	number of days duration of intervention number of interventions	1,2,3,5,6 4 8,10

In a few cases we could not easily attribute overheads to the units of interest, for the reasons described below.

1) Outpatient and ambulatory services provided in the hospital (Case vignettes 4, 8 and 10: Cataract operation, Colonoscopy and Knee Rehabilitation)

Each of the relevant wards (Oculistics, Gastroenterology and Rehabilitation) provides patients care in different regimes (ordinary hospitalization, day hospital/day surgery and ambulatory services). In 4 out of 5 providers it was not possible to distinguish overheads of each of these regimes (only one hospital provided separate accounts for different regimes of care). For the purpose of our analysis we needed to find a way to differentiate the overheads for all providers (otherwise overheads for outpatient and ambulatory care would be highly overestimated due to higher costs of providing inpatient care). In order to estimate a portion of overheads, we allocated overheads proportionally to revenues attributed to the different regimes. If revenues from day surgery was X% of total revenue of the ward, we attributed to day surgery activities X% of the overheads of the ward. In case of Cataract surgery, managed by the Oculistics wards, the percentage of overheads to be attributed to Day Surgery varied from 60 to 80%. In case of Gastroenterology ward, the % of overheads allocated to ambulatory services ranged from 15 to 20%.
The portion of overheads estimated according to this assumption was then allocated to each case. For ambulatory type of services (Colonoscopy and Knee Rehabilitation), the overheads attributed were divided by the total quantity of ambulatory services provided by the ward. In this way, each service was assigned an equal amount of overheads.
For the Cataract surgery vignette, different approach was adopted. Overheads attributed to day surgery activities were divided by the number of minutes of functioning of day surgery and then multiplied by the duration of the specific intervention of interest.

2) Intensive Care Units (Vignette 5:: Acute Myocardial Infarction)

The main therapy for AMI in all hospitals was PTCA, performed in cath-labs. After the intervention patients are transferred to the Intensive Care Unit for Coronary Care (UCC or UTIC) for few days before going to the Cardiology ward. Thus, AMI patients are treated in three sites of care that may have different cost structures. For the purpose of our analysis, we tried to cost separately direct costs and overheads of the cardiology ward, the intensive care unit and the cath-lab. This turned out to be a very difficult task since very often these

units share resources (personnel and technology) so we had to make assumptions about their allocation making the best of the available data and inputs of clinicians.

In most of the hospitals, cost of cath-lab is directly accounted for in the costs of the Cardiology ward and can not be directly identified. In these cases, we could not estimate the cath-lab running costs separately; they were included in the wards overheads. In 2 out of 5 hospitals, the accounting system allowed us to differentiate the costs attributed to cath-lab so we estimated the OT running costs per minute (on the basis of number of interventions and estimated average duration).
Similar issue came up the with allocation UCC costs. In 3 out of 5 hospitals (all in Lombardy region) we were available to distinguish between Cardiology ward and UCC costs since, according to accounting principles adopted; a portion of UCC costs is allocated to Cardiology ward on the basis of the number of days used by its patients. In these cases, we applied the following approach:

I. We identified and subtracted the UCC costs from the costs of the Cardiology ward
II. from the UCC costs we subtracted direct costs (mainly personnel: 80-90% of total costs) as estimated from the UCC cost accounts
III. we divided the remaining UCC costs (UCC overheads) by the total number of days provided by the UCC in the relative period
IV. we multipled the daily rate of UCC overheads with number of days spent in UCC of AMI patient in the case vignette

3) Obstetrics vs. Gynaecology (Vignette 2: Natural Delivery)

Four out of five hospitals do not have data to distinguish between obstetrics and gynaecology costs; they only have costs for the entire OG department. In only one hospital (Niguarda) it was possible to distinguish between costs of Obstetrics and Gynaecology. For the four hospitals without disaggregated data, we simply calculated one overhead value per case for all cases of the OG departments. It is likely that this simplification (only one value across all cases of the OG departments) may have caused to overestimate overheads for a normal delivery since the total costs of the Gynaecology wards are mainly determined by more serious and severe cases that natural delivery.

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2.3.3. Capital costs

The estimates presented in this report exclude most of capital costs. This is due to the fact that capital funding is kept separate from funding for running costs and hospitals and other NHS organisations still do not have appropriate procedures to evaluate the costs of land and buildings and to apportion capital costs over time.

B) Cases treated outside the hospital

For the two outpatients case vignettes- n. 7 (Cough) and n.9 (Tooth filling), we selected 5 providers in two Italian regions (Lombardy and Marche). For both vignettes providers were purposely selected to include a large and a small town (as they present differences in some important cost categories- e.g. rent), to include both public and private providers. For the dental vignette, we included one public provider only because the majority of dental services in Italy are provided by private practices without public funding. For the cough vignette we include one public clinic and four private GP clinics. This mix is expected to reflect the possible location of the visit described in the vignette. In Italy most primary care is provided under the NHS; therefore all the providers we included are funded by the government.

The approach adopted for the evaluation of full service costs was similar to the ones used for hospital vignettes. In short, the direct cost components (time of personnel, drugs, exams) were identified from the interviews with GPs/ paediatricians or dentists. In case of Cough vignettes, the cost of personnel (GPs or paediatricians) was evaluated by using the annual income set by the national contract for NHS GPs. The share of overheads was allocated on the basis of the average duration of the consultation. More specifically, the total annual overhead cost provided by the interviewees was divided by the n. of hours dedicated to direct patient care in one year. The hourly rate of overheads was then multiplied by the duration of consultation/service as described in the each case vignette. Although the list of the items included in the overheads somehow varied from provider to provider, the following items are generally included:

- *Rent and practice furnishings*
- *Utilities (electricity, heat, water)*
- *Cleaning and waste management*
- *Insurance*
- *Data processing*
- *Miscellaneous purchases*
- *Administration (assistant)*
- *Trainee costs*

3. RESULTS: COSTS AND TARIFFS OF THE CASE VIGNETTES

3.1 Appendectomy (file: Vignette 1 APPENDECTOMY.xls)

Full cost for a plain appendectomy varies from € 1,461 (H2) € 2,195 (H3). Part of the cost differences are due to whether laparoscopy (innovative, less invasive and more costly) or laparotomy (traditional, more invasive and less costly) is used.

Total direct costs are higher in hospitals that use laparoscopy in a percentage of cases (H2 20%, H4 60% laparoscopy). In fact, costs for disposables used by H2 and H4 are much higher in comparison with the other hospitals. It is worthwhile to point out that laparoscopy is widespread in the hospital (H4) that practices the smallest number of appendectomy on annual basis. With the exception of H4, a traditional surgical approach (laparotomy) remains the technique most frequently used across selected providers.

As it was mentioned above, for one provider (H5) it was not possible to estimate operating theatre costs separately and they were included in the ward overheads. Consequently, the total direct costs for ths provider are the lowest.

Differences in costs of the operating theatre are mainly due to the estimated cost per minute of its use. Heterogeneous direct costs depend also on labour time (personnel direct costs) and purchasing cost of drugs. The slight difference in the length of the intervention (from 45 to 65 minutes) doesn't generate relevant cost differences. On the contrary, differences in overhead costs are due to differences in the length of stay (varying from 2 to 3.5 days), used as allocation basis of the overheads, and differences in their unit costs. Overheads vary from €264 (H4) €1,126 (H3).

Overall, tariffs appear close to full costs. Only in the case of H3, the tariff value does not cover full costs.

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Appendectomy	**H1**	**H2**	**H3**	**H4**	**H5**	**Mean**	**Median**
Direct costs							
Personnel	€ 297	€ 327	€ 279	€ 296	€ 262	€ 292	€ 296
Drugs	€ 7	€ 25	€ 53	€ 15	€ 125	€ 45	€ 25
Exams (lab and diagn)	€ 76	€ 29	€ 36	€ 71	€ 109	€ 64	€ 71
Disposables	€ 6	€ 195	€ 0	€ 223	€ 1	€ 85	€ 6
Operating Theatre	€ 179	€ 138	€ 282	€ 294		€ 223	€ 231
Total	**€ 565**	**€ 715**	**€ 650**	**€ 900**	**€ 497**	€ 665	€ 650
Personnel Indirect Costs							
Total	**€ 363**	**€ 238**	**€ 419**	**€ 317**	**€ 472**	€ 362	€ 363
Overheads							
Ward	€ 320	€ 199	€ 671	€ 119	€ 305	€ 323	€ 305
Hospital	€ 233	€ 310	€ 455	€ 145	€ 270	€ 283	€ 270
Total	**€ 553**	**€ 509**	**€ 1.126**	**€ 264**	**€ 574**	€ 605	€ 553
Grand Total	**€ 1.482**	**€ 1.461**	**€ 2.195**	**€ 1.480**	**€ 1.544**	€ 1.632	€ 1.482
Regional Tariff	**€ 1.840**	**€ 1.840**	**€ 1.840**	**€ 2.149**	**€ 1.794**		

3.2 Normal Delivery (file: Vignette 2 NORMAL DELIVERY.xls)

While the average length of stay for a normal delivery is very similar across the 5 hospitals (2-3 days), total costs significantly vary. Differences in direct costs are mainly due intensity of care provided by personnel, while the use of other direct resources (drugs, exams) appear very similar across providers. In some hospitals the care is mainly provided by midwives (less costly resource), in others obstetricians are most frequently involved (more costly resource). For example, this partially explains very low direct costs estimated in H5. The other 4 hospitals present similar direct costs (from € 558 to €723). Much larger variations are associated with overheads, including the cost of personnel that is not directly attributable to final provision of services. H5 is considered an outlier also for the cost category because of much less overheads to be allocated.
Overall, the impression is that direct use of resources, reflecting the way the delivery is managed, is similar across the hospitals, while the large differences in total costs are mainly due to the share of overheads allocated to the intervention. More specifically, in one of the providers (H2) hospital overheads resulted very high. This is due to the fact the general hospital costs are allocated to the ward on the basis of generated revenues. Considering that for this provider Obstetrics and Gynaecology is one of the most important clinical areas, generating very high revenues (for example two times as those of cardiology), this ward is given very large amount of overheads.

Two hospitals have full costs smaller that their regional tariff. For the other three hospitals, tariffs do not cover full costs (but largely cover direct costs). It is worth noticing that also tariffs vary significantly across regions.

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Normal Delivery	**H1**	**H2**	**H3**	**H4**	**H5**	**Mean**	**Median**
Direct costs							
Personnel	€ 391	€ 472	€ 544	€ 457	€ 225	€ 417	€ 457
Drugs	€ 8	€ 4	€ 26	€ 0	€ 0	€ 8	€ 4
Exams (lab and diagn)	€ 182	€ 157	€ 153	€ 101	€ 116	€ 142	€ 153
Total	**€ 581**	**€ 632**	**€ 723**	**€ 558**	**€ 341**	€ 567	€ 581
Personnel Indirect Costs							
Total	**€ 315**	**€ 751**	**€ 662**	**€ 313**	**€ 110**	€ 430	€ 315
Overheads							
Ward	€ 142	€ 459	€ 513	€ 122	€ 71	€ 261	€ 142
Hospital	€ 176	€ 784	€ 358	€ 204	€ 73	€ 319	€ 204
Total	**€ 319**	**€ 1.244**	**€ 872**	**€ 325**	**€ 143**	€ 581	€ 325
Grand Total	**€ 1.214**	**€ 2.627**	**€ 2.257**	**€ 1.196**	**€ 594**	€ 1.578	€ 1.214
Regional Tariff	**€ 1.858**	**€ 1.858**	**€ 1.858**	**€ 730**	**€ 1.638**		

3.3 Hip Replacement (file: Vignette 3 HIP REPLACEMENT.xls)

All the providers show similar data concerning length of stay (from 7 to 9 days) and duration of surgical intervention (from 60 to 90 minutes). As a consequence, with the exception of the H5 (direct costs of operating theatre not available) , all categories of direct costs are similar across the hospitals: personnel costs vary from € 597 to € 808, drugs from € 43 to € 55, and the cost of the operating theatre (excluding surgeon time, prostheses and medical devices) from € 252 to € 351.

Notably, prosthesis cost represent about 75% and 50% of direct costs and total full costs, respectively. Two different types of prosthesis are implanted in the intervention: cemented (traditional, less costly) and non-cemented (innovative, more costly). Three out of five hospitals use only the non-cemented one (H2, H3, H4), while H1 and H5 used it in 90% and 60% of cases, respectively. The cost of prosthesis varies slightly, ranging from € 3,409 to €4,173 for the hospitals that most frequently use non-cemented prosthesis (H1-H4). The H5 is characterised by lower costs for prosthesis because mainly applies the traditional type of device.

Personnel indirect costs, that are the costs of the personnel of the ward that are not directly attributable to final services but needs to be allocated to follow a full costing approach, are very similar as well. In effects, both the allocation basis (the length of stay) and the unit cost (the cost per hour of the personnel) are very similar across providers. Instead, large variations are evident as far as overheads are concerned. Values range from the minimum of € 642 (H5) and the maximum of € 2,410 at H3. These differences are mainly due to the different magnitudes of overheads to be allocated.

For two providers, operating in two different regions, tariffs exceeds full costs, while for the hospitals operating in Lombardy regions tariffs appear sufficient to cover costs, considering that they are topped with a special provision to cover a fraction of the prostheses costs.

ITALY

Hip Replacement	**H1**	**H2**	**H3**	**H4**	**H5**	**Mean**	**Median**
Direct costs							
Personnel	€ 610	€ 665	€ 769	€ 808	€ 597	€ 690	€ 665
Drugs	€ 55	€ 55	€ 43	€ 48	€ 153	€ 71	€ 55
Exams (lab & diagn)	€ 143	€ 101	€ 131	€ 234	€ 118	€ 145	€ 131
Device-Prosthesis	€ 3.664	€ 4.173	€ 3.463	€ 3.409	€ 2.370	€ 3.416	€ 3.463
Operating Theatre	€ 231	€ 199	€ 351	€ 284		€ 266	€ 258
Total	**€ 4.704**	**€ 5.192**	**€ 4.758**	**€ 4.783**	**€ 3.238**	€ 4.535	€ 4.758
Personnel Indirect Costs							
Total	**€ 1.062**	**€ 1.160**	**€ 921**	**€ 740**	**€ 605**	€ 897	€ 921
Overheads							
Ward	€ 557	€ 813	€ 968	€ 540	€ 390	€ 654	€ 557
Hospital	€ 630	€ 1.293	€ 1.442	€ 710	€ 252	€ 865	€ 710
Total	**€ 1.187**	**€ 2.106**	**€ 2.410**	**€ 1.250**	**€ 642**	€ 1.519	€ 1.250
Grand Total	**€ 6.953**	**€ 8.459**	**€ 8.088**	**€ 6.774**	**€ 4.485**	€ 6.952	€ 6.953
Regional Tariff (DRG 209)	**€ 7.802**	**€ 7.802**	**€ 7.802**	**€ 9.739**	**€ 9.975**		
	plus 45% of regional average value of prosthesis costs			**inclusive of prosthesis costs**			

3.4 Cataract Operation (file: Vignette 4 CATARACT OPERATION.xls)

All providers perform Cataract operation in a day surgery regime. The costs of personnel, laboratory exams and the use of the operating theatre are relatively similar as they reflect similar use of physical resources. However, the cost of disposables (mainly lens) varies almost tenfold. Two different types of lenses are used: rigid or soft lenses. The former are less expensive, the latter are newer with, consequently, higher costs. For example, the two providers operating in the same region (H5 and H6) use only soft lenses for cataract operations; this is the reason why total direct costs in these hospitals are higher than in the others. Costs of personnel appear more similar in this case than in the previous ones, probably due to the use of operation time rather than length of stay as the driver for the allocation of these costs. In addition to the cost of lens, differences are mainly driven by overheads. They vary from € 176 to € 624. However, total costs appear homogenous across providers of the same regions and reasonably close to reimbursement fees.

Cataract Operation	**H1**	**H2**	**H3**	**H5**	**H6**	**Mean**	**Median**
Direct costs							
Personnel	€ 106	€ 159	€ 210	€ 172	€ 180	€ 166	€ 172
Drugs	€ 24	€ 20	€ 14	€ 36	€ 32	€ 25	€ 24
Exams (lab & diagn)	€ 103	€ 66	€ 81	€ 103	€ 94	€ 89	€ 94
Disposables (Lens)	€ 43	€ 130	€ 146	€ 373	€ 384	€ 215	€ 146
Operating Theatre	€ 69	€ 86	€ 76	€ 80	€ 80	€ 78	€ 80
Total	**€ 345**	**€ 461**	**€ 526**	**€ 764**	**€ 771**	€ 573	€ 526
Personnel Indirect Costs							
Total	**€ 86**	**€ 107**	**€ 124**	**€ 289**	**€ 150**	€ 151	€ 124
Overheads							
Ward	€ 105	€ 212	€ 150	€ 310		€ 194	€ 181
Hospital	€ 70	€ 413	€ 210	€ 89	€ 253	€ 207	€ 210
Total	**€ 176**	**€ 624**	**€ 359**	**€ 399**	**€ 253**	€ 456	€ 359
Grand Total	**€ 606**	**€ 1.192**	**€ 1.010**	**€ 1.452**	**€ 1.173**	€ 1.181	€ 1.173
Regional Tariff	**€ 968**	**€ 968**	**€ 968**	**€ 1.436**	**€ 1.436**		

3.5 Acute Myocardial Infarction (file: Vignette 5 ACUTE MYOCARDIAL INFARCTION.xls)

Costing an acute AMI treated in hospital poses a few major problems, mainly due to the fact that three hospital units may manage the patient: the Cardiology Ward, the Intensive Care Unit and the Haemodinamic Laboratory- Cath Lab (see above for the detailed approach).
Personnel costs, inclusive of all the phases of the treatment, vary greatly among providers. These costs range from € 333 (H4) to € 1557 (H5) and reflect the different amount of time spent by physicians and nurses to take care the case illustrated in the vignette. The H5 uses a higher amount of personnel resources probably due to the presence of a semi-intensive care unit where monitoring of patient is more intense than in a normal ward. The H4 has a much lower value for direct personnel costs (€ 333), that reflects a much shorter length of stay. In fact, LOS at H4 is 3.5 days (1.5 in Intensive Care Unit), while at the other hospitals ranges from 5.5 to 10 days. This wide range reflects different attitudes of providers towards length of stay. However, all the 5 providers use the same major approach to the treatment that is the use of PTCA. This results in high costs for laboratory and devices (mainly the cost of the services rendered by the haemodinamic unit). All but H4 spend about € 2,000 for medical devices. The difference in costs is due to the type of devices used in PTCA: more costly drug eluting stents (DES) or traditional bare metal stent (BMS). With exception of H5 that stated to use DES in 90% of AMI patients, other providers still use BMS in majority of cases (80% in H2 and H3, 70% in H1). The BMS is used in all cases treated in H4, and consequently device costs result significantly lower for this provider.
This item counts for about 40% of total direct costs that range from € 2,598 at H4 to € 5,540 at H1. The use of Intensive Care Units appears more homogenous than the use of the Cardiology Ward. While for the former data show a variation from 1.5 to 3 days, for the latter they show a variation from to 2 to 8 days.

Given the differences in the length of stay, high differences in the share of overheads attributable to the case could be expected. This is because to allocate overheads it is first calculated a share of overheads per day of stay and then this value is multiplied by the number of days reported for the case of interest. Therefore, large variations in the LOS should have resulted in large variations of overheads across the five hospitals. Instead, overheads are relatively similar, ranging from € 1,055 to € 1,931. This similarity is much more

evident if H4, somehow the outlier of this vignette, is excluded: overheads per case varies from € 1,770 to € 1,922. This homogeneity derives by the fact that hospitals with higher LOS have lower overhead costs per day.

Except H4, that has a LOS of 3.5 days only, hospitals have total costs, inclusive of overheads, ranging from € 7,200 and € 8,700. This interval is relatively narrow (about 20% of the mean value) and close to the reimbursement fees that stay in the € 7,000-8,000 range.

ACUTE MYOCARDIAL INFARCTION	**H1**	**H2**	**H3**	**H4**	**H5**	**Mean**	Median
Direct costs							
Personnel	€ 853	€ 653	€ 869	€ 333	€ 1.557	€ 853	€ 853
Drugs	€ 1.051	€ 923	€ 578	€ 650	€ 342	€ 709	€ 650
Exams (lab & diagn)	€ 586	€ 556	€ 499	€ 242	€ 463	€ 469	€ 499
Cath lab running costs	€ 308		€ 455	€ 784			
Devices	€ 2.742	€ 1.947	€ 2.171	€ 590	€ 2.340	€ 1.958	€ 2.171
Total	**€ 5.540**	**€ 4.079**	**€ 4.572**	**€ 2.598**	**€ 4.703**	**€ 4.298**	**€ 4.572**
Personnel Indirect Costs							
Cardiology Ward	€ 987	€ 729	€ 509				
Intensive Care Unit	€ 765	€ 561	€ 401				
Total	**€ 1.752**	**€ 1.291**	**€ 909**	**€ 731**	**€ 1.992**	**€ 1.335**	**€ 1.291**
Overheads							
Intensive Care Unit	€ 547	€ 1.124	€ 635				
Ward	€ 190	€ 98	€ 138	€ 404	€ 1.286	€ 423	€ 190
Hospital	€ 1.168	€ 1.284	€ 1.158	€ 652	€ 637	€ 980	€ 1.158
Total	**€ 1.904**	**€ 2.505**	**€ 1.931**	**€ 1.055**	**€ 1.922**	€ 1.864	€ 1.922
Grand Total	**€ 9.196**	**€ 7.875**	**€ 7.412**	**€ 4.385**	**€ 8.616**	**€ 7.497**	**€ 7.875**
Regional Tariff (DRG 516 or 112)	**€ 7.333**	**€ 7.333**	**€ 7.333**	**€ 7.216**	**€ 7.437**		
	plus 45% of regional average value of device costs			**inclusive of device costs**			

3. 6 Stroke (file: Vignette 6 STROKE.xls)

Management of the case described in vignette 6 (Stroke) significantly varies across providers. Average length of Stay varies from 6.5 (H4) to 15 (H2 and H5). Different lengths of stay are reflected in substantial differences in both direct costs and shares of overheads. It is also important to notice that different drug therapies are administered. In two hospitals (H3 and H4) patients received two doses of r-tpa while in the other three hospitals other less expensive and easier-to-administer therapies were used. Given the cost of r-tpa (almost € 1,000) this difference has a relevant impact on direct and total costs. Indeed, H3 and H4 have the highest direct costs.

Excluding the costs of the pharmaceutical therapy, direct costs would range between € 859 and € 1,680. This range is relatively modest and it is mainly due to differences in length of stay. Costs of exams and diagnostic procedures appear very homogenous across the sample. On the contrary, personnel indirect costs and overheads are very relevant and greatly vary. At H2, where patients have an average length of stay of 15 days, overheads and personnel indirect costs count for 42% and 43% of total cost, respectively. While this provider is probably an outlier, it is clear that in this vignette overheads have a very relevant impact on total costs and result from a large share of resources belonging to the ward that cannot be directly attributed to individual patients.

Three out of five hospitals have costs close to tariffs, while 2 have costs that are much higher than costs. These are the hospitals that have the longer length of stay.

STROKE	H1	H2	H3	H4	H5	**Mean**	**Median**
Direct costs							
Personnel	€ 410	€ 628	€ 892	€ 339	€ 1.106	€ 675	€ 628
Drugs	€ 2	€ 6	€ 950	€ 956	€ 14	€ 385	€ 14
Exams (lab & diagn)	€ 585	€ 508	€ 636	€ 521	€ 573	€ 565	€ 573
Total	**€ 998**	**€ 1.141**	**€ 2.477**	**€ 1.815**	**€ 1.693**	€ 1.625	€ 1.693
Personnel Indirect Costs							
Total	**€ 1.074**	**€ 3.223**	**€ 990**	**€ 683**	**€ 804**	€ 1.355	€ 990
Overheads							
Ward	€ 407	€ 2.061	€ 1.233	€ 381	€ 519	€ 920	€ 519
Hospital	€ 290	€ 1.186	€ 929	€ 536	€ 489	€ 686	€ 536
Total	**€ 696**	**€ 3.247**	**€ 2.162**	**€ 917**	**€ 1.007**	€ 1.606	€ 1.007
Grand Total	**€ 2.767**	**€ 7.611**	**€ 5.629**	**€ 3.415**	**€ 3.505**	€ 4.585	€ 3.505
Regional Tariff	**€ 3.443**	**€ 3.443**	**€ 3.443**	**€ 3.586**	**€ 4.712**		

3.7. Cough (file: Vignette 7 COUGH.xls)

In Italy paediatric care is mainly provided by general paediatricians who have a status very similar to those of General Practitioners. However, some babies and children are taken care by GPs and, outside of normal office hours, care is mainly provided by hospital-based ambulatories. As a consequence, we built a sample with three paediatricians, one GP and one hospital-based paediatric ambulatory.

Provider 1 (the hospital-based ambulatory) presents much higher cost due to more resources used to directly manage the case and to much higher overheads. The other providers present direct costs ranging from € 18 and € 45, and overheads ranging from € 4 to € 18. Differences in direct costs reflect different stated length of the visit, while differences in overheads reflect differences in total costs to run the ambulatory (depending for example by rent rates that differ across locations), opening hours (the impact on the hourly cost of keeping the ambulatory open) and the length of the visit (the driver for the allocation of overheads). Overall, management of this case appears homogenous. We do not report tariffs for this case because both GPs and paediatricians are paid on a capitation basis.

COUGH	Prov 1	Prov 2	Prov 3	Prov 4	Prov 5	**Mean**	**Median**
Direct costs	68.45	18.25	45.14	24.70	19.80	35.27	24.70
Overheads	67.05	11.60	18.11	4.40	4.55	21.14	11.60
Total	**135.50**	**29.85**	**63.25**	**29.10**	**24.35**	**56.41**	**29.85**

3. 8 Colonoscopy (file: Vignette 8 COLONOSCOPY.xls)

The five providers of the case described in this vignette are ambulatories based on important hospitals (the same of the hospital cases reported above). The major problem with cost estimates of this vignette is related to overheads. It resulted impossible to allocate them according to time. We could only calculate a flat overhead rate per intervention.

Time required to perform the procedures is very similar across providers. The personnel time and direct costs of personnel appear equivalent across the sample. Instead relevant differences concern the use of laboratory exams and drugs. Overall, direct costs range from € 66 to € 100, with three providers in a very narrow range (€ 64-67).

Costs for preparation for the exams (fluids) are not included in the calculation because preparative-drugs are non provided by hospitals. Providers give suggestions about an appropriate intestinal preparation for the exam but the patient has to buy drugs on his own. Only in one hospitals, the fluids were provided free of charge under the specific regional initiative for colon cancer screening planned for that year.

Given the crude criteria to allocate overheads and the different magnitude of the overheads to be allocated, the share of overheads allocated to each colonoscopy intervention greatly varies from provider to provider. At H4 overheads reach € 79, while for the other providers they range from € 15 to € 32.

Total costs of a colonoscopy range from € 93 to € 168. The mean and median values are very close at about €121-122. The reimbursement tariff for this intervention, set at € 72 for all providers, is largely insufficient to cover full costs.

COLONOSCOPY	**H1**	**H2**	**H3**	**H4**	**H5**	**Mean**	**Median**
Direct costs							
Personel	€ 66	€ 37	€ 67	€ 56	€ 74	€ 60	€ 66
Exams			€ 25				
Equipment		€ 20					
Drugs	€ 1	€ 9	€ 9	€ 8	€ 10	€ 8	€ 9
Total	**€ 66**	**€ 67**	**€ 100**	**€ 64**	**€ 85**	€ 76	€ 67
Personnel Indirect Costs							
Total	**€ 10**	**€ 23**	**€ 14**	**€ 25**	**€ 5**	€ 15	€ 14
Overheads							
Ward	€ 11	€ 27	€ 24	€ 40		€ 25	€ 25
Hospital	€ 6	€ 5	€ 5	€ 38		€ 14	€ 6
Total	**€ 17**	**€ 32**	**€ 29**	**€ 79**	**€ 15**	€ 34	€ 29
Grand Total	**€ 93**	**€ 121**	**€ 143**	**€ 168**	**€ 106**	€ 126	€ 121
Regional Tariff	**€ 72**	**€ 72**	**€ 72**	**€ 72**	**€ 72**		

3. 9 Tooth filling (file: Vignette 9 TOOTH FILLING.xls)

Two major issues characterise this vignette. First, in Italy dental care is mainly provided in the private sector with no public reimbursement. Consequently, we decided to include in the sample 4 private providers and 1 public provider. For private providers it is difficult to calculate the cost of the intervention because it is difficult to assign a cost value to the time of the dentist. As he/she is also an entrepreneur it is difficult to make a distinction between costs, revenues (prices) and profits. The second issue concerns the estimate of the overheads. For three providers we estimated total cost to run the dental clinic (inclusive of rent, equipment, utilities, receptionist, etc.) and we then calculated an overhead rate per hour on the basis of the number of hours the clinic is open. For the other two providers we were given an hourly rate that the dentist had previously calculated and that he/she used to set charges. These rates may include some profits.

Mean direct and total costs of the 5 providers are € 104 and € 135, respectively. In the public sector costs they are significantly lower (Dent 3 € 58 and € 83 for direct and total costs, respectively). In the private sector dentist costs vary from € 35 to € 75, mainly due to the duration of the intervention. Costs of X Ray greatly vary because the fraction of patients for which it is made greatly varies across providers. For 4 providers overheads vary from € 15 and € 25. However, one dentist reports overheads for € 75.

Despite these differences total costs of a tooth filling appear similar across private providers, ranging from € 100 to € 165. Interestingly, the three private providers located in the same geographical area present very similar values.

Tooth filling	Dent 1	Dent 2	Dent 3	Dent 4	Dent 5	**Mean**	**Median**
Direct costs							
Dentist	€ 65	€ 75	€ 25	€ 35	€ 35	€ 47	€ 35
Other personnel	€ 25	€ 27	€ 18	€ 10	€ 10	€ 18	€ 18
X Ray	€ 15	€ 5	€ 4	€ 20	€ 10	€ 11	€ 10
Material	€ 40	€ 40	€ 12	€ 25	€ 25	€ 28	€ 25
Total	**€ 145**	**€ 147**	**€ 58**	**€ 90**	**€ 80**	€ 104	€ 90
Overheads							
Total	**€ 20**	**€ 15**	**€ 25**	**€ 75**	**€ 20**	€ 31	€ 20
Grand Total	**€ 165**	**€ 161**	**€ 83**	**€ 165**	**€ 100**	€ 135	€ 161

3. 10 Physiotherapy (file: Vignette 10 PHYSIOTHERAPY.xls)

Generally, sessions are conducted by a physiotherapist that oversees more patients at a time. Sessions vary from 45 to 60 minutes; frequency ranges from three to five times a week. Numbers of session vary from 16 to 23 over a period of time of 4-6 weeks.

Direct costs for three hospital providers vary from € 244 (H1) to € 352 (H2). Comparing the private providers only, the difference between minimum and maximum is higher probably due to different experience and specialization of provider in knee rehabilitation. These costs exclude equipment, which is included in the overheads. However, the share of overheads attributed to this service appears low compared to other services analysed in this report. For the three public organizations we were reported low overheads (about € 60). For private providers overheads are much larger, probably also because they include profits. We suggest being particularly cautious about the estimates of overheads of this vignette. The relevant differences in total costs across providers are mainly due to overheads. Direct costs are more similar, ranging from € 233 to € 396. Total costs for the case described in the vignette ranges from € 285 to € 576.

PHYSIOTHERAPY	**H1**	**H2**	**P1**	**P2**	**H6**	**Mean**	**Median**
Direct costs							
Total	€ 243,6	€ 351,9	€ 396,0	€ 232,5	€ 346,8	€ 314,2	€ 346,8
Personnel Indirect Costs							
Total	€ 17,0	€ 22,8			€ 21,8	€ 20,5	€ 21,8
Overheads							
Total	€ 24,6	€ 48,5	*€ 180,0**	*€ 333,5**	€ 36,6	€ 124,7	€ 48,5
Grand Total	**€ 285,2**	**€ 423,2**	**€ 576,0**	**€ 566,0**	**€ 405,2**	**€ 451,1**	**€ 423,2**

Total overheads of Private 1 and Private 2 include profit

4. CONCLUSIONS

The quality of the estimates presented in this paper greatly depends on the information collected during the interviews and the data made available by the accounting systems of the providers included in the sample. Interviews were mainly useful to estimate the direct use of physical resources (personnel, drugs, exams) for the case described in the vignettes. Although "strategic" answers cannot be excluded and recall biases may be present, we do believe that the people we interviewed have given reasonable and credible answers. All the respondents appeared comfortable with the vignette and generally provided the information we needed.

The quality and usefulness of information provided by the accounting systems of providers should be discussed carefully. In all the hospitals we contacted, accounting systems were mainly aimed at making organisational units accountable for their activities, revenues and costs. Consequently, they do not make available data on the cost of each service. We could get precise estimates on the number of hours worked in the units or about the costs of medical devices. But it was not possible to directly know how much an appendectomy or a normal delivery costs. This is simply because the accounting system is not designed to do this.

At the same, data made available by these accounting systems provide a very rich source of information for the purpose of the present study. For example, it made possible to know the average cost per minute of the personnel of the ward or the cost of specific goods purchased by the hospitals. Also, when transfer prices are used for transactions between units, they may be used to assign a value to services such as lab tests and other activities performed by auxiliary departments.

This premise allows us to shed light on the data we collected. We strongly believe that direct costs estimated in this study are appropriate to detect possible differences in the way patients are managed and in the resources used. Information given by the personnel we interviewed should reflect substantial differences in real practice. For example, in our study it clearly emerges that for many vignettes (e.g. normal delivery or colonoscopy) providers have very similar approach to the management of the case illustrated in the vignette. For others substantial differences appear. For example, despite the all providers adopt the same principal treatment (PTCA) for IMA patients, length of stay greatly differs and thus probably

shows different clinical attitudes and different intensity in the use of hospital resources. Differences in the way patients are managed are also very relevant in the case of stroke where, in addition to length of stay, the main therapeutic strategy varies across providers. Again, this exercise shows that a comparison across providers on the use of physical resources (personnel time, procedure, drugs, etc.) is meaningful and useful.

In order to obtain direct costs, units of physical resources need to be multiplied by unit costs. These values are often made available by the accounting documents of the providers or can be estimated. While these data results from written document, and thus do not suffer from some of the problems of data collected in interviews, they may reflect different accounting practices. For example, there are a large variety of methods to calculate the cost per unit of time of physicians. Data may refer to physicians working in the ward or in the entire hospital; the amount of time the physician is expected to work may be that defined by the national contract or may be the actual time worked in the hospital of the physician; cost of labour may or may not include benefits and premiums. We found such differences in our study and this needs to be clearly mentioned. As in Italy providers are not forced to follow standardised management accounting procedures, data are not fully comparable across the sample.

Nevertheless, differences are not large. According to our experience in this and other studies different accounting procedures to calculate unit costs of labour may cause differences of the magnitude of 10%-20%. Overall, such differences do not affect substantially the validity of the estimate of direct costs, provided that an uncertainty of +/-20% is deemed acceptable. Consequently, we do believe that direct costs can be used to make comparisons across providers and that interpreting differences and similarities make sense because is on reliable valid and reliable data..

The allocation of overheads is significantly more problematic. From one side this allocation is important because modern medicine involve complex organisations, many very important activities that aim to make direct care safe and effective and relevant administrative costs. In our vignettes, the use of resources directly traceable to patient care is often less than 50%. This means that decisions regarding the estimates of total overheads and, more importantly, the system to allocate them to “cost objectives” have a very relevant impact on cost estimates.

Our results show that overheads (both hospital and ward) are very relevant and are a source of variation of cost estimates across providers. The variation of the share of overheads attributed to services is much larger than the variation of direct costs. We do think that an important source of variation in the overheads is due to the way they are estimated and apportioned. Given the lack of precise and standardized rules across providers, there is the risk that differences are due to different accounting decisions. For this reason we urge to be cautious when comparing overheads across providers. In addition, we suggest thinking about the possibility to standardise the way overheads costs are apportioned to services.

Overall, the estimates we got for the vignettes appear reasonable and close to estimates suggested by some of the providers we contacted. Variation across direct costs is generally not large and when relevant is justified by substantial differences in the way the patients are treated. However, when very relevant variations are observed between total full costs, these are often due to relevant variations in overheads.

For some vignettes cost estimates are very close to reimbursement tariffs. In a few cases there are very important differences. Overall, tariffs are generally in the +/- 20% range of estimated costs; often tariffs are lower than estimated costs. Differences between mean costs and tariffs appear less relevant for inpatient than for outpatient cases.

Finally, it is important to underline that tariffs vary significantly among three regions represented in the sample (see for example natural delivery and cataract surgery). This result illustrates that production costs of services are only one of the criteria used for determining the reimbursement tariffs at regional level. Other important elements are taken into consideration when tariffs of the vignettes of this report are set by regions; they include giving incentives for giving births through natural delivery or for providing cataract interventions in the day-surgery regime rather than through normal hospital admissions.

Appendix A. File enclosed

Vignette 1 APPENDECTOMY.xls
Vignette 2 NORMAL DELIVERY.xls
Vignette 3 HIP REPLACEMENT.xls
Vignette 4 CATARACT OPERATION.xls
Vignette 5 ACUTE MYOCARDIAL INFARCTION.xls
Vignette 6 STROKE.xls
Vignette 7 COUGH.xls
Vignette 8 COLONOSCOPY.xls
Vignette 9 TOOTH FILLING.xls
Vignette 10 PHYSIOTHERAPY.xls

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