

*HealthBASKET***WORK PACKAGE 9**

(Deliverable 24, Phase III)

AUGUST 2006

AUTHORS: JAUME PUIG, LLUÍS SEGÚ, IVAN PLANAS, JOSEFA MA TRABAL

CONTENTS

Introduction	4
A. PROCEEDINGS AND LIMITATIONS IN THE DATA COLLECTION	4
B. DATA COLLECTED AND ANALYSIS OF RESULTS:	9
Vignette 1 - Appendectomy	9
HOSPITAL A	9
HOSPITAL B	11
HOSPITAL C	14
HOSPITAL D	17
HOSPITAL E	20
Vignette 2 - Hip replacement	24
HOSPITAL A	24
HOSPITAL B	27
HOSPITAL C	30
HOSPITAL D	34
HOSPITAL E	37
Vignette 3 - Cataract operation	43
HOSPITAL A	43
HOSPITAL B	45
HOSPITAL C	47
HOSPITAL D	50
HOSPITAL E	52
Vignette 4 – Stroke	56
HOSPITAL A	56
HOSPITAL B	59
HOSPITAL C	62
HOSPITAL D	65
HOSPITAL E	67
Vignette 5 – AMI	73
HOSPITAL A	73
HOSPITAL B	77
HOSPITAL C	82
HOSPITAL D	86

HOSPITAL E	90
Vignette 6- Cough	97
Primary Care Center A	97
Primary Care Center B	98
Primary Care Center C	99
Primary Care Center D	100
Vignette 7 - Ambulatory Physiotherapy	103
HOSPITAL A	103
HOSPITAL B	104
HOSPITAL C	105
HOSPITAL D	106
HOSPITAL E	107
Vignette 8 – Colonoscopy	110
HOSPITAL A	110
HOSPITAL B	111
HOSPITAL C	112
HOSPITAL D	114
HOSPITAL E	115
Vignette 9 - Tooth filling	117
Vignette 10 - Normal Delivery	120
C) REIMBURSEMENT FOR PROVIDER BY PURCHASER	126
D) CONCLUSIONS AND INTERPRETATION OF RESULTS	132

TABLES AND FIGURES:

Table 1. Case Vignette for appendectomy in the HOSPITAL A	9
Table 2. Case Vignette for appendectomy in the HOSPITAL B	11
Table 3. Case Vignette for appendectomy in the HOSPITAL C	14
Table 4. Case Vignette for appendectomy in the HOSPITAL D	17
Table 5. Case Vignette for appendectomy in the HOSPITAL E	20
Table 6. Case Vignette for hip replacement in the HOSPITAL A	24
Table 7. Case Vignette for hip replacement in the HOSPITAL B	27
Table 8. Case Vignette for hip replacement in the HOSPITAL C	30
Table 9. Case Vignette for hip replacement in the HOSPITAL D	34
Table 10. Case Vignette for hip replacement in the HOSPITAL E	37
Table 11. Cataract operation in the HOSPITAL A	43
Table 12. Cataract operation in the HOSPITAL B	45
Table 13. Cataract operation in the HOSPITAL C	47
Table 14. Cataract operation in the HOSPITAL D	50
Table 15. Cataract operation in the HOSPITAL E	52
Table 16. Stroke intervention in the HOSPITAL A	56
Table 17. Stroke intervention in the HOSPITAL B	59
Table 18. Stroke intervention in the HOSPITAL C	62
Table 19. Stroke intervention in the HOSPITAL D	65
Table 20. Stroke intervention in the HOSPITAL E	67
Table 21. AMI in the HOSPITAL A	73
Table 22. AMI in the HOSPITAL B	77
Table 23. AMI in the HOSPITAL C	82

Table 24. AMI intervention in the HOSPITAL D.	86
Table 25. AMI intervention in the HOSPITAL E.	90
Table 26. Cough at the Primary Care Center A.	97
Table 27. Cough at the Primary Care Center B.	98
Table 28. Cough at the Primary Care Center C.	99
Table 29. Cough at the Primary Care Center D.	100
Table 30. Ambulatory Physiotherapy in the HOSPITAL A.	103
Table 31. Ambulatory Physiotherapy in the HOSPITAL B.	104
Table 32. Ambulatory Physiotherapy in the HOSPITAL C.	105
Table 33. Ambulatory Physiotherapy in the HOSPITAL D.	106
Table 34. Ambulatory Physiotherapy in the Hospital E.	107
Table 35. Colonoscopy in the HOSPITAL A.	110
Table 36. Colonoscopy in the HOSPITAL B.	111
Table 37. Colonoscopy in the HOSPITAL C.	112
Table 38. Colonoscopy in the HOSPITAL D.	114
Table 39. Colonoscopy in the HOSPITAL E.	115
Table 40. Tooth filling in Destist A.	117
Table 40. Tooth filling in Destist B.	118
Table 40. Destist C.	118
Table 40. Destist D.	119

Introduction

This paper summarizes the main results from the collection of data on health procedures costs in several Spanish providers. The objective of such work is to identify main determinants of costs differences among health care providers in Spain. A secondary objective within the BASCET project is to compare costs per procedure across countries. Following sections are structured according to a common scheme with other partners in the project. In the first section characteristics of the data collection process, limitations and main assumptions are described. In the second section several tables include all data collected by procedure and provider. After each procedure a final table summarizes the information for a better cross comparison.

A. PROCEEDINGS AND LIMITATIONS IN THE DATA COLLECTION

For each proceeding a health professional of each centre has been interviewed. A Spanish translation of the case description and the data sheet (case vignette) was provided to each health professional in advance to the interview. During the interview the data sheet was filled.

One of the most important limitations in the data collection was that some processes, mainly Stroke, AIM and appendectomy require the participation of professionals in different areas of the hospital (urgencies, operation room and normal ward). In all cases, the interviewed professional is working in the most important area of those implied in the management of the health process, and he informed and provided information on behalf of peers on the other areas. Providers were selected since they were representative of the overall group of providers (excluding as agreed with all the partners the High Technology and University Hospitals).

All the information about costs (especially overhead costs) was the most difficult to obtain since Spanish hospitals are not used to account costs per item or per line or per product. Hospitals follow the legal accounting, which only establishes that it has to be stated, to which type of cost or income belongs a specific money movement. In this sense, we had to work with managers to develop costs per product or item.

Another limitation of the data is that capital costs (investment, not maintenance) are excluded from the overhead costs since most infrastructure is public and therefore doesn't account for

amortization. Most infrastructure has already been amortized and since new investments are done directly by the Health Authorities no public hospital accounts it. Therefore, in order to make data comparable with other countries an estimation of capital costs (investment) should be first done.

Labour costs are assumed to be the same in all health institutions provided that all are publicly financed and that they tend to converge in the public use network of hospitals. Labour costs include social security costs, independently if they are financed by the employee or the employer.

Pharmaceutical prices are centrally regulated. Regulate consumer price is used for medicines dispensed at pharmacies. Also, regulated ex-factory price has been employed as a proxy to value hospital dispensed medicines. In fact, hospitals may buy medicines in a decentralized process. However, hospital associations tend to negotiate prices for their entire member. And, sometimes even drugs are provided to the hospital free of cost by the laboratories, especially when it is expected that the patient continues with the treatment after hospital discharge.

Costs and limitations

Because of accounting weaknesses, reported in Report 2 (Phase 6), costs have been the most critical part of data collection in this phase. Main characteristics of the different cost concepts are the following:

- a) Staff / personal costs: As all the centres are belonging to the public system (some are public and some are private but all work for the NHS) all salaries are the same (overall consensus on wages in the Catalan health sector), thus costs differentials in this concept will come only from the amount of human resources (quantities) devoted to each process, since unitary cost is the same. Staff cost include social cost (Labour Social Security costs for the hospital), however due to lack of good data indirect costs have not been included, this should be estimated if comparable data with other countries wants to be obtained.
- b) Physician visit: So far it has only been included the cost derived from 15 minutes physician time, as it is the average time that interviewed doctors declare they use

to be with patients on average. There are no differences among specialities as protocols do not differ across them.

- c) Cost of staff on surgical interventions: it has been calculated as a function of the type of human resource used and the length of intervention.
- d) Cost of nursing in urgencies: It has been calculated assuming an average intensity of one nurse every four boxes per hour.
- e) Cost of nursing in the intensive unit ward: It has been estimated a proportion of one nurse every two beds per working day.
- f) Cost of nursing in non-ICU ward: It has been calculated assuming an average intensity of a nurse every eight beds per working day.
- g) Cost of medicines for hospital inpatient: It has been used the ex-factory price (PVL) of consumed medicines which, in some cases only represents an approximation of the real price paid by the hospital for the following reasons: a) hospital has bargaining power and freedom on their purchasing prices, however the official accounting establishes that it has to be considered the PVL, b) price differences between centres are small since most of them are associated to a providers association (employer's organizations CHC or UNIO) and medicines are jointly bought, c) finally, in some cases, oral medicines may be delivered without cost for the hospital as an introductory strategy for therapeutically innovations, and this practice is not reflected in the official accounting system. Units of medicines are days, and the unitary price is the cost of a Daily Doses.
- h) Price of outpatient medicines: it has been valued at regulated maximum consumer price (PVP) which is the price user's pay.
- i) Cost of complementary tests: it has been used the cost provided by the interviewed centres which, in most cases, is the price they pay in case they buy it to third parties (which may be different from the cost of producing the same test in the hospital). We know that some providers do have internal units for those services

but have no real accounting reliable information in order to determine the cost per unit.

- j) Cost of consumables: It has been used the purchasing price paid and provided to us by the interviewed centres.
- k) Cost of stay in ward: it only includes staff time directly allocated to the patient. It has not been possible to get data on the cost of time devoted to general activities by the staff (revising documents...). Hospitals do not collect that information and there were to problems with directly collecting it: hospitals were reluctant to allow it, and secondly it would have been very costly.
- l) Overhead: this includes the following cots: indirect management costs, admissions and planning costs, cleaning and general maintainance costs, but it excludes laundry and food (which are accounted separately in a different row). Units for this concept are a ratio: Structure costs/Total costs and assigned by multiplying this % by the total cost of the process (case). In some cases 2 different overheads are calculated if outpatient and inpatient activity is involved. Since hospitals did not exactly know their costs we accounted the average of the 3 of them that had data.

Providers general description:

Characteristics	H1	H2	H3	H4	H5
NAME	A	B	C	D	E
DESCRIPTION	General County (Comarcal general)	General Basic	General County (Comarcal general)	General	General County (Comarcal general)
COMPLEXITY	MEDIUM	HIGH	MEDIUM	MEDIUM	LOW
LEVEL					
BEDS	282	872	346	359	150
ICU	YES	YES	YES	YES	YES
LOCATION	RURAL	URBAN	URBAN	URBAN	RURAL

The table included above summarizes de description of providers. Some additional comments have to be added to understand the implication of these characteristics over costs.

There is no speciality hospital but their structure it is somehow different since large hospitals have less contact between specialities. This Low complexity hospitals do derive most of complex cases to other hospitals, which means that even carrying on activity such as the one

described in the studied cases they will do it when there is low complexity involved in the specific case.

Hospital 3 is located in Barcelona and is the only one treating private patients (on a ratio 50/50), this also affects some of the studied cases.

Hospital 1 and 5 are those farer from Barcelona and in a rural area, which means less access to high complex technology unless available at their own hospital.

B. DATA COLLECTED AND ANALYSIS OF RESULTS:

Vignette 1 - Appendectomy

Procedure description:

A healthy male, ca. 14-25 years old, presents to hospital (accident and emergency department if existing; otherwise directly to surgical department) with acute abdominal pain. Start of case vignette: hospital door. Abdominal palpation yields typical signs of appendicitis. End of vignette: discharge.

HOSPITAL A

Table 1. Case Vignette for appendectomy in the HOSPITAL A.

Phase	Elements	Units	No. of units used/patient	Unit Cost	Total costs
	<i>Emergency Physician</i>	No. Visits	1	12.34	12.34
Pre-operative (admission and planning)	<i>Diagnostic Procedures</i>				
	Imaging (e.g. ultrasound)	No. procedures	0		0
	Laboratory (e.g. blood count)	No. procedures	1	16.2	16.2
	Laboratory (blood coagulation,)	No. procedures	1	2.7	2.7
	Laboratory (C-reactive protein - CRP).	No. procedures	0	9	0
	Radiology	No. procedures	1	7.41	7.41
	ECG	No. procedures	1	3	3
	<i>Care before OP</i>				
	Surgeon/Physician input	Patient days /Visits	1	10.83	10.83

	Anaesthetist	Patient days /Visits	1	10.83	10.83
	Nursing input	Patient days			
	Other (paramedical)	Patient days			
	<i>Drugs, infusions, injections, etc. Drug A, Drug B, etc.</i>	Days (cost: price of a dd)			
	Tetanus vaccine	DD	1	1.31	1.31
	Prophylaxis (Metro 1500 + Genta 80)	DD	0	0.72	0
	Prophylaxis (cefoxitin 2 g))	DD	0	8.4	0
	Prophylaxis (Amoxicillin /Clavunic)	DD	1	1.44	1.44
	Ranitidin (150 mg)	DD	0	0.15	0
	Omeprazol	DD	1	0.18	0.18
Operation	OP-Team (altogether or separately)	Min.	45		0
	Surgeon	Hours of staff*	1.5	33.2	49.8
	Anaesthetist	Hours of staff	0.75	33.2	24.9
	OP-nurses etc.	Hours of staff	1.5	20.37	30.555
	Auxiliary nurse	Hours of staff	0.75	12.27	9.2025
	Drugs (anaesthetics, other?)	Days (cost: price of a dd)			
	Diazepam 5 mg	DD	1	0.03	0.03
	Midazolam 1-2 mg	DD	0	0.37	0
	Metocopramide 10 mg im	DD	0	1.1	0
	propofol 2mg /Kg	DD	0	18	0
	sevorane 1,5%	DD	1	17.1	17.1
	Fentanil 100-150 mcg	DD	0	0.75	0
	Atropine 0,01 mg/Kg	DD	1	0.18	0.18
	Succinilcoline 1mg/K	DD	0	0.18	0
	Atracurio 35 mg	DD	0	1.65	0
	Rocuronio 5 mg /K	DD	0	3.93	0
	Wake-up room	Personnel	Hours		
Post-operative	<i>Normal Ward</i>	Hours	3		0
	Pathological Anatomy	No. Tests	1	129	129
	Surgeon/Physician	No. visits	3	10.83	32.49
	Nursing	3 hours nurse a day	9	20.37	183.33

	Other (e.g. Physiotherapy)	Patient days			
	Drugs	Days (cost: price of a dd)			
	Serum (physiologic + glucose 5%)	DD	3	1.7	5.1
	Antibiotics	DD	3	1.44	4.32
	Metro 1500 + Genta 80	DD	0	0.72	0
	Anti-inflammatory	DD	3	0.074	0.222
	Metoclopramida 10 mg	DD	3	1.1	3.3
	Paracetamol	DD	3	0.037	0.111
	Omeprazol (gastric protective)	DD	3	0.18	0.54
	Diagnostic Procedures (blood count)	No. tests	0	16.2	0
	Therapeutic Procedures (e.g. punctures, drainages, special wound dressing)				
	Total, or: - On ward level - On departmental level - On hospital level	Patient days	3		0
Overhead (including administration, catering, etc.) Outpatient (visits)		% on total budget	13%		10.019 1
Overhead (including administration, catering, etc.) Inpatient (stays)		% on total budget	20%		63.723 4
Laundry and Food			3	13	39
Total Cost per case		€ (euros)			669.17

Note: * hours of staff: proportion of hours devoted by the indicated staff (i.e. 1.5 surgeons means 2 surgeons 45 minutes each so total of 1.5 hours)

HOSPITAL B

Table 2. Case Vignette for appendectomy in the HOSPITAL B.

Phase	Elements	Units	No. of units used/patient	Unit Cost	Total costs

	<i>Emergency Physician</i>	No. Visits	1.00	12.34	12.34
Pre-operative (admission and planning)	<i>Diagnostic Procedures</i>				
	Imaging (e.g. ultrasound)	No. procedures			
	Laboratory (e.g. blood count)	No. procedures	1.00	15.80	15.80
	Laboratory (blood coagulation,)	No. procedures	1.00	2.50	2.50
	Laboratory (C-reactive protein - CRP).	No. procedures	0.00	8.00	0.00
	Radiology	No. procedures	2.00	7.00	14.00
	ECG	No. procedures	1.00	2.50	2.50
	<i>Care before OP</i>				
	Surgeon/Physician input	Patient days /Visits	1.00	10.83	10.83
	Anaesthetist	Patient days /Visits	1.00	10.83	10.83
	Nursing input	Patient days			
	Other (paramedical)	Patient days			
	<i>Drugs, infusions, injections, etc. Drug A, Drug B, etc.</i>	Days (cost: price of a dd)	1.00	1.31	1.31
	Tetanus vaccine	DD	0.00	0.72	0.00
	Prophylaxis (Metro 1500 + Genta 80)	DD	0.00	8.40	0.00
	Prophylaxis (cefoxitina 2 g))	DD	1.00	1.44	1.44
	Prophylaxis (Amoxicillin/Clavunico)	DD	0.00	0.15	0.00
	Ranitidine (150 mg)	DD	1.00	0.18	0.18
	Omeprazol	DD	60.00		0.00
	Operation	OP-Team (altogether or separately)	Min.	1.00	33.20
	Surgeon	Hours of staff	1.00	33.20	33.20
	Anaesthetist	Hours of staff	2.00	20.37	40.74
	OP-nurses etc.	Hours of staff	1.00	12.27	12.27

	Auxiliary nurse	Hours of staff			
	Drugs (anaesthetics, other?)	Days (cost: price of a dd)	1.00	0.03	0.03
	Diazepam 5 mg	DD	0.00	0.37	0.00
	Midazolam 1-2 mg	DD	0.00	1.10	0.00
	Metocoprāmida 10 mg im	DD	1.00	18.00	18.00
	propofol 2mg /Kg	DD	0.00	17.10	0.00
	sevorange 1,5%	DD	0.00	0.75	0.00
	fentanilo 100-150 mcg	DD	1.00	0.18	0.18
	Atropine 0,01 mg/Kg	DD	0.00	0.18	0.00
	Succinilcolina 1mg/K	DD	0.00	1.65	0.00
	Atracurio 35 mg	DD	0.00	3.93	0.00
	Rocuronio 5 mg /K	DD			
Wake-up room	Personnel	Hours	3.00		0.00
Post-operative	<i>Normal Ward</i>	Hours	1.00	110.00	110.00
	Pathological anatomy test	No. Tests	3.00	10.83	32.49
	Surgeon/Physician	No. visits	9.00	20.37	183.33
	Nursing	3 hours nurse a day			
	Other (e.g. Physiotherapy)	Patient days			
	Drugs	Days (cost: price of a dd)	3.00	1.70	5.10
	Serum (physiological + glycoside 5%)	DD	0.00	1.44	0.00
	Antibiotics	DD	0.00	0.72	0.00
	Metro 1500 + Genta 80	DD	3.00	0.07	0.22
	Anti-inflammatory	DD	3.00	1.10	3.30
	Metocloprāmida 10 mg	DD	3.00	0.04	0.11
	Paracetamol	DD	3.00	0.18	0.54
	Omeprazol	DD	0.00	15.80	0.00
	Diagnostic Procedures (e.g. imaging, laboratory) Laboratory (blood count)	No. tests			
	Therapeutic Procedures (e.g. punctures, drainages, special wound dressing)				
	Total, or: - On ward level - On departmental level - On hospital level	Patient days	3.00		0.00
Overhead		% on	0.12		13.55

(including administration, catering, etc.) Outpatient (visits)		total budget			
Overhead (including administration, catering, etc.) Inpatient (stays)		% on total budget	0.19		61.45
Laundry and Food			3	13	39
Total Cost per case		€ (euros)			690.93

Note: * hours of staff: proportion of hours devoted by the indicated staff (i.e. 1.5 surgeons means 2 surgeons 45 minutes each so total of 1.5 hours)

HOSPITAL C

Table 3. Case Vignette for appendectomy in the HOSPITAL C.

Phase	Elements	Units	No. of units used/patient	Unit Cost	Total costs
	<i>Emergency Physician</i>	No. Visits	1.00	12.34	12.34
Pre-operative (admission and planning)	<i>Diagnostic Procedures</i>				
	Imaging (e.g. ultrasound)	No. procedures			
	Laboratory (e.g. blood count)	No. procedures	1.00	16.00	16.00
	Laboratory (blood coagulation,)	No. procedures	1.00	2.90	2.90
	Laboratory (C-reactive protein - CRP).	No. procedures	1.00	8.20	8.20
	Radiology	No. procedures	1.00	7.20	7.20
	ECG	No. procedures	1.00	1.90	1.90
	<i>Care before OP</i>				
	Surgeon/Physician input	Patient days /Visits	1.00	10.83	10.83

	Anaesthetist	Patient days /Visits	1.00	10.83	10.83
	Nursing input	Patient days			
	Other (paramedical)	Patient days			
	<i>Drugs, infusions, injections, etc. Drug A, Drug B, etc.</i>	Days (cost: price of a dd)	0.00	1.31	0.00
	Tetanus vaccine	DD	1.00	0.72	0.72
	Prophylaxis (Metro 1500 + Genta 80)	DD	0.00	8.40	0.00
	Prophylaxis (cefoxitina 2 g))	DD	0.00	1.44	0.00
	Prophylaxis (Amoxicillin/Clavunico)	DD	1.00	0.15	0.15
	Ranitidine (150 mg)	DD	0.00	0.18	0.00
	Omeprazol	DD	30.00		0.00
Operation	OP-Team (altogether or separately)	Min.	0.50	33.20	16.60
	Surgeon	Hours of staff	0.50	33.20	16.60
	Anaesthetist	Hours of staff	0.50	20.37	10.19
	OP-nurses	Hours of staff	0.00	12.27	0.00
	Auxiliary nurse	Hours of staff			
	Drugs (anaesthetics, other?)	Days (cost: price of a dd)	0.00	0.03	0.00
	Diazepam 5 mg	DD	1.00	0.37	0.37
	Midazolam 1-2 mg	DD	1.00	1.10	1.10
	Metocopramida 10 mg im	DD	1.00	18.00	18.00
	propofol 2mg /Kg	DD	1.00	17.10	17.10
	sevorane 1,5%	DD	1.00	0.75	0.75
	fentanilo 100-150 mcg	DD	1.00	0.18	0.18
	Atropine 0,01 mg/Kg	DD	1.00	0.18	0.18
	Succinilcolina 1mg/K	DD	0.00	1.65	0.00
	Atracurio 35 mg	DD	1.00	3.93	3.93
	Rocuronio 5 mg /K	DD			
Wake-up room	Personnel	Hours	2.00		0.00
Post-operative	<i>Normal Ward</i>	Hours	1.00	96.00	96.00
	Pathological anatomy test	No. Tests	2.00	10.83	21.66
	Surgeon/Physician	No. visits	6.00	20.37	122.22
	Nursing	3 hours nurse a day			

	Other (e.g. Physiotherapy)	Patient days			
	Drugs	Days (cost: price of a dd)			
	Serum (physiological + glycoside 5%)	DD	2.00	1.70	3.40
	Antibiotics	DD	0.00	1.44	0.00
	Metro 1500 + Genta 80	DD	3.00	0.72	2.16
	Anti-inflammatory	DD	2.00	0.07	0.15
	Metoclopramida 10 mg	DD	2.00	1.10	2.20
	Paracetamol	DD	2.00	0.04	0.07
	Omeprazol	DD	2.00	0.18	0.36
	Diagnostic Procedures (e.g. imaging, laboratory) Laboratory (blood count)	No. tests	1.00	16.00	16.00
	Therapeutic Procedures (e.g. punctures, drainages, special wound dressing)				
	Total, or: - On ward level - On departmental level - On hospital level	Patient days	2.00		0.00
Overhead (including administration, catering, etc.) Outpatient (visits)		% on total budget	0.12		13.46
Overhead (including administration, catering, etc.) Inpatient (stays)		% on total budget	0.20		45.40
Laundry and Food			3	13	39
Total Cost per case		€ (euros)			550.64

Note: * hours of staff: proportion of hours devoted by the indicated staff (i.e. 1.5 surgeons means 2 surgeons 45 minutes each so total of 1.5 hours)

HOSPITAL D**Table 4. Case Vignette for appendectomy in the HOSPITAL D.**

Phase	Elements	Units	No. of units used/ patient	Unit Cost	Total costs
	<i>Emergency Physician</i>	No. Visits	n.a.	12.34	n.a.
Pre-operative (admission and planning)	<i>Diagnostic Procedures</i>		n.a.		n.a.
	Imaging (e.g. ultrasound)	No. procedures	n.a.		n.a.
	Laboratory (e.g. blood count)	No. procedures	n.a.	14.30	n.a.
	Laboratory (blood coagulation.)	No. procedures	n.a.	2.70	n.a.
	Laboratory (C-reactive protein - CRP).	No. procedures	n.a.	8.70	n.a.
	Radiology	No. procedures	n.a.	6.40	n.a.
	ECG	No. procedures	n.a.	3.00	n.a.
	<i>Care before OP</i>		n.a.		n.a.
	Surgeon/Physician input	Patient days /Visits	n.a.	10.83	n.a.
	Anaesthetist	Patient days /Visits	n.a.	10.83	n.a.
	Nursing input	Patient days	n.a.		n.a.
	Other (paramedical)	Patient days	n.a.		n.a.
	<i>Drugs. infusions. injections, etc. Drug A, Drug B, etc.</i>	Days (cost: price of a dd)	n.a.	1.31	n.a.
	Tetanus vaccine	DD	n.a.	0.72	n.a.
	Prophylaxis (Metro 1500 + Genta 80)	DD	n.a.	8.40	n.a.
	Prophylaxis (cefoxitina 2 g))	DD	n.a.	1.44	n.a.
	Prophylaxis (Amoxicillin/Clavunico)	DD	n.a.	0.15	n.a.
	Ranitidine (150 mg)	DD	n.a.	0.18	n.a.
	Omeprazol	DD	n.a.		n.a.
	Operation	OP-Team (altogether or separately)	Min.	n.a.	33.20

	Surgeon	Hours of staff	n.a.	33.20	n.a.
	Anaesthetist	Hours of staff	n.a.	20.37	n.a.
	OP-nurses	Hours of staff	n.a.	12.27	n.a.
	Auxiliary nurse	Hours of staff	n.a.		n.a.
	Drugs (anaesthetics, other?)	Days (cost: price of a dd)	n.a.	0.03	n.a.
	Diazepam 5 mg	DD	n.a.	0.37	n.a.
	Midazolam 1-2 mg	DD	n.a.	1.10	n.a.
	Metocoprāmida 10 mg im	DD	n.a.	18.00	n.a.
	propofol 2mg /Kg	DD	n.a.	17.10	n.a.
	sevorane 1,5%	DD	n.a.	0.75	n.a.
	fentanilo 100-150 mcg	DD	n.a.	0.18	n.a.
	Atropine 0,01 mg/Kg	DD	n.a.	0.18	n.a.
	Succinilcolina 1mg/K	DD	n.a.	1.65	n.a.
	Atracurio 35 mg	DD	n.a.	3.93	n.a.
	Rocuronio 5 mg /K	DD	n.a.		n.a.
Wake-up room	Personnel	Hours	n.a.		n.a.
Post-operative	<i>Normal Ward</i>	Hours	n.a.	100.00	n.a.
	Pathological anatomy test	No. Tests	n.a.	10.83	n.a.
	Surgeon/Physician	No. visits	n.a.	20.37	n.a.
	Nursing	3 hours nurse a day	n.a.		n.a.
	Other (e.g. Physiotherapy)	Patient days	n.a.		n.a.
	Drugs	Days (cost: price of a dd)	n.a.	1.70	n.a.
	Serum (physiological + glycoside 5%)	DD	n.a.	1.44	n.a.
	Antibiotics	DD	n.a.	0.72	n.a.
	Metro 1500 + Genta 80	DD	n.a.	0.07	n.a.
	Anti-inflammatory	DD	n.a.	1.10	n.a.
	Metocloprāmida 10 mg	DD	n.a.	0.04	n.a.
	Paracetamol	DD	n.a.	0.18	n.a.
	Omeprazol	DD	n.a.	14.30	n.a.
	Diagnostic Procedures (e.g. imaging, laboratory) Laboratory (blood count)	No. tests	n.a.		n.a.
	Therapeutic Procedures (e.g. punctures, drainages, special wound dressing)		n.a.		n.a.

	Total, or: - On ward level - On departmental level - On hospital level	Patient days	n.a.		n.a.
Overhead (including administration, catering, etc.) Outpatient (visits)		% on total budget	n.a.		n.a.
Overhead (including administration, catering, etc.) Inpatient (stays)		% on total budget	n.a.		n.a.
Laundry and Food				13	
Total Cost per case		€ (euros)	n.a.		n.a.

Note: * hours of staff: proportion of hours devoted by the indicated staff (i.e. 1.5 surgeons means 2 surgeons 45 minutes each so total of 1.5 hours)

HOSPITAL E**Table 5. Case Vignette for appendectomy in the HOSPITAL E.**

Phase	Elements	Units	No. of units used/ patient	Unit Cost	Total costs
	<i>Emergency Physician</i>	No. Visits	1.00	12.34	12.34
Pre-operative (admission and planning)	<i>Diagnostic Procedures</i>				
	Imaging (e.g. ultrasound)	No. procedures			
	Laboratory (e.g. blood count)	No. procedures	1.00	17.00	17.00
	Laboratory (blood coagulation)	No. procedures	1.00	2.80	2.80
	Laboratory (C-reactive protein - CRP).	No. procedures	0.00	9.00	0.00
	Radiology	No. procedures	1.00	7.90	7.90
	ECG	No. procedures	1.00	2.20	2.20
	<i>Care before OP</i>				
	Surgeon/Physician input	Patient days /Visits	1.00	10.83	10.83
	Anaesthetist	Patient days /Visits	1.00	10.83	10.83
	Nursing input	Patient days			
	Other (paramedical)	Patient days			
	<i>Drugs, infusions, injections, etc. Drug A, Drug B, etc.</i>	Days (cost: price of a dd)	1.00	1.31	1.31
	Tetanus vaccine	DD	0.00	0.72	0.00
	Prophylaxis (Metro 1500 + Genta 80)	DD	1.00	8.40	8.40
	Prophylaxis (cefoxitina 2 g))	DD	0.00	1.44	0.00
	Prophylaxis (Amoxicillin/Clavunico)	DD	0.00	0.15	0.00
	Ranitidine (150 mg)	DD	0.00	0.18	0.00
	Omeprazol	DD	30.00		0.00
	Operation	OP-Team (altogether or separately)	Min.	0.50	33.20

	Surgeon	Hours of staff	0.50	33.20	16.60
	Anaesthetist	Hours of staff	0.50	20.37	10.19
	OP-nurses	Hours of staff	0.00	12.27	0.00
	Auxiliary nurse	Hours of staff			
	Drugs (anaesthetics, other?)	Days (cost: price of a dd)		0.03	0.00
	Diazepam 5 mg	DD	1.00	0.37	0.37
	Midazolam 1-2 mg	DD		1.10	0.00
	Metocoprāmida 10 mg im	DD	1.00	18.00	18.00
	propofol 2mg /Kg	DD	1.00	17.10	17.10
	sevorane 1,5%	DD	1.00	0.75	0.75
	fentanilo 100-150 mcg	DD	1.00	0.18	0.18
	Atropine 0,01 mg/Kg	DD	0.00	0.18	0.00
	Succinilcolina 1mg/K	DD	1.00	1.65	1.65
	Atracurio 35 mg	DD	0.00	3.93	0.00
	Rocuronio 5 mg /K	DD			
Wake-up room	Personnel	Hours	2.00		0.00
Post-operative	<i>Normal Ward</i>	Hours	1.00	130.00	130.00
	Pathological anatomy test	No. Tests	2.00	10.83	21.66
	Surgeon/Physician	No. visits	6.00	20.37	122.22
	Nursing	3 hours nurse a day			
	Other (e.g. Physiotherapy)	Patient days			
	Drugs	Days (cost: price of a dd)			
	Serum (physiological + glycoside 5%)	DD	1.00	1.70	1.70
	Antibiotics	DD	0.00	1.44	0.00
	Metro 1500 + Genta 80	DD	0.00	0.72	0.00
	Anti-inflammatory	DD	2.00	0.07	0.15
	Metocloprāmida 10 mg	DD	2.00	1.10	2.20
	Paracetamol	DD	2.00	0.04	0.07
	Omeprazol	DD	2.00	0.18	0.36
	Diagnostic Procedures (e.g. imaging, laboratory) Laboratory (blood count)	No. tests	0.00	17.00	0.00
	Therapeutic Procedures (e.g. punctures, drainages, special wound dressing)				

	Total, or: - On ward level - On departmental level - On hospital level	Patient days			
			2.00		0.00
Overhead (including administration, catering, etc.) Outpatient (visits)		% on total budget			
			0.14		10.98
Overhead (including administration, catering, etc.) Inpatient (stays)		% on total budget			
			0.21		46.77
Laundry and Food			3	13	39
Total Cost per case		€ (euros)			540.99

Note: * hours of staff: proportion of hours devoted by the indicated staff (i.e. 1.5 surgeons means 2 surgeons 45 minutes each so total of 1.5 hours)

Reimbursement for provider by purchaser (incl. patient co-payments if applicable): No reimbursement, no co-payment. Public hospitals financing: budget. Details are given in section C).

Analysis of results:

APENDECTOMY	HA	HB	HC	HD	HE	Average	%
STAFF COST	375.11	401.72	253.76	n.a.	232.10	315.67	51.28%
DRUGS COST	33.83	30.41	50.82	n.a.	52.24	41.83	6.79%
DIAGNOSTIC PROCEDURES COST	158.31	144.80	148.20	n.a.	159.90	152.80	24.82%
MATERIAL AND DEVICES COST	0.00	0.00	0.00	n.a.	0.00	0.00	0.00%
OVERHEAD COST	112.74	114.00	97.86	n.a.	96.75	105.34	17.11%
TOTAL COST	669.17	690.93	550.64	n.a.	540.99	615.64	100%
OPERATION ROOM TIME (minutes)	45.00	60.00	30.00	n.a.	30.00	41.25	
ICU time	0.00	0.00	0.00	n.a.	0.00	0.00	
NORMAL WARD STAY	3.00	3.00	2.00	n.a.	2.00	2.50	
TOTAL STAY	3.00	3.00	2.00	n.a.	2.00	2.50	
OUTPATIENT VISITAS	1.00	3.00	3.00	n.a.	1.00	2.00	
REHABILITATION TIME	0.00	0.00	0.00	n.a.	0.00	0.00	

Note.- Information for hospital 4 is not available at this date.

1. **Average total cost** for appendectomy is €615.64, ranging from €40.99 in hospital 5 to €90.93 in hospital 2. The lowest calculated cost for appendectomy in hospital 5 represents 78% of cost in hospital 2 for this same diagnostic.
2. On the average, **cost distribution** among input types follows the following pattern: staff costs account for 51.28% of total cost, and diagnostic and procedure cost account for 24.82%. Medicines only account for 6.79% of total cost of this diagnostic.
3. The **main reason for variation in total cost** among providers lies in the time devoted by professional to this type of patient: in hospital 2, operation room time lasts 60 minutes and the patients stays in hospital for 3 days and receives 3 outpatient visits. In comparison, in hospital 5 the operation room time is only 30 minutes (as hospital 3), the patient stays in hospital for two days and receives only one visit. Then, staff cost in hospital 5 represents only 57.7% of this cost in hospital 2. This seems to be a substantial difference with a high effect over costs. Lower general complexity in hospital 5 could be alleged to explain this differences in all studied cases, however protocol for this case should not differ that much.
4. **Diagnostic and procedure costs** present a lower range of variation among hospitals, indicating a more homogeneous pattern of care: this cost varies between €144,8 in hospital 2 and €159,9 in hospital 5. Prices do not differ too much among providers. Despite the most expensive hospital is the largest one, and that the cheapest one is the smaller hospital, it does not seem that in this case department size and setting (economies of scale and scope) or environmental (morbidity of patients) characteristics would be enough to explain these small differences in costs.
5. **Drugs cost** do not represent a high proportion of total cost of appendectomy, however there are substantial differences that indicate that probably cheapest hospitals (with presumably less complex cases) are using more drugs (clinical protocol variation), and this is not always compensated by a lower number of outpatient visits.

Vignette 2 - Hip replacement

Procedure description:

Female, 65-75 years old, with hip osteoarthritis requiring hip replacement because of considerable impairment is finally (after waiting time if normal in the hospital) admitted for her first hip replacement (one side). The patient is without co-morbidity (i.e. expensive drugs due to treating co-morbidity should be excluded), the surgeon uses the most frequently used implant for female patients; the operation is without severe complications; end of case vignette: discharge (home or to separate rehabilitation institution).

HOSPITAL A

Table 6. Case Vignette for hip replacement in the HOSPITAL A.

Phase	Elements	Units	No. of units used/patient	Unit Cost	Total costs
Pre-operative (admission and planning)	<i>Care before OP</i>				
	Surgeon/Physician input				
	Specialist input (orthopaedics)	No. visits	3	14,40 39	43,21 17
	Anaesthetist input	No. Visits	1	14,40 39	14,40 39
	Rheumatologist	No. Visits	0	14,40 39	0
	Haematologist	No. Visits	0	14,40 39	0
	Nursing input	Patient days	0	0	0
	Other (paramedical)	Patient days	0	0	0
	<i>Diagnostic Procedures</i>				
	Imaging (X-Ray)	No. tests	4	7,41	29,64
	Imaging (ultrasound)	No. tests	0	0	0
	Imaging (CT)	No. tests	0	0	0
	Laboratory (blood count)	No. tests	1	16,2	16,2
	Laboratory (blood coagulation)	No. tests	1	2,7	2,7
	Other (ECG)	No. tests	1	3	3
	<i>Drugs, infusions, injections, etc. Drug A, Drug B, etc.</i>	Days (cost: price of a dd)			
	Tetanus Vaccine	DD	1	1,31	1,31
	Prophylaxis Cefazolina 1 g	DD	3	1,66	4,98

	Prophylaxis Cefonicid 2 g	DD	0	2,28	0	
	Ranitidine 150 mg	DD	0	0,29	0	
	Omeprazol 20 mg	DD	1	0,18	0,18	
	HBM (enoxaparina 1mg/Kg/12 hours)	DD	0	1,64	0	
Operation	OP-Team (altogether or separately)	Min.	180		0	
	Surgeon	Hours of staff*	9	44,15 6	397,4 04	
	OP-nurses	Hours of staff	6	15,4	92,4	
	Auxiliary nurse	Hours of staff	0	12,27	0	
	Anaesthetist	Hours of staff	3	44,15 6	132,4 68	
	<i>Devices (total price paid by hospital)</i>					
	Hip implant	No.	1	1800	1800	
	<i>Drugs (anaesthetics, other?)</i>	Days (cost: price of a dd)				
	Special wound dressing	No. Units	1	0,18	0,18	
	Diazepam	DD	0	0,03	0	
	Midazolam 1,5 mg	DD	0	0,37	0	
	Morfic Cl 0,3mg	DD	0	0,29	0	
	Propofol	DD	0	18	0	
	Sevorane	DD	1	17,1	17,1	
	Bupivacaina 15 Mg (intradural)	DD	1	1,29	1,29	
	Fetaniolo peridural	DD	1	0,75	0,75	
	OP-Theatre running costs (e.g. sterilisation)***	Min.	180			0
Wake-up room	<i>Intensive Care Unit</i>	Min	180			
	Surgeon/Physician	Hours of staff	0			
	Nursing	Hours of staff	3	15.4	46.2	
	Other					
	Drugs	Days (cost: price of a dd)	0			
	Diagnostic Procedures (e.g. imaging, laboratory)	No.	0			
	Therapeutic Procedures (e.g. punctures, drainages, special wound dressing)	No.	0			
Post-operative	<i>Normal Ward</i>	Days	7		0	
	<i>Diagnostic Procedures (e.g. imaging, laboratory)</i>					
	Radiology	No.	3	7,41	22,23	
	Laboratory (blood count)	No.	1	16,2	16,2	

<i>Drugs given to patient until contact with GP</i>	Daily doses			
Serum (physiological + glycoside 5%)	Days (cost: price of a dd)	1	1,7	1,7
Cefonicid 2g	Days (cost: price of a dd)	0	2,28	0
Cefazolina 3g EV	Days (cost: price of a dd)	0	3,22	0
Other antibiotics	Days (cost: price of a dd)	4	1,44	5,76
Anti-inflammatory	Days (cost: price of a dd)	7	0,074	0,518
Omeprazol	Days (cost: price of a dd)	7	0,18	1,26
HBM (enoxaparina 1mg/Kg/12 hours)	Days (cost: price of a dd)	7	1,64	11,48
Therapeutic Procedures (e.g. punctures, drainages, special wound dressing)	Days (cost: price of a dd)			
Special wound dressing	No.	7	0,18	1,26
Drainages	No.	2	0,04	0,08
Physician	No.	7		
Nurse (3 hours a day)	No.	21	14,40 39	100,8 273
Medical aids given to patient	Units			
Planned Re-admissions (when part of care episode)				
Surgeon/Physician	Patient days			
Nursing (3 hours nurse a day)	Patient days			
Other (e.g. Physiotherapy)	Patient days			

	Total, or: - On ward level - On departmental level - On hospital level	Patient days			
			7		0
Discharge planning	Follow up visits	No.			
	Physician	No.	14,4039	86,42	14,4039
Overhead (including administration, catering, etc.) Outpatient (visits)			13%		26,27
Overhead (including administration, catering, etc.) Inpatient (stays)			20%		606,14
Food and Laundry			7	13	91,00
Capital costs (if taken into account in your country)					
Total Cost per case		€(euros)			4002.33

* Note: hours of staff: proportion of hours devoted by the indicated staff (i.e. 9 surgeons means 3 surgeons 3 hours so total of 9 equivalent hours of surgeon)

HOSPITAL B

Table 7. Case Vignette for hip replacement in the HOSPITAL B.

Phase	Elements	Units	No. Of units used/ patient	Unit Cost	Total costs
Pre-operative (admission and planning)	<i>Care before OP</i>				
	Surgeon/Physician input				
	Specialist input (orthopaedic)	No. visits	4	15,3786	61,5144
	Anaesthetist input	No. Visits	1	15,3786	15,3786
	Rheumatologist	No. Visits	1	15,3786	15,3786
	Haematologist	No. Visits	0	15,3786	0
	Nursing input	Patient days		0	0

	Other (paramedical)	Patient days	0	0	0
	<i>Diagnostic procedures</i>				
	Imaging (e.g. X-Ray)	No. tests	4	7	28
	Imaging (e.g. Ultrasound)	No. tests	0	0	0
	Imaging (e.g. CT)	No. tests	0	0	0
	Laboratory (blood count)	No. tests	1	15,8	15,8
	Laboratory (blood coagulation)	No. tests	1	2,5	2,5
	Other (ECG)	No. tests	1	2,5	2,5
	<i>Drugs, infusions, injections, etc. Drug A, Drug B, etc.</i>	Days (cost: price of a dd)			
	Tetanus vaccine	DD	1	1,31	1,31
	Prophylaxis Cefazolina 1 g	DD	0	1,66	0
	Prophylaxis Cefonicid 2 g	DD	1	2,28	2,28
	Ranitidine 150 mg	DD	0	0,29	0
	Omeprazol 20 mg	DD	1	0,18	0,18
	HBM (enoxaparina 1mg/Kg/12 hours)	DD	0	1,64	0
Operation	OP-Team (altogether or separately)	Min.	120		0
	Surgeon	Hours of staff*	6	47,144	282,864
	OP-nurses	Hours of staff	4	15,4	61,6
	Auxiliary nurse	Hours of staff	2	12,27	24,54
	Anaesthetist	Hours of staff	2	47,144	94,288
	<i>Devices (total price paid by hospital)</i>				
	Hip implant	No.	1	1700	1700
	<i>Drugs (anaesthetics, other?)</i>	Days (cost: price of a dd)			
	Special wound dressing	No. Units	1	0,18	0,18
	Diazepam	DD	1	0,03	0,03
	Midazolam 1,5 mg	DD	0	0,37	0
	Morfic Cl 0,3mg	DD	0	0,29	0
	Propofol	DD	0	18	0
	Sevorane	DD	1	17,1	17,1
	Bupivacaina 15 Mg (intradural)	DD	0	1,29	0
	Fetanilo peridural	DD	0	0,75	0
	OP-Theatre running costs (e.g. Sterilisation)***	Min.	120		0
Wake-up room	<i>Intensive Care Unit</i>	Min	180		
	Surgeon/Physician	Hours of staff	0		
	Nursing	Hours of staff	3		
	Other		0		

	Drugs	Days (cost: price of a dd)	0		
	Diagnostic Procedures (e.g. Imaging, laboratory)	No.	0		
	Therapeutic Procedures (e.g. Punctures, drainages, special wound dressing)	No.	0		
Post-operative	<i>Normal ward</i>	Days	7		0
	<i>Diagnostic Procedures (e.g. Imaging, laboratory)</i>				
	Radiology	No.	2	7	14
	Laboratory (blood count)	No.	2	15,8	31,6
	<i>Drugs given to patient until contact with GP</i>	Daily doses			
	Serum (physiological + glycoside 5%)	Days (cost: price of a dd)	1	1,7	1,7
	Cefonicid 2g	Days (cost: price of a dd)	3	2,28	6,84
	Cefazolina 3g EV	Days (cost: price of a dd)	0	3,22	0
	Other antibiotics	Days (cost: price of a dd)	0	1,44	0
	Anti-inflammatory	Days (cost: price of a dd)	7	0,074	0,518
	Omeprazol	Days (cost: price of a dd)	7	0,18	1,26
	HBM (enoxaparina 1mg/Kg/12 hours)	Days (cost: price of a dd)	7	1,64	11,48
	Therapeutic Procedures (e.g. Punctures, Drainages, special wound dressing)	Days (cost: price of a dd)			
	Special wound dressing	No.	7	0,18	1,26
	Drainages	No.	2	0,04	0,08
Physician	No.	7			

	Nurse (3 hours a day)	No.	21	15,378 6	107,650 2
	Medical aids given to patient	Units			
	Planned Re-admissions (when part of care episode)				
	Surgeon/physician	Patient days			
	Nursing (3 hours nurse a day)	Patient days			
	Other (e.g. Physiotherapy)	Patient days			
	Total, or: - On ward level - On departmental level - On hospital level	Patient days	7		0
Discharge planning	Follow up visits	No.			
	Physician	No.	2	15,38	30,76
Overhead (including administration, catering, etc.) Outpatient (visits)			12%		22,83
Overhead (including administration, catering, etc.) Inpatient (stays)			19%		556,95
Food and Laundry			6	13	78
Capital costs (if taken into account in your country)					
Total Cost per case		€(euros)			3677.34

* Note: hours of staff: proportion of hours devoted by the indicated staff (i.e. 9 surgeons means 3 surgeons 3 hours so total of 9 equivalent hours of surgeon)

HOSPITAL C

Table 8. Case Vignette for hip replacement in the HOSPITAL C.

Phase	Elements	Units	No. Of units used/patient	Unit Cost	Total costs
Pre-operative (admission and planning)	<i>Care before OP</i>				
	Surgeon/Physician input				
	Specialist input (orthopaedic)	No. visits	3	14,403 9	43,21 17
	Anaesthetist input	No. Visits	1	14,403 9	14,40 39

	Rheumatologist	No. Visits	0	14,403 9	0
	Haematologist	No. Visits	3	14,403 9	43,21 17
	Nursing input	Patient days	0	0	0
	Other (paramedical)	Patient days	0	0	0
	<i>Diagnostic Procedures</i>				
	Imaging (e.g. X-Ray)	No. tests	3	7,2	21,6
	Imaging (e.g. Ultrasound)	No. tests	0	0	0
	Imaging (e.g. CT)	No. tests	0	0	0
	Laboratory (blood count) <i>Laboratory (blood count)</i>	No. tests	3	16	48
	Laboratory (blood coagulation)	No. tests	3	2,9	8,7
	Other (ECG)	No. tests	1	1,9	1,9
	<i>Drugs, infusions, injections, etc. Drug A, Drug B, etc.</i>	Days (cost: price of a dd)			
	Tetanus Vaccine	DD	1	1,31	1,31
	Prophylaxis Cefazolina 1 g	DD	3	1,66	4,98
	Prophylaxis Cefonicid 2 g	DD	0	2,28	0
	Ranitidine 150 mg	DD	0	0,29	0
	Omeprazol 20 mg	DD	1	0,18	0,18
	HBM (enoxaparina 1mg/Kg/12 hours)	DD	0	1,64	0
Operation	OP-Team (altogether or separately)	Min.	180		0
	Surgeon	Hours of staff*	9	44,156	397,4 04
	OP-nurses	Hours of staff	6	15,4	92,4
	Auxiliary nurse	Hours of staff	0	12,27	0
	Anaesthetist	Hours of staff	3	44,156	132,4 68
	<i>Devices (total price paid by hospital)</i>				
	Hip implant	No.	1	1900	1900
	<i>Drugs (anaesthetics, other?)</i>	Days (cost: price of a dd)			
	Special wound dressing	No. Units	1	0,18	0,18
	Diazepam	DD	1	0,03	0,03
	Midazolam 1,5 mg	DD	0	0,37	0
	Morfic Cl 0,3mg	DD	0	0,29	0
	Propofol	DD	0	18	0
	Sevorane	DD	1	17,1	17,1
	Bupivacaina 15 Mg (intradural)	DD	1	1,29	1,29
	Fetaniolo peridural	DD	1	0,75	0,75
	OP-Theatre running costs (e.g. Sterilisation)***	Min.	180		0

Wake-up room	<i>Intensive Care Unit</i>	Min	180		
	Surgeon/Physician	Hours of staff	0		
	Nursing	Hours of staff	3		
	Other		0		
	Drugs	Days (cost: price of a dd)	0		
	Diagnostic Procedures (e.g. Imaging, laboratory)	No.	0		
	Therapeutic Procedures (e.g. Punctures, drainages, special wound dressing)	No.	0		
Post-operative	<i>Normal Ward</i>	Days	6		0
	<i>Diagnostic Procedures (e.g. Imaging, laboratory)</i>				
	Radiology	No.	2	7,2	14,4
	Laboratory (blood count)	No.	2	16	32
	<i>Drugs given to patient until contact with GP</i>	Daily doses			
	Serum (physiological + glycoside 5%)	Days (cost: price of a dd)	1	1,7	1,7
	Cefonicid 2g	Days (cost: price of a dd)	0	2,28	0
	Cefazolina 3g EV	Days (cost: price of a dd)	0	3,22	0
	Other antibiotics	Days (cost: price of a dd)	4	1,44	5,76
	Anti-inflammatory	Days (cost: price of a dd)	6	0,074	0,444
	Omeprazol	Days (cost: price of a dd)	6	0,18	1,08
	HBM (enoxaparina 1mg/Kg/12 hours)	Days (cost: price of a dd)	6	1,64	9,84

	Therapeutic Procedures (e.g. Punctures, Drainages, special wound dressing)	Days (cost: price of a dd)			
	Special wound dressing	No.	6	0,18	1,08
	Drainages	No.	2	0,04	0,08
	Physician	No.	6	14,403 9	86,42 34
	Nurse (3 hours a day)	No.	18	20,37	366,6 6
	Medical aids given to patient	Units			
	Planned Re-admissions (when part of care episode)				
	Surgeon/Physician	Patient days			
	Nursing (3 hours nurse a day)	Patient days			
	Other (e.g. Physiotherapy)	Patient days			
	Total, or: - On ward level - On departmental level - On hospital level	Patient days	6		0
Discharge planning	Follow up visits	No.			
	Physician	No.	10	14,40	144,0 4
Overhead (including administration, catering, etc.) Outpatient (visits)			12%		43,10
Overhead (including administration, catering, etc.) Inpatient (stays)			20%		612,2 2
Food and Laundry			6	13	78
Capital costs (if taken into account in your country)					
Total Cost per case		€(euros)			4172. 14

* Note: hours of staff: proportion of hours devoted by the indicated staff (i.e. 9 surgeons means 3 surgeons 3 hours so total of 9 equivalent hours of surgeon)

HOSPITAL D

Table 9. Case Vignette for hip replacement in the HOSPITAL D.

Phase	Elements	Units	No. of units used/patient	Unit Cost	Total costs
Pre-operative (admission and planning)	<i>Care before OP</i>				
	Surgeon/Physician input				
	Specialist input (orthopaedic)	No. visits	2	15,3786	30,7572
	Anaesthetist input	No. Visits	1	15,3786	15,3786
	Rheumatologist	No. Visits	0	15,3786	0
	Haematologist	No. Visits	0	15,3786	0
	Nursing input	Patient days	0	0	0
	Other (paramedical)	Patient days	0	0	0
	<i>Diagnostic Procedures</i>				
	Imaging (e.g. X-Ray)	No. tests	4	6,4	25,6
	Imaging (e.g. ultrasound)	No. tests	0	0	0
	Imaging (e.g. CT)	No. tests	0	0	0
	Laboratory (blood count) <i>Laboratory (blood count)</i>	No. tests	1	14,3	14,3
	Laboratory (blood coagulation)	No. tests	1	2,7	2,7
	Other (ECG)	No. tests	1	3	3
	<i>Drugs, infusions, injections, etc. Drug A, Drug B, etc.</i>	Days (cost: price of a dd)			
	Tetanus Vaccine	DD	1	1,31	1,31
	Prophylaxis Cefazolina 1 g	DD	3	1,66	4,98
	Prophylaxis Cefonicid 2 g	DD	0	2,28	0
	Ranitidine 150 mg	DD	0	0,29	0
Omeprazol 20 mg	DD	1	0,18	0,18	
HBM (enoxaparina 1mg/Kg/12 hours)	DD	0	1,64	0	
Operation	OP-Team (altogether or separately)	Min.	120		0
	Surgeon	Hours of staff*	6	47,144	282,864
	OP-nurses	Hours of staff	6	15,4	92,4
	Auxiliary nurse	Hours of staff	0	12,27	0

	Anaesthetist	Hours of staff	2	47,14 4	94,288
	<i>Devices (total price paid by hospital)</i>				
	Hip implant	No.	1	1500	1500
	<i>Drugs (anaesthetics, other?)</i>	Days (cost: price of a dd)			
	Special wound dressing	No. Units	1	0,18	0,18
	Diazepam	DD	0	0,03	0
	Midazolam 1,5 mg	DD	1	0,37	0,37
	Morphic Cl 0,3mg	DD	0	0,29	0
	Propofol	DD	0	18	0
	Sevorane	DD	1	17,1	17,1
	Bupivacaina 15 Mg (intradural)	DD	1	1,29	1,29
	Fetaniolo peridural	DD	0	0,75	0
	OP-Theatre running costs (e.g. sterilisation)***	Min.	120		0
Wake-up room	<i>Intensive Care Unit</i>	Min	180		
	Surgeon/Physician	Hours of staff	0		
	Nursing	Hours of staff	3	15.4	46.2
	Other		0		
	Drugs	Days (cost: price of a dd)	0		
	Diagnostic Procedures (e.g. imaging, laboratory)	No.	0		
	Therapeutic Procedures (e.g. punctures, drainages, special wound dressing)	No.	0		
Post-operative	<i>Normal Ward</i>	Days	8		0
	<i>Diagnostic Procedures (e.g. imaging, laboratory)</i>				
	Radiology	No.	4	6,4	25,6
	Laboratory (blood count)	No.	2	14,3	28,6
	<i>Drugs given to patient until contact with GP</i>				
	Serum (physiological + glycoside 5%)	Days (cost: price of a dd)	2	1,7	3,4
	Cefonicid 2g	Days (cost: price of a dd)	3	2,28	6,84

	Cefazolina 3g EV	Days (cost: price of a dd)	0	3,22	0
	Other antibiotics	Days (cost: price of a dd)	0	1,44	0
	Anti-inflammatory	Days (cost: price of a dd)	8	0,074	0,592
	Omeprazol	Days (cost: price of a dd)	8	0,18	1,44
	HBM (enoxaparina 1mg/Kg/12 hours)	Days (cost: price of a dd)	8	1,64	13,12
	Therapeutic Procedures (e.g. punctures, Drainages, special wound dressing)	Days (cost: price of a dd)			
	Special wound dressing	No.	6	0,18	1,08
	Drainages	No.	2	0,04	0,08
	Physician	No.	8	15,37 86	123,028 8
	Nurse (3 hours a day)	No.	24	20,37	488,88
	Medical aids given to patient	Units			
	Planned Re-admissions (when part of care episode)				
	Surgeon/Physician	Patient days			
	Nursing (3 hours nurse a day)	Patient days			
	Other (e.g. Physiotherapy)	Patient days			
	Total, or: - On ward level - On departmental level - On hospital level	Patient days	8		0
Discharge planning	Follow up visits	No.			
	Physician	No.	5	10.83	54.15
Overhead (including administratio n, catering, etc.) Outpatient (visits)			13%		18.0323

Overhead (including administratio n, catering, etc.) Inpatient (stays)			18%		506.642 4
Capital costs (if taken into account in your country)					
Food and Laundry			8	13	104
Total Cost per case		€(euros)			3565.45

* Note: hours of staff: proportion of hours devoted by the indicated staff (i.e. 9 surgeons means 3 surgeons 3 hours so total of 9 equivalent hours of surgeon)

HOSPITAL E

Table 10. Case Vignette for hip replacement in the HOSPITAL E.

Phase	Elements	Units	No. of units used/ patient	Unit Cost	Total costs
Pre-operative (admission and planning)	<i>Care before OP</i>				
	Surgeon/Physician input				
	Specialist input (orthopaedic)	No. visits	2	13,53 75	27,075
	Anaesthetist input	No. Visits	1	13,53 75	13,537 5
	Rheumatologist	No. Visits	0	13,53 75	0
	Haematologist	No. Visits	0	13,53 75	0
	Nursing input	Patient days	0	0	0
	Other (paramedical)	Patient days	0	0	0
	<i>Diagnostic Procedures</i>				
	Imaging (e.g. X-Ray)	No. tests	3	7,9	23,7
	Imaging (e.g. ultrasound)	No. tests	0	0	0
	Imaging (e.g. CT)	No. tests	0	0	0

	Laboratory (blood count)	No. tests	1	17	17	
	Laboratory (blood coagulation)	No. tests	1	2,8	2,8	
	Other (ECG)	No. tests	1	2,2	2,2	
	<i>Drugs, infusions, injections, etc. Drug A, Drug B, etc.</i>	Days (cost: price of a dd)				
	Tetanus Vaccine	DD	1	1,31	1,31	
	Prophylaxis Cefazoline 1 g	DD	3	1,66	4,98	
	Prophylaxis Cefonicid 2 g	DD	0	2,28	0	
	Ranitidine 150 mg	DD	0	0,29	0	
	Omeprazol 20 mg	DD	0	0,18	0	
	HBM (enoxaparin 1mg/Kg/12 hours)	DD	1	1,64	1,64	
Operation	OP-Team (altogether or separately)	Min.	90		0	
	Surgeon	Hours of staff*	3	41,5	124,5	
	OP-nurses	Hours of staff	1,5	15,4	23,1	
	Auxiliary nurse	Hours of staff	1,5	12,27	18,405	
	Anaesthetist	Hours of staff	1,5	41,5	62,25	
	<i>Devices (total price paid by hospital)</i>					
	Hip implant	No.	1	2000	2000	
	<i>Drugs</i>	Days (cost: price of a dd)				
	Special wound dressing	No. Units	1	0,18	0,18	
	Diazepam	DD	1	0,03	0,03	
	Midazolam 1,5 mg	DD	1	0,37	0,37	
	Morfic Cl 0,3mg	DD	1	0,29	0,29	
	Propofol	DD	0	18	0	
	Sevorane	DD	1	17,1	17,1	
	Bupivacaina 15 Mg (intradural)	DD	1	1,29	1,29	
	Fetanilo peridural	DD	0	0,75	0	
	OP-Theatre running costs (e.g. sterilisation)***	Min.	90		0	
	Wake-up room****	<i>Intensive Care Unit</i>	Min	180		
		Surgeon/Physician	Hours of staff	0		
		Nursing	Hours of staff	3	15.7	46.2

	Other		0		
	Drugs	Days (cost: price of a dd)	0		
	Diagnostic Procedures (e.g. imaging, laboratory)	No.	0		
	Therapeutic Procedures (e.g. punctures, drainages, special wound dressing)	No.	0		
Post-operative	<i>Normal Ward</i>	Days	7		0
	<i>Diagnostic Procedures (e.g. imaging, laboratory)</i>				
	Radiology	No.	1	7,9	7,9
	Laboratory (blood count)	No.	2	17	34
	<i>Drugs given to patient until contact with GP</i>	Daily doses			
	Serum (physiological + glycoside 5%)	Days (cost: price of a dd)	2	1,7	3,4
	Cefonicid 2g	Days (cost: price of a dd)	0	2,28	0
	Cefazolina 3g EV	Days (cost: price of a dd)	1	3,22	3,22
	Other antibiotics	Days (cost: price of a dd)	0	1,44	0
	Anti-inflammatory	Days (cost: price of a dd)	7	0,074	0,518
	Omeprazol	Days (cost: price of a dd)	7	0,18	1,26

	HBM (enoxaparina 1mg/Kg/12 hours)	Days (cost: price of a dd)	7	1,64	11,48
	Therapeutic Procedures (e.g. punctures, Drainages, special wound dressing)	Days (cost: price of a dd)			
	Special wound dressing	No.	7	0,18	1,26
	Drainages	No.	2	0,04	0,08
	Physician	No.	7	13,53	94,762
	Nurse (3 hours a day)	No.	21	20,37	427,77
	Medical aids given to patient	Units			
	Planned Re-admissions (when part of care episode)				
	Surgeon/Physician	Patient days			
	Nursing (3 hours nurse a day)	Patient days			
	Other (e.g. Physiotherapy)	Patient days			
	Total, or: - On ward level - On departmental level - On hospital level	Patient days	7		0
Discharge planning	Follow up visits	No.			
	Physician	No.	3	10,83	32,49
Overhead (including administration , catering, etc.) Outpatient (visits)			14%		15,419 3
Overhead (including administration , catering, etc.) Inpatient (stays)			21%		555,37 26
Food and Laundry			7	13	91
Capital costs (if taken into account in your country)					
Total Cost per		€			3689.3 8

case		(euros)			
------	--	---------	--	--	--

* Note: hours of staff: proportion of hours devoted by the indicated staff (i.e. 9 surgeons means 3 surgeons 3 hours so total of 9 equivalent hours of surgeon)

Analysis of results:

HIP REPLACEMENT	H1	H2	H3	H4	H5	Average	%
STAFF COST	1341.11	1167.94	1366.42	1250.69	878.21	1200.87	31.43%
DRUGS COST	46,33	42,70	44,46	50,62	46,89	46,20	1.21%
DIAGNOSTIC PROCEDURES COST	89,97	94,40	126,60	99,80	87,60	99,67	2.61%
MATERIAL AND DEVICES COST	1801.52	1701.52	1901.34	1501.34	2001.52	1781.45	46.62%
OVERHEAD COST	723,40	670,78	733,32	662,99	675,16	693,13	18.14%
TOTAL COST	4002.33	3677.34	4172.14	3565.45	3689.38	3821.33	100%
OPERATION ROOM TIME (minutes)	180.00	120.00	180.00	120.00	90.00	138.00	
NORMAL WARD STAY	7.00	7.00	6.00	8.00	7.00	7.00	
FOLLOW UP VISITS	10.00	8.00	17.00	8.00	6.00	9.80	

1. **Average total cost** for hip replacement is €3821.33, ranging from €565.45 in hospital 4 to €4172.14 in hospital 3. The lowest calculated cost for appendectomy in hospital 4 represents 85% of cost in hospital 3 for this same diagnostic.

2. On the average, **cost distribution** among input types follows the following pattern: staff costs account for only 31.43% of total cost, material and devices account for 49.86%, and diagnostic and procedure cost account for 2.61%. Medicines only account for 1,21% of total cost of this diagnostic.

3. The **main reason for variation in total cost** among provider costs is also related to the time devoted by clinical staff to these patients: in hospital 2, operation room time lasts 60 minutes and the patients stays in hospital for 3 days and receives 3 outpatient visits. In comparison, in hospital 5 the operation room time is only 30 minutes (as in hospital 3), the patient stays in hospital only for two days and receives only one visit. Then, staff cost in hospital 5 represents only 58% of this cost in hospital 2. Differences in staff costs are directly linked to the length of stay and the number of visits. Hospital 3 has the lower length of stay (6 days versus 7-8) although this seems to imply a higher number of follow-up visits (17 versus

a range from 6 to 10). This strategy does not mean a cost saving activity due to the large number of follow-up visits. Patient case-mix attended by each hospital appears also to influence costs since hospital 5 has the lower staff expenditure because of a short time in the operation room (90 minutes versus 120 or 180). Lower patient complexity and severity in hospital 5 could be alleged to explain this differences in all studied cases.

4. The second important reason for variation in provider cost lies in **the price of the implant**, which accounts for more than half of total cost of hip replacement. Hospital 5 appears to be using/paying for the more expensive implant: it pays one third more than the price paid by hospital 4. Indeed, hospital 5 probably has less purchasing and negotiation power than the other providers, and at the same time, the lower patient complexity in this hospital allows the process to be done in a lower time. Economies of scope and scale do not seem to influence this case since operation time works in the opposite way (smaller hospitals) spend less time.

5. **Diagnostic and procedure costs** present a lower range of variation among hospitals, indicating a more homogeneous pattern of care: this cost varies between €87,6 in hospital 3 and €26,6 in hospital 5.

6. **Drugs cost** do not represent a high proportion of total cost of hip replacement, and there are not substantial differences between providers drug cost, indicating a probably high degree of coincidence in clinical protocols.

Vignette 3 - Cataract operation

Procedure description:

Day-surgery out-patient procedure: Male, 70-75 years old, has consulted a hospital clinic/ ophthalmologist's office because of blurred vision. After clinical assessment a diagnosis of *Cataracta Senilis* is made and the patient put on the operating list. The case vignette concerns the actual operation in the hospital/ ophthalmologist's office including any pre-operative assessment. Please specify the type of implant/ ocular lens used (especially if costs differ).

Site of Operation: Out-patient department of hospital

HOSPITAL A

Table 11. Cataract operation in the HOSPITAL A.

Phase	Elements	Units	No. of units used	Unit Cost	Total costs
Pre-operative Assessment	Ophthalmology visit	No.	1	10.83	10.83
	Nurse Visit	No.	0	5.09	0
	Anaesthetist visit	No.	1	10.83	10.83
	<i>Diagnostic Procedures</i>				
	Captimetria	No.	1	68	68
	Biometry	No.	1	86	86
	Thorax radiography	No.	1	7.41	7.41
	ECG	No.	0	3	0
	<i>Laboratory (e.g. blood count, INR, CRP, etc.)</i>				
	Blood count	No.	0	16.2	0
	Blood coagulation	No	1	2.7	2.7
	<i>Drugs</i>	Days (price of a DD)			
	Tetanus vaccine	Days (price of a DD)	0	1.31	0
	Fenilefrin 3 doses	Days (price of a DD)	1	0.05	0.05

	Tropicamine 3 doses	Days (price of a DD)	1	0.12	0.12
	Ciprofloxacin 4 doses	Days (price of a DD)	0	5.01	0
Procedure	<i>Devices (type of intra-ocular lens.) total price paid by hospital</i>				
	Intra-ocular lens		1	210	210
	<i>OP-Team (altogether or separately)</i>	Min.	60		0
	Ophthalmologist	Hours of staff	1	33.2	33.2
	OP-Nurse	Hours of staff	2	20.37	40.74
	Auxiliary Nurse	Hours of staff	0	12.27	0
	Anaesthetist	Hours of staff	1	33.2	33.2
	<i>Drugs (anaesthetics, other?)</i>	Days (cost: price of a dd)			
	Midazolam 5 mg	Days (cost: price of a dd)	0	0.74	0
	Atropine 0.4 mg	Days (cost: price of a dd)	0	0.016	0
	Diazepam 5 mg	Days (cost: price of a dd)	1	0.03	0.03
	Local anaesthetic Colirium	Days (cost: price of a dd)	1	0.03	0.03

	Lidocain 1% intracameral	Days (cost: price of a dd)	1	0.38	0.38
	Bupivacain 0.75% + lidocaine 2%	Days (cost: price of a dd)	0	0.84	0
	OP-Theatre running costs (e.g. sterilisation)*	Min.	60		0
	Reanimation time	Min	1.5	20.3736	30.5604
	Running Costs of ambulatory service (overhead)	Min.			
After-Care	Drugs or other given by provider	Days (cost: price of a dd)			
	Tobradex (Tobra + Dexa) 1 drop / 8 hours	Pack ets	1	5.03	5.03
	Fluorometolone	Pack ets	0	2.04	0
	Colirium diclofenac	Pack ets	1	4.55	4.55
	Antibiotic topical (Ofacilox) 2 g / day	Pack ets	0	3.85	0
	Follow-up visits		3	10.83	32.49
Overhead (visits)			13%		75.812152
Total Cost per case		€ (euros)			649.80

* Note: hours of staff: proportion of hours devoted by the indicated staff (i.e. 9 surgeons means 3 surgeons 3 hours so total of 9 equivalent hours of surgeon)

HOSPITAL B

Table 12. Cataract operation in the HOSPITAL B.

Phase	Elements	Units	No. of units used	Unit Cost	Total costs
Pre-operative Assessment	Ophthalmology visit	No.	1	10.83	10.83
	Nurse Visit	No.	1	5.09	5.09
	Anaesthetist visit	No.	1	10.83	10.83
	<i>Diagnostic Procedures</i>				
	Captimetria	No.	1	73	73

	Biometry	No.	1	82	82
	Thorax radiography	No.	1	7	7
	ECG	No.	1	2.5	2.5
	<i>Laboratory (e.g. blood count, INR, CRP, etc.)</i>				
	Blood count	No.	1	15.8	15.8
	Blood coagulation	No	1	2.5	2.5
	<i>Drugs</i>	Days (price of a DD)			
	Tetanus vaccine	Days (price of a DD)	1	1.31	1.31
	Fenilefrina 3 doses	Days (price of a DD)	1	0.05	0.05
	Tropicamina 3 doses	Days (price of a DD)	1	0.12	0.12
	Ciprofloxacin 4 doses	Days (price of a DD)	0	5.01	0
Procedure	<i>Devices (type of intra-ocular lens.) total price paid by hospital</i>				
	Intra-ocular lens		1	190	190
	<i>OP-Team (altogether or separately)</i>	Min.	30		0
	Ophthalmologist	Hours of staff	0.5	33.2	16.6
	OP-Nurse	Hours of staff	1	20.37	20.37
	Auxiliary Nurse	Hours of staff	0	12.27	0
	Anaesthetist	Hours of staff	0.5	33.2	16.6
	<i>Drugs (anaesthetics, other?)</i>	Days (cost: price of a dd)			
	Midazolam 5 mg	Days (cost: price of a dd)	0	0.74	0

	Atropine 0.4 mg	Days (cost: price of a dd)	0	0.016	0
	Diazepam 5 mg	Days (cost: price of a dd)	1	0.03	0.03
	Local anaesthetic Colirium	Days (cost: price of a dd)	1	0.03	0.03
	Lidocaine 1% intracameral	Days (cost: price of a dd)	1	0.38	0.38
	Bupivacana 0.75% + lidocaine 2%	Days (cost: price of a dd)	0	0.84	0
	OP-Theatre running costs (e.g. sterilisation)*	Min.	30		0
	Reanimation time	Min	1	20.373 6	20.373 6
	Running Costs of ambulatory service (overhead)	Min.			
After-Care	Drugs or other given by provider	Days (cost: price of a dd)			
	Tobradex (Tobra + Dexa) 1 drop / 8 hours	Packets	1	5.03	5.03
	Fluorometolone	Packets	0	2.04	0
	Colirium diclofenac	Packets	1	4.55	4.55
	Antibiotic topical (Ofacilox) 2 g / day	Packets	1	3.85	3.85
	Follow-up visits		3	10.83	32.49
Overhead (visits)			12%		66.027 468
Total Cost per case		€ (euros)			587.36 1068

* Note: hours of staff: proportion of hours devoted by the indicated staff (i.e. 9 surgeons means 3 surgeons 3 hours so total of 9 equivalent hours of surgeon)

HOSPITAL C

Table 13. Cataract operation in the HOSPITAL C.

Phase	Elements	Units	No. of units used	Unit Cost	Total costs
Pre-operative	Ophthalmology visit	No.	1	10.83	10.83

Assessment	Nurse Visit	No.	0	5.09	0
	Anaesthetist visit	No.	1	10.83	10.83
	<i>Diagnostic Procedures</i>				
	Captimetria	No.	0	70	0
	Biometry	No.	1	84	84
	Thorax radiography	No.	1	7.2	7.2
	ECG	No.	1	1.9	1.9
	<i>Laboratory (e.g. blood count, INR, CRP, etc.)</i>				
	Blood count	No.	1	16	16
	Blood coagulation	No	1	2.9	2.9
	<i>Drugs</i>				
	Tetanus vaccine	Days (price of a DD)	0	1.31	0
	Fenilefrina 3 doses	Days (price of a DD)	1	0.05	0.05
	Tropicamina 3 doses	Days (price of a DD)	1	0.12	0.12
Ciprofloxacin 4 doses	Days (price of a DD)	0	5.01	0	
Procedure	<i>Devices (type of intra-ocular lens.) total price paid by hospital</i>				
	Intra-ocular lens		1	230	230
	<i>OP-Team (altogether or separately)</i>				
	Ophthalmologist	Hours of staff	1	33.2	33.2
	OP-Nurse	Hours of staff	1	20.37	20.37
	Auxiliary Nurse	Hours of staff	0	12.27	0
	Anaesthetist	Hours of staff	1	33.2	33.2
	<i>Drugs (anaesthetics, other?)</i>				
	Days (cost: price of a dd)				

	Midazolam 5 mg	Days (cost: price of a dd)	0	0.74	0
	Atropine 0.4 mg	Days (cost: price of a dd)	0	0.016	0
	Diazepam 5 mg	Days (cost: price of a dd)	1	0.03	0.03
	Local anaesthetic Colirium	Days (cost: price of a dd)	1	0.03	0.03
	Lidocaine 1% intracameral	Days (cost: price of a dd)	0	0.38	0
	Bupivacana 0.75% + lidocaine 2%	Days (cost: price of a dd)	1	0.84	0.84
	OP-Theatre running costs (e.g. sterilisation)*	Min.	60		0
	Reanimation time	Min	1	20.3736	20.3736
	Running Costs of ambulatory service (overhead)	Min.			
After-Care	Drugs or other given by provider	Days (cost: price of a dd)			
	Tobradex (Tobra + Dexa) 1 drop / 8 hours	Packet s	1	5.03	5.03
	Fluorometolone	Packet s	0	2.04	0
	Colirium diclofenac	Packet s	1	4.55	4.55
	Antibiotic topical (Ofacilox) 2 g / day	Packet s	1	3.85	3.85
	Follow-up visits		2	10.83	21.66
Overhead (visits)			12%		64.159368

Total Cost per case		€ (euros)			571.12296 8
---------------------	--	--------------	--	--	----------------

* Note: hours of staff: proportion of hours devoted by the indicated staff (i.e. 9 surgeons means 3 surgeons 3 hours so total of 9 equivalent hours of surgeon)

HOSPITAL D

Table 14. Cataract operation in the HOSPITAL D.

Phase	Elements	Units	No. of units used	Unit cost	Total costs
Pre-operative Assessment	Ophthalmology visit	No.	1	10.83	10.83
	Nurse Visit	No.	0	5.09	0
	Anaesthetist visit	No.	1	10.83	10.83
	<i>Diagnostic Procedures</i>				
	Captimetria	No.	1	59	59
	Biometry	No.	1	75	75
	Thorax radiography	No.	1	6.4	6.4
	ECG	No.	1	3	3
	<i>Laboratory (e.g. blood count, INR, CRP, etc.)</i>				
	Blood count	No.	1	14.3	14.3
	Blood coagulation	No	1	2.7	2.7
	<i>Drugs</i>	Days (price of a DD)			
	Tetanus vaccine	Days (price of a DD)	1	1.31	1.31
	Fenilefrina 3 doses	Days (price of a DD)	1	0.05	0.05
	Tropicamina 3 doses	Days (price of a DD)	1	0.12	0.12
Ciprofloxacin 4 doses	Days (price of a DD)	0	5.01	0	
Procedure	<i>Devices (type of intra-ocular lens.) total price paid by hospital</i>				
	Intra-ocular lens		1	204	204
	<i>OP-Team (altogether or separately)</i>	Min.	60		0
	Ophthalmologist	Hours of staff	1	33.2	33.2
	OP-Nurse	Hours of staff	2	20.37	40.74

	Auxiliary Nurse	Hours of staff	0	12.27	0
	Anaesthetist	Hours of staff	1	33.2	33.2
	<i>Drugs (anaesthetics, other?)</i>	Days (cost: price of a dd)			
	Midazolam 5 mg	Days (cost: price of a dd)	0	0.74	0
	Atropine 0.4 mg	Days (cost: price of a dd)	0	0.016	0
	Diazepam 5 mg	Days (cost: price of a dd)	0	0.03	0
	Local anaesthetic Colirium	Days (cost: price of a dd)	1	0.03	0.03
	Lidocaine 1% intracameral	Days (cost: price of a dd)	1	0.38	0.38
	Bupivacana 0.75% + lidocaine 2%	Days (cost: price of a dd)	0	0.84	0
	OP-Theatre running costs (e.g. sterilisation)*	Min.	60		0
	Reanimation time	Min	1.5	20.3736	30.5604
	Running Costs of ambulatory service (overhead)	Min.			
After-Care	Drugs or other given by provider	Days (cost: price of a dd)			
	Tobradex (Tobra + Dexa) 1 drop / 8 hours	Packets	1	5.03	5.03
	Fluorometolone	Packets	0	2.04	0
	Colirium diclofenac	Packets	1	4.55	4.55
	Antibiotic topical (Ofacilox) 2 g / day	Packets	0	3.85	0
	Follow-up visits		3	10.83	32.49
Overhead (visits)			13%		72.558252

Total Cost per case		€(euros)			640.27 8652
---------------------	--	----------	--	--	----------------

* Note: hours of staff: proportion of hours devoted by the indicated staff (i.e. 9 surgeons means 3 surgeons 3 hours so total of 9 equivalent hours of surgeon)

HOSPITAL E

Table 15. Cataract operation in the HOSPITAL E.

Phase	Elements	Units	No. of units used	Unit Cost	Total costs
Pre-operative Assessment	Ophthalmology visit	No.	1	10.83	10.83
	Nurse Visit	No.	0	5.09	0
	Anaesthetist visit	No.	1	10.83	10.83
	<i>Diagnostic Procedures</i>				
	Captimetria	No.	0	71	0
	Biometry	No.	1	88	88
	Thorax radiography	No.	1	7.9	7.9
	ECG	No.	1	2.2	2.2
	<i>Laboratory (e.g. blood count, INR, CRP, etc.)</i>				
	Blood count	No.	1	17	17
	Blood coagulation	No	1	2.8	2.8
	<i>Drugs</i>	Days (price of a DD)			
	Tetanus vaccine	Days (price of a DD)	1	1.31	1.31
	Fenilefrina 3 doses	Days (price of a DD)	1	0.05	0.05
	Tropicamina 3 doses	Days (price of a DD)	1	0.12	0.12
Ciprofloxacin 4 doses	Days (price of a DD)	1	5.01	5.01	
Procedure	<i>Devices (type of intra-ocular lens.) total price paid by hospital</i>				
	Intra-ocular lens		1	250	250
	<i>OP-Team (altogether or separately)</i>	Min.	30		0
	Ophthalmologist	Hours of staff	1	33.2	33.2
	OP-Nurse	Hours of staff	0.5	20.37	10.185
	Auxiliary Nurse	Hours of staff	0	12.27	0

	Anaesthetist	Hours of staff	0.5	33.2	16.6
	<i>Drugs</i>	Days (cost: price of a dd)			
	Midazolam 5 mg	Days (cost: price of a dd)	1	0.74	0.74
	Atropine 0.4 mg	Days (cost: price of a dd)	1	0.016	0.016
	Diazepam 5 mg	Days (cost: price of a dd)	0	0.03	0
	Local anaesthetic Colirium	Days (cost: price of a dd)	0	0.03	0
	Lidocaine 1% intracameral	Days (cost: price of a dd)	0	0.38	0
	Bupivacana 0.75% + lidocaine 2%	Days (cost: price of a dd)	1	0.84	0.84
	OP-Theatre running costs (e.g. sterilisation)*	Min.	30		0
	Reanimation time	Min	3	20.373 6	61.120 8
	Running Costs of ambulatory service (overhead)	Min.			
After-Care	Drugs or other given by provider	Days (cost: price of a dd)			
	Tobradex (Tobra + Dexta) 1 drop / 8 hours	Packets	0	5.03	0
	Fluorometolone	Packets	1	2.04	2.04
	Colirium diclofenac	Packets	1	4.55	4.55
	Antibiotic topical (Ofacilox) 2 g / day	Packets	1	3.85	3.85
	Follow-up visits		1	10.83	10.83
Overhead (visits)			14%		68.845 634
Total Cost per case		€(euros)			608.86 7434

* Note: hours of staff: proportion of hours devoted by the indicated staff (i.e. 9 surgeons means 3 surgeons 3 hours so total of 9 equivalent hours of surgeon)

Analysis of results:

CATARACTS (DAY SURGERY)	HA	HB	HC	HD	HE	Average	%
STAFF COST	191.85	133.18	150.46	191.85	153.60	167.51	27.31%
DRUGS COST	10.19	15.35	14.50	11.47	18.53	14.01	2.28%
DIAGNOSTIC PROCEDURES COST	164.11	180.30	110.10	157.40	115.70	145.52	23.73%
MATERIAL AND DEVICES COST	210.00	190.00	230.00	204.00	250.00	216.80	35.35%
OVERHEAD COST	73.65	66.03	64.16	72.56	68.85	69.48	11.33%
TOTAL COST	649.80	584.86	569.22	637.28	606.67	609.57	100%
Operation room time (minutes)	60	30	60	60	30	48.00	
OUTPATIENT FOLLOW-UP VISITS	4.00	5.00	3.00	4.00	2.00	3.60	

1. **Average total cost** for cataracts (day surgery) is €609.57, ranging from €569.22 in hospital 3 to €649.8 in hospital 1. The lowest calculated cost for cataracts in hospital 3 represents 85% of cost in hospital 1 for this same diagnostic.

2. On the average, **cost distribution** among input types follows the following pattern: staff costs account for only 27.31% of total cost, material and devices (intraocular lenses) account for 35.35%, and diagnostic and procedure cost account for 23.73%. Medicines only account for 2,28% of total cost of this diagnostic.

3. The **main reason for variation in total cost** among provider costs is also related to the time devoted by **clinical staff** to these patients: Both, hospital 5 and hospital 2 manage to run the operation time in half the time (30 minutes) than the others (60 minutes). According to general characteristics of both hospitals we can infer that the first is due to lower general complexity but the second might be due to economies of scale. Surprisingly both have the lower and the higher rates of follow-up visits, which might also be explained by the same reasons just above mentioned.

4. The second **important reason for variation in provider cost lies in the price** of the intraocular lenses (material and devices cost), which accounts for more than one third of total cost of cataracts. As it happens with other procedures hospital 5 manages to be one of the

cheapest thanks to low staff cost and low diagnostic procedures expenditure despite being again the one that gets the more expensive device, since as a rural isolated hospital (with a lower activity rate) has less bargaining power. Prices do not differ much among providers but in the case of the device. Again hospital 5 does not manage to get a good price for the intraocular lenses and instead hospital 2 gets the cheapest one.

5. **Diagnostic and procedure costs**, representing one fourth of total costs, present also an important range of variation among hospitals, indicating a heterogeneous pattern of care for a very homogeneous group of patients: this cost varies between €10,1 in hospital 3 and €180,3 (a 64% higher cost) in hospital 2. The main reason for this variation is that a captometry is not included as a diagnostic test in the clinical protocol of hospital 3.

6. **Drugs costs** do not represent a high proportion of total cost of cataracts.

Vignette 4 – Stroke

Procedure description:

So far healthy female (i.e. no co-morbidity), 60-70 years old, with sudden severe hemiparesis (right side) and dependency, with severe aphasia: Admission to hospital (accident & emergency, medical or neurological department depending on country/ hospital) by ambulance car. Start of case vignette: hospital door. All the interventions including diagnostic and treatment are delivered in the same hospital. The patient is diagnosed and treated according to normal hospital standards (which may or may not include a stroke unit, early rehabilitation etc.); progress is average for age. Transient (TIA), short and reversible (RIND) and prolonged and reversible (PRIND) ischemic neurological deficits are excluded. End of vignette: discharge home.

HOSPITAL A

Table 16. Stroke intervention in the HOSPITAL A.

Phase	Stroke	Units	No. of units used	Unit cost	Total costs
Emergency dpt.	Physician / Nursing Visits	No. Visits	3	12.34	37.02
Initial diagnosis (Assessment)	<i>Diagnostic Procedures</i>				
	Imaging (ACT)	No. Tests	1	63.2	63.2
	Imaging (Thorax radiography-angiogram)	No. Tests	1	7.41	7.41
	Imaging (emergency MRI)	No. Tests	0	120	0
	Imaging (Emergency Eco-Doppler carotidal)	No. Tests	0	90	0
	Emergency ECG	No. Tests	2	3	6
	<i>Laboratory (e.g. blood sugar, etc.)</i>	No. Tests			
	Blood count	No. Tests	1	16.2	16.2
	Blood coagulation	No. Tests	1	2.7	2.7
Main Therapy	<i>Lyses</i>				
	<i>Drugs</i>	Days (cost: price of a dd)			
	Emergency medication ASA	Days (cost: price of a dd)	2	0.05	0.1

	Emergency medication clopidogrel	Days (cost: price of a dd)	0	1	0
	Serum physiological 1000 ml/24 hours	Days (cost: price of a dd)	1	1.7	1.7
	Omeprazol 20 mg/24 hours	Days (cost: price of a dd)	1	0.18	0.18
	Enoxaprina 20 mg/12 hours	Days (cost: price of a dd)	0	1.64	0
	Glycaemia control	Days (cost: price of a dd)	1	2.07	2.07
	<i>Total time at the emergency department</i>	Hours	24	20.37	244.44
Hospital care (convalescence)	<i>Intermediate Care Unit (Stroke unit) Spain: Intensive Care Unit</i>		0		0
	Physicians	Patient days	0	21.67	0
	Nursing (12 hours/bed/day)	Patient days	0	20.37	0
	<i>Drugs</i>	Days (cost: price of a dd)			
	ASA	Days (cost: price of a dd)	0	0.05	0
	Enoxaprina	Days (cost: price of a dd)	0	1.64	0
	Pantoprazol	Days (cost: price of a dd)	0	0.64	0
	<i>Diagnostic procedures (e.g. imaging, laboratory)</i>	<i>No.</i>			
	Blood test	No. tests	0	16.2	0
	EKG	No. tests	0	3	0
	Glycaemia control	No. tests	0	1.02	0
	Other therapeutic procedures	<i>No.</i>			
	<i>Normal Ward</i>		8		0
	Physicians	Patient days (cost is equivalent to average time devoted to each patient)	8	10.83	86.64

	Nursing	Patient days	24	20.373 6	488.96 64
	<i>Drugs</i>	Days (cost: price of a dd)			
	ASA	Days (cost: price of a dd)	8	0.05	0.4
	Clopidogrel	Days (cost: price of a dd)	0	1	0
	Enoxaprina 20 mg every 12 hours	Days (cost: price of a dd)	8	1.64	13.12
	Pantoprazol (o similar)	Days (cost: price of a dd)	8	0.64	5.12
	sinvastatine 40 mg 24 hours	Days (cost: price of a dd)	0	0.36	0
	Enalapril 10 mg 24 hours	Days (cost: price of a dd)	0	0.16	0
	<i>Diagnostic procedures (e.g. imaging, laboratory)</i>	<i>No.</i>			
	ACT in normal ward	No. tests	1	63	63
	Eco-Doppler carotidal	No. tests	1	90	90
	Eco-Doppler transcranial	No. tests	0	90	0
	Echocardiogram	No. tests	0	90	0
	Laboratory (blood count)	No. tests	2	15.8	31.6
	Coagulation time	No. tests	0	2.7	0
	electrocardiogram	No. tests	8	3	24
	Holter (monitor)	No. tests	1	80	80
	Early rehabilitation				
	Physiotherapist	Sessions	15	9.142	137.13
Discharge planning	Drugs given to patient until contact with GP	Days (cost: price of a dd)			
	Medical aids given to patient	Units			
	Follow-up visits		1	10.83	10.83
Overhead (including administration, catering, etc.) outpatient (visits)	Total, or: - On ward level - On departmental level - On hospital level	Patient days			
			13%		50.94
Overhead (including administration, catering, etc.) Inpatient (stays)	Total, or: - On ward level - On departmental level - On hospital level	Patient days			
			20%		204.00

Food and Laundry		Patient days	8	13	104
Capital costs (if taken into account in your country)					
Total Cost per case		€(euros)			1770.7 6218

* Note: hours of staff: proportion of hours devoted by the indicated staff (i.e. 9 surgeons means 3 surgeons 3 hours so total of 9 equivalent hours of surgeon)

HOSPITAL B

Table 17. Stroke intervention in the HOSPITAL B.

Phase	Stroke	Units	No. of units used	Unit cost	Total costs
Emergency dpt.	Physician / Nursing Visits	No. Visits	2	12.34	24.68
Initial diagnosis (Assessment)	<i>Diagnostic Procedures</i>				
	Imaging (ACT)	No. Tests	1	60	60
	Imaging (Thorax radiography-angiogram)	No. Tests	1	7	7
	Imaging (emergency MRI)	No. Tests	0	115	0
	Imaging (Emergency Eco-Doppler carotidal)	No. Tests	0	86	0
	Emergency ECG	No. Tests	1	2.5	2.5
	<i>Laboratory (e.g. blood sugar, etc.)</i>	No. Tests			
	Blood count	No. Tests	1	15.8	15.8
Main Therapy	Blood coagulation	No. Tests	1	2.5	2.5
	<i>Lyses</i>				
	<i>Drugs</i>	Days (cost: price of a dd)			
	Emergency medication ASA	Days (cost: price of a dd)	2	0.05	0.1
	Emergency medication clopidogrel	Days (cost: price of a dd)	0	1	0
Serum physiological 1000 ml/24 hours	Days (cost: price of a dd)	1	1.7	1.7	

	Omeprazol 20 mg/24 hours	Days (cost: price of a dd)	1	0.18	0.18
	Enoxaprina 20 mg/12 hours	Days (cost: price of a dd)	0	1.64	0
	Glycaemia control	Days (cost: price of a dd)	1	2	2
	<i>Total time at the emergency department</i>	Hours	12	20.37	122.22
Hospital care (convalescence)	<i>Intermediate Care Unit (Stroke unit) Spain: Intensive Care Unit</i>		2		0
	Physicians	Patient days	2	21.67	43.34
	Nursing (12 hours/bed/day)	Patient days	24	20.37	488.88
	<i>Drugs</i>	Days (cost: price of a dd)			
	ASA	Days (cost: price of a dd)	2	0.05	0.1
	Enoxaprina	Days (cost: price of a dd)	2	1.64	3.28
	Pantoprazol	Days (cost: price of a dd)	2	0.64	1.28
	<i>Diagnostic procedures (e.g. imaging, laboratory)</i>	<i>No.</i>			
	Blood test	No. tests	2	15.8	31.6
	ECG	No. tests	2	2.5	5
	Glycaemia control	No. tests	2	1	2
	Other therapeutic procedures	<i>No.</i>			
	<i>Normal Ward</i>		12		0
	Physicians	Patient days (cost is equivalent to average time devoted to each patient)	14	10.83	151.62
	Nursing	Patient days	36	20.3736	733.4496
<i>Drugs</i>	Days (cost: price of a dd)				

	ASA	Days (cost: price of a dd)	14	0.05	0.7
	Clopidogrel	Days (cost: price of a dd)	0	1	0
	Enoxaprina 20 mg every 12 hours	Days (cost: price of a dd)	14	1.64	22.96
	Pantoprazol (o similar)	Days (cost: price of a dd)	14	0.64	8.96
	sinvastatine 40 mg 24 hours	Days (cost: price of a dd)	0	0.36	0
	Enalapril 10 mg 24 hours	Days (cost: price of a dd)	0	0.16	0
	<i>Diagnostic procedures (e.g. imaging, laboratory)</i>	No.			
	ACT in normal ward	No. tests	1	60	60
	Eco-Doppler carotidal	No. tests	1	86	86
	Eco-Doppler transcranial	No. tests	1	86	86
	Echocardiogram	No. tests	1	100	100
	Laboratory (blood count)	No. tests	2	15	30
	Coagulation time	No. tests	0	2.5	0
	electrocardiogram	No. tests	14	2.5	35
	Holter	No. tests	0	78	0
	Early rehabilitation				
	Physiotherapist	Sessions	6	10.448	62.688
Discharge planning	Drugs given to patient until contact with GP	Days (cost: price of a dd)			
	Medical aids given to patient	Units			
	Follow-up visits		1	10.83	10.83
Overhead (including administration, catering, etc.) outpatient (visits)	Total, or: - On ward level - On departmental level - On hospital level	Patient days	12%		32.44
Overhead (including administration, catering, etc.) Inpatient (stays)	Total, or: - On ward level - On departmental level - On hospital level	Patient days	19%		275.48
Food and Laundry		Patient days	12	13	156
Capital costs (if taken into account in your					

country)					
Total Cost per case		€(euros)			2666.2 7942

* Note: hours of staff: proportion of hours devoted by the indicated staff (i.e. 9 surgeons means 3 surgeons 3 hours so total of 9 equivalent hours of surgeon)

HOSPITAL C

Table 18. Stroke intervention in the HOSPITAL C.

Phase	Stroke	Units	No. of units used	Unit cost	Total costs
Emergency dpt.	Physician / Nursing Visits	No. Visits	1	12.34	12.34
Initial diagnosis (Assessment)	<i>Diagnostic Procedures</i>				
	Imaging (ACT)	No. Tests	1	68.3	68.3
	Imaging (Thorax radiography-angiogram)	No. Tests	1	7.2	7.2
	Imaging (emergency MRI)	No. Tests	1	125	125
	Imaging (Emergency Eco-Doppler carotidal)	No. Tests	1	91	91
	Emergency ECG	No. Tests	1	1.9	1.9
	<i>Laboratory (e.g. blood sugar, etc.)</i>	No. Tests			
	Blood count	No. Tests	1	16	16
	Blood coagulation	No. Tests	1	2.9	2.9
Main Therapy	<i>Lyses</i>				
	<i>Drugs</i>	Days (cost: price of a dd)			
	Emergency medication ASA	Days (cost: price of a dd)	2	0.05	0.1
	Emergency medication clopidogrel	Days (cost: price of a dd)	0	1	0
	Serum physiological 1000 ml/24 hours	Days (cost: price of a dd)	1	1.7	1.7
	Omeprazol 20 mg/24 hours	Days (cost: price of a dd)	1	0.18	0.18
	Enoxaprina 20 mg/12 hours	Days (cost: price of a dd)	0	1.64	0

	Glycaemia control	Days (cost: price of a dd)	1	1.9	1.9
	<i>Total time at the emergency department</i>	Hours	3	20.37	30.555
Hospital care (convalescence)	<i>Intermediate Care Unit (Stroke unit) Spain: Intensive Care Unit</i>		0		0
	Physicians	Patient days	0	21.67	0
	Nursing (12 hours/bed/day)	Patient days	0	20.37	0
	<i>Drugs</i>	Days (cost: price of a dd)			
	ASA	Days (cost: price of a dd)	0	0.05	0
	Enoxaprina	Days (cost: price of a dd)	0	1.64	0
	Pantoprazol	Days (cost: price of a dd)	0	0.64	0
	<i>Diagnostic procedures (e.g. imaging, laboratory)</i>	<i>No.</i>			
	Blood test	No. tests	0	16	0
	ECG	No. tests	0	1.9	0
	Glycaemia control	No. tests	0	1.01	0
	Other therapeutic procedures	<i>No.</i>			
	<i>Normal Ward</i>		10		0
	Physicians	Patient days (cost is equivalent to average time devoted to each patient)	10	10.83	108.3
	Nursing	Patient days	30	20.3736	611.208
	<i>Drugs</i>	Days (cost: price of a dd)			
ASA	Days (cost: price of a dd)	10	0.05	0.5	
Clopidogrel	Days (cost: price of a dd)	10	1	10	

	Enoxaprina 20 mg every 12 hours	Days (cost: price of a dd)	10	1.64	16.4
	Pantoprazol (o similar)	Days (cost: price of a dd)	10	0.64	6.4
	sinvastatine 40 mg 24 hours	Days (cost: price of a dd)	0	0.36	0
	Enalapril 10 mg 24 hours	Days (cost: price of a dd)	0	0.16	0
	<i>Diagnostic procedures (e.g. imaging, laboratory)</i>	No.			
	ACT in normal ward	No. tests	1	68.3	68.3
	Eco-Doppler carotidal	No. tests	0	91	0
	Eco-Doppler transcranial	No. tests	0	91	0
	Echocardiogram	No. tests	0	98	0
	Laboratory (blood count)	No. tests	1	13	13
	Coagulation time	No. tests	1	2.9	2.9
	electrocardiogram	No. tests	14	1.9	26.6
	Holter	No. tests	1	81	81
	Early rehabilitation				
	Physiotherapist	Sessions	10	7.836	78.36
Discharge planning	Drugs given to patient until contact with GP	Days (cost: price of a dd)			
	Medical aids given to patient	Units			
	Follow-up visits		1	10.83	10.83
Overhead (including administration, catering, etc.) outpatient (visits)	Total, or: - On ward level - On departmental level - On hospital level	Patient days	12%		48.09
Overhead (including administration, catering, etc.) Inpatient (stays)	Total, or: - On ward level - On departmental level - On hospital level	Patient days	20%		204.59
Food and Laundry		Patient days	10	13	130
Capital costs (if taken into account in your country)					
Total Cost per case		€(euros)			1775.5 5425

* Note: hours of staff: proportion of hours devoted by the indicated staff (i.e. 9 surgeons means 3 surgeons 3 hours so total of 9 equivalent hours of surgeon)

HOSPITAL D

Table 19. Stroke intervention in the HOSPITAL D.

Phase	Stroke	Units	No. of units used	Unit cost	Total costs
Emergency dpt.	Physician / Nursing Visits	No. Visits	3	12.34	37.02
Initial diagnosis (Assessment)	<i>Diagnostic Procedures</i>				
	Imaging (ACT)	No. Tests	1	63	63
	Imaging (Thorax radiography-angiogram)	No. Tests	1	6.4	6.4
	Imaging (emergency MRI)	No. Tests	0	120	0
	Imaging (Emergency Eco-Doppler carotidal)	No. Tests	0	90	0
	Emergency ECG	No. Tests	1	3	3
	<i>Laboratory (e.g. blood sugar, etc.)</i>	No. Tests			
	Blood count	No. Tests	1	14.3	14.3
Blood coagulation	No. Tests	1	2.7	2.7	
Main Therapy	<i>Lyses</i>				
	<i>Drugs</i>	Days (cost: price of a dd)			
	Emergency medication ASA	Days (cost: price of a dd)	2	0.05	0.1
	Emergency medication clopidogrel	Days (cost: price of a dd)	0	1	0
	Serum physiological 1000 ml/24 hours	Days (cost: price of a dd)	1	1.7	1.7
	Omeprazol 20 mg/24 hours	Days (cost: price of a dd)	1	0.18	0.18
	Enoxaprina 20 mg/12 hours	Days (cost: price of a dd)	0	1.64	0
	Glycaemia control	Days (cost: price of a dd)	1	1.7	1.7
	<i>Total time at the emergency department</i>	Hours	24	20.37	244.44
Hospital care (convalescence)	<i>Intermediate Care Unit (Stroke unit) Spain: Intensive Care Unit</i>		0		0

	Physicians	Patient days	0	21.67	0
	Nursing (12 hours/bed/day)	Patient days	0	20.37	0
	<i>Drugs</i>	Days (cost: price of a dd)			
	ASA	Days (cost: price of a dd)	0	0.05	0
	Enoxaprina	Days (cost: price of a dd)	0	1.64	0
	Pantoprazol	Days (cost: price of a dd)	0	0.64	0
	<i>Diagnostic procedures (e.g. imaging, laboratory)</i>	No.			
	Blood test	No. tests	0	14.3	0
	ECG	No. tests	0	3	0
	Glycaemia control	No. tests	0	1.06	0
	Other therapeutic procedures	No.			
	Normal Ward		12		0
	Physicians	Patient days (cost is equivalent to average time devoted to each patient)	12	10.83	129.96
	Nursing	Patient days	36	20.3736	733.4496
	<i>Drugs</i>	Days (cost: price of a dd)			
	ASA	Days (cost: price of a dd)	12	0.05	0.6
	Clopidogrel	Days (cost: price of a dd)	0	1	0
	Enoxaprina 20 mg every 12 hours	Days (cost: price of a dd)	12	1.64	19.68
	Pantoprazol (o similar)	Days (cost: price of a dd)	12	0.64	7.68

	sinvastatine 40 mg 24 hours	Days (cost: price of a dd)	0	0.36	0
	Enalapril 10 mg 24 hours	Days (cost: price of a dd)	0	0.16	0
	<i>Diagnostic procedures (e.g. imaging, laboratory)</i>	No.			
	ACT in normal ward	No. tests	1	63	63
	Eco-Doppler carotidal	No. tests	1	90	90
	Eco-Doppler transcranial	No. tests	0	90	0
	Echocardiogram	No. tests	0	97	0
	Laboratory (blood count)	No. tests	2	14	28
	Coagulation time	No. tests	0	2.7	0
	electrocardiogram	No. tests	12	3	36
	Holter	No. tests	1	75	75
	Early rehabilitation				
	Physiotherapist	Sessions	24	9.142	219.408
Discharge planning	Drugs given to patient until contact with GP	Days (cost: price of a dd)			
	Medical aids given to patient	Units			
	Follow-up visits		3	10.83	32.49
Overhead (including administration, catering, etc.) outpatient (visits)	Total, or: - On ward level - On departmental level - On hospital level	Patient days	13%		52.91
Overhead (including administration, catering, etc.) Inpatient (stays)	Total, or: - On ward level - On departmental level - On hospital level	Patient days	18%		280.56
Food and Laundry		Patient days	12	13	156
Capital costs (if taken into account in your country)					
Total Cost per case		€(euros)			2299.27702

* Note: hours of staff: proportion of hours devoted by the indicated staff (i.e. 9 surgeons means 3 surgeons 3 hours so total of 9 equivalent hours of surgeon)

HOSPITAL E

Table 20. Stroke intervention in the HOSPITAL E.

Phase	Stroke	Units	No.	Unit	Total
-------	--------	-------	-----	------	-------

			of unit s used	cost	costs
Emergency dpt.	Physician / Nursing Visits	No. Visits	1	12.34	12.34
Initial diagnosis (Assessment)	<i>Diagnostic Procedures</i>				
	Imaging (ACT)	No. Tests	1	70	70
	Imaging (Thorax radiography-angiogram)	No. Tests	0	7.9	0
	Imaging (emergency MRI)	No. Tests	0	125	0
	Imaging (Emergency Eco-Doppler carotidal)	No. Tests	0	90	0
	Emergency ECG	No. Tests	1	2.2	2.2
	<i>Laboratory (e.g. blood sugar, etc.)</i>	No. Tests			
	Blood count	No. Tests	1	17	17
	Blood coagulation	No. Tests	1	2.8	2.8
Main Therapy	<i>Lyses</i>				
	<i>Drugs</i>	Days (cost: price of a dd)			
	Emergency medication ASA	Days (cost: price of a dd)	2	0.05	0.1
	Emergency medication clopidogrel	Days (cost: price of a dd)	0	1	0
	Serum physiological 1000 ml/24 hours	Days (cost: price of a dd)	1	1.7	1.7
	Omeprazol 20 mg/24 hours	Days (cost: price of a dd)	1	0.18	0.18
	Enoxaprina 20 mg/12 hours	Days (cost: price of a dd)	1	1.64	1.64
	Glycaemia control	Days (cost: price of a dd)	1	2.4	2.4
	<i>Total time at the emergency department</i>	Hours	2	20.37	20.37
	Hospital care (convalescence)	<i>Intermediate Care Unit (Stroke unit) Spain: Intensive Care Unit</i>		0	
Physicians		Patient days	0	21.67	0
Nursing (12 hours/bed/day)		Patient days	0	20.37	0
<i>Drugs</i>		Days (cost: price of a dd)			

ASA	Days (cost: price of a dd)	0	0.05	0
Enoxaprina	Days (cost: price of a dd)	0	1.64	0
Pantoprazol	Days (cost: price of a dd)	0	0.64	0
<i>Diagnostic procedures (e.g. imaging, laboratory)</i>	No.			
Blood test	No. tests	0	17	0
ECG	No. tests	0	2.2	0
Glycaemia control	No. tests	0	1.1	0
Other therapeutic procedures	No.			
Normal Ward		7		0
Physicians	Patient days (cost is equivalent to average time devoted to each patient)	7	10.83	75.81
Nursing	Patient days	21	20.3736	427.8456
<i>Drugs</i>	Days (cost: price of a dd)			
ASA	Days (cost: price of a dd)	7	0.05	0.35
Clopidogrel	Days (cost: price of a dd)	0	1	0
Enoxaprina 20 mg every 12 hours	Days (cost: price of a dd)	7	1.64	11.48
Pantoprazol (o similar)	Days (cost: price of a dd)	7	0.64	4.48
sinvastatine 40 mg 24 hours	Days (cost: price of a dd)	7	0.36	2.52
Enalapril 10 mg 24 hours	Days (cost: price of a dd)	7	0.16	1.12
<i>Diagnostic procedures (e.g. imaging, laboratory)</i>	No.			
ACT in normal ward	No. tests	0	70	0

	Eco-Doppler carotidal	No. tests	1	90	90
	Eco-Doppler transcranial	No. tests	0	90	0
	Echocardiogram	No. tests	0	93	0
	Laboratory (blood count)	No. tests	2	17	34
	Coagulation time	No. tests	2	2.8	5.6
	electrocardiogram	No. tests	7	2.2	15.4
	Holter	No. tests	0	77	0
	Early rehabilitation				
	Physiotherapist	Sessions	10	7.836	78.36
Discharge planning	Drugs given to patient until contact with GP	Days (cost: price of a dd)			
	Medical aids given to patient	Units			
	Follow-up visits		1	10.83	10.83
Overhead (including administration, catering, etc.) outpatient (visits)	Total, or: - On ward level - On departmental level - On hospital level	Patient days			
			14%		18.40
Overhead (including administration, catering, etc.) Inpatient (stays)	Total, or: - On ward level - On departmental level - On hospital level	Patient days			
			21%		149.39
Food and Laundry		Patient days	7	13	91
Capital costs (if taken into account in your country)					
Total Cost per case		€(euros)			1147.3 2152

* Note: hours of staff: proportion of hours devoted by the indicated staff (i.e. 9 surgeons means 3 surgeons 3 hours so total of 9 equivalent hours of surgeon)

Analysis of results:

STROKE	H1	H2	H3	H4	H5	Average	%
STAFF COST	1.005,03	1.637,71	851,59	1.396,77	625,56	1.103,33	57,11%
DRUGS COST	20,62	39,26	35,28	29,94	23,57	29,73	1,54%
DIAGNOSTIC PROCEDURES COST	386,18	525,40	506,00	383,10	239,40	408,02	21,12%
MATERIAL AND DEVICES COST	0,00	0,00	0,00	0,00	0,00	0,00	0,00%
OVERHEAD COST	358,94	463,91	382,68	489,47	258,80	390,76	20,23%
TOTAL COST	1.770,76	2.666,28	1.775,55	2.299,28	1.147,32	1.931,84	100%
EMERGENCY ROOM TIME	24,00	12,00	3,00	24,00	2,00	13,00	

(hours)						
ICU time	0,00	2,00	0,00	0,00	0,00	0,40
NORMAL WARD STAY	8,00	12,00	10,00	12,00	7,00	9,80
TOTAL STAY	8,00	14,00	10,00	12,00	7,00	10,20
OUTPATIENT VISITS	1,00	1,00	1,00	3,00	1,00	1,40
REHABILITATION SESSIONS	15,00	6,00	10,00	24,00	10,00	13,00

1. **Average total cost** for stroke is €1931.84, ranging from €147.32 in hospital 5 to €666.28 in hospital 2. The lowest calculated cost for stroke in hospital 5 represents only 43% of cost in hospital 2 for this same diagnostic.

2. On the average, **cost distribution** among input types follows the following pattern: staff costs account for 57.11% of total cost, diagnostic and procedure cost account for 21.12%. Medicines only account for 1.54% of total cost of this case and overhead accounts for the 20.23%.

3. The **main reason for variation** in total cost among provider costs is also related to the **time devoted by clinical staff** to these patients: this different utilisation is directly linked to different emergency room time and length of stay. The different emergency room time may be a clear indication of differences in the mix of complexity and severity of hospital cases. Hospital 2 receives high complexity cases, however this fact does not seem to be enough to justify the much higher length of stay (14 days, including 2 days in an intensive care unit). Nevertheless, the lower number of rehabilitation sessions performed by each patient could also be an indicator of a better health outcome for patients being treated by this provider. Hospital 3 and hospital 4 do not use the intensive care unit for this procedure despite its availability, both having the higher length of stay in normal ward jointly with hospital 2. Hospital 1 probably has a higher complexity and severity for this diagnostic than for other revised procedures given that proximity seems to be a determinant factor, and that complex cases could be derived to it (instead of being derived to high complexity hospitals in Barcelona) from smaller providers located in the same county, such as Hospital 5 (once the patient has been stabilised).

4. **Diagnostic and procedure costs**, representing nearly one fourth of total costs, present also an important range of variation among hospitals, also indicating a heterogeneity in case mix and/or pattern of care: this cost varies between €239,4 in hospital 5 and €25.4 (a 119%

higher cost) in hospital 2. These variations are also related with the ordinary use of ACT, echocardiogram and Eco-Doppler carotidal and transcranial in hospital 2.

5. **Drugs costs** do not represent a high proportion of total cost of stroke.

Vignette 5 – AMI

Procedure description:

Up to the moment of presentation healthy male, 50-60 yr. old, who has developed a sudden acute chest pain. An ambulance is called and transports the patient within 2 hours (in Spain the average is 3 hours but in the case of going first to a Primary Care Unit, in which case it becomes 5 hours average) of the onset of symptoms to hospital (accident & emergency department, cardiology or ICU depending on country/ hospital). Start of case vignette: hospital door. The patient shows typical ECG alterations and is admitted and treated for AMI. The patient is diagnosed and treated according to normal hospital standards (if a PTCA is performed, there are no complications, i.e. a referral to cardio-surgery is excluded); progress is average for age. End of vignette: discharge to rehabilitative institution or home.

HOSPITAL A

Table 21. AMI in the HOSPITAL A.

Phase	AMI	Units	No. of units used	Unit cost	Total costs
Emergency dpt.	Physician visits	No. visits	2	12.34	24.68
Initial diagnosis (Assessment)	<i>Diagnostic Procedures</i>				
	Imaging (Echocardiogram)	No. tests	2	3	6
	Imaging (Emergency Thorax Angiography-radiography)	No. tests	1	7.41	7.41
	Laboratory (blood count)	No. tests	1	16.2	16.2
	Laboratory (coagulation time)	No. tests	1	2.7	2.7
	Laboratory (Troponine, etc.)	No. tests	2	9	18
	Laboratory (CKmb.)	No. tests	2	8.6	17.2
	Other (Electrocardiography etc.)	No. tests			
Main Therapy	Lyses	Days (cost: price of a dd)			
	<i>Drugs</i>	Days (cost: price of a dd)			

	Emergency medication ASA	Days (cost: price of a dd)	1	0.05	0.05
	Emergency medication clopidogrel	Days (cost: price of a dd)	0	1	0
	Beta-blocker (propranolol 10mg/6 hours ev)	Days (cost: price of a dd)	1	1.68	1.68
	Transdermic nitrites	Days (cost: price of a dd)	1	0.43	0.43
	Nitrite endovenose (50 mg 3 n 50 cc 6ml/h)	Days (cost: price of a dd)	1	0.57	0.57
	Enoxaprina 1 mg/Kg/12 hours	Days (cost: price of a dd)	2	1.64	3.28
	Enalapril 5 mg	Days (cost: price of a dd)	1	0.08	0.08
	Sinvastatine 40 mg	Days (cost: price of a dd)	1	0.36	0.36
	Omeprazol 20 mg	Days (cost: price of a dd)	1	0.18	0.18
	Diazepam 5 mg	Days (cost: price of a dd)	1	0.03	0.03
	Oral Nitrites (1 comp sublingual)	Days (cost: price of a dd)	1	0.03	0.03
	Glycaemia Control	No. tests	1	2.07	2.07
	<i>Total time at emergency department</i>		12	20.37	122.2 2
Hospital care (convalescence)	<i>Intensive Care Unit</i>	Time (days)	0		0
	Physicians	Patient days*	0	21.67	0

	Nursing (12 hours/bed/day)	Patient days	0	20.37	0
	<i>Drugs</i>	Days (cost: price of a dd)			
	ASA	Days (cost: price of a dd)	0	0.05	0
	clopidogrel	Days (cost: price of a dd)	0	1	0
	atenolol 50 mg	Days (cost: price of a dd)	0	0.08	0
	Diltiazem 60 mg each 8 h	Days (cost: price of a dd)	0	0.17	0
	Isosorbide mononitrate 20 mg/8h	Days (cost: price of a dd)	0	0.26	0
	transdermic nitrites	Days (cost: price of a dd)	0	0.43	0
	Enoxaprina 1 mg/Kg/12 hours	Days (cost: price of a dd)	0	1.64	0
	Sinvastatine 40 mg	Days (cost: price of a dd)	0	0.36	0
	omeprazol 20 mg	Days (cost: price of a dd)	0	0.18	0
	Enalapril 5 mg	Days (cost: price of a dd)	0	0.08	0
	Furosemida 20 mg/8 hours ev	Days (cost: price of a dd)	0	0.87	0

Diagnostic procedures (e.g. imaging, ultrasound, laboratory)	No.			
Emergency blood count	No. tests	0	16.2	0
Troponin	No. tests	0	9	0
CKmb	No. tests	0	8.6	0
electrocardiogram	No. tests	0	3	0
Glycaemia Control	No. tests	0	2.7	0
<i>Normal Ward</i>		8		0
Physicians	Patient days	6	10.83	64.98
Nursing (3 hours nurse a day)	Patient days	24	20.37	488.88
<i>Drugs</i>	Days (cost: price of a dd)			
ASA 150 mg 24 hours	Days (cost: price of a dd)	6	0.025	0.15
Clopidogrel	Days (cost: price of a dd)	0	1	0
atenolol 50 mg	Days (cost: price of a dd)	6	0.08	0.48
transdermic nitrites	Days (cost: price of a dd)	0	0.43	0
Enoxaprina 1 mg/Kg/12 hours	Days (cost: price of a dd)	6	1.64	9.84
Sinvastatine 40 mg	Days (cost: price of a dd)	6	0.36	2.16
omeprazol 20 mg	Days (cost: price of a dd)	6	0.18	1.08
Enalapril 5 mg	Days (cost: price of a dd)	6	0.08	0.48
<i>Diagnostic Procedures (e.g. imaging, laboratory)</i>	<i>No.</i>			
Echocardiogram	No. tests	1	90	90

	Laboratory (blood count)	No. tests	3	16.2	48.6
	Troponin	No. tests	2	9	18
	CKmb	No. tests	2	8.6	17.2
	Electrocardiogram	No. tests	6	3	18
	Ergometry	No. tests	0	90	0
	Thorax Rx	No. tests	1	7.41	7.41
	<i>Early rehabilitation (if during hospital stay)</i>				
	Physiotherapist	Patient days			
Discharge planning	Drugs given to patient until contact with GP	Days (cost: price of a dd)			
	Medical aids given to patient	Units			
	Follow-up visits	No. visits	4	10.83	43.32
Overhead (including administration, catering, etc.) outpatient (visits)	Total, or: - On ward level - On departmental level - On hospital level	% over total costs		13%	34.64
Overhead (including administration, catering, etc.) Inpatient (stays)	Total, or: - On ward level - On departmental level - On hospital level	% over total costs		20%	153.45
Food and Laundry		Patient days	8	13	104
Total Cost per case		€(euros)			1325.8457

HOSPITAL B

Table 22. AMI in the HOSPITAL B.

Phase	AMI	Units	No. of units used	Unit cost	Total costs
Emergency dpt.	Physician visits	No. visits	2	12.34	24.68
Initial diagnosis (Assessment)	<i>Diagnostic Procedures</i>				
	Imaging (Echocardiogram)	No. tests	3	2.5	7.5
	Imaging (Emergency Thorax Angiography-radiography)	No. tests	1	7	7
	Laboratory (blood count)	No. tests	1	15.8	15.8
	Laboratory (coagulation time)	No. tests	1	2.5	2.5

	Laboratory (Troponine, etc.)	No. tests	2	8.7	17.4
	Laboratory (CKmb.)	No. tests	2	8.5	17
	Other (Electrocardiography etc.)	No. tests			
Main Therapy	Lyses	Days (cost: price of a dd)			
	<i>Drugs</i>	Days (cost: price of a dd)			
	Emergency medication ASA	Days (cost: price of a dd)	1	0.05	0.05
	Emergency medication clopidogrel	Days (cost: price of a dd)	0	1	0
	Beta-blocker (propranolol 10mg/6 hours ev)	Days (cost: price of a dd)	1	1.68	1.68
	Transdermic nitrites	Days (cost: price of a dd)	1	0.43	0.43
	Nitrite endovenose (50 mg 3 n 50 cc 6ml/h)	Days (cost: price of a dd)	1	0.57	0.57
	Enoxaprina 1 mg/Kg/12 hours	Days (cost: price of a dd)	1	1.64	1.64
	Enalapril 5 mg	Days (cost: price of a dd)	1	0.08	0.08
	Sinvastatine 40 mg	Days (cost: price of a dd)	1	0.36	0.36
	Omeprazol 20 mg	Days (cost: price of a dd)	1	0.18	0.18

	Diazepam 5 mg	Days (cost: price of a dd)	0	0.03	0
	Oral Nitrites (1 comp sublingual)	Days (cost: price of a dd)	0	0.03	0
	Glycaemia Control	No. tests	1	2	2
	<i>Total time at emergency department</i>		12	20.37	122.2 2
Hospital care (convalescence)	<i>Intensive Care Unit</i>	Time (days)	3		0
	Physicians	Patient days*	6	21.67	130.0 2
	Nursing (12 hours/bed/day)	Patient days	36	20.37	733.3 2
	<i>Drugs</i>	Days (cost: price of a dd)			
	ASA	Days (cost: price of a dd)	3	0.05	0.15
	clopidogrel	Days (cost: price of a dd)	0	1	0
	atenolol 50 mg	Days (cost: price of a dd)	3	0.08	0.24
	Diltiazem 60 mg each 8 h	Days (cost: price of a dd)	0	0.17	0
	Isosorbide mononitrate 20 mg/8h	Days (cost: price of a dd)	0	0.26	0
	transdermic nitrites	Days (cost: price of a dd)	3	0.43	1.29
	Enoxaprina 1 mg/Kg/12 hours	Days (cost: price of a dd)	3	1.64	4.92

	Sinvastatine 40 mg	Days (cost: price of a dd)	3	0.36	1.08
	omeprazol 20 mg	Days (cost: price of a dd)	3	0.18	0.54
	Enalapril 5 mg	Days (cost: price of a dd)	3	0.08	0.24
	Furosemida 20 mg/8 hours ev	Days (cost: price of a dd)	0	0.87	0
	Diagnostic procedures (e.g. imaging, ultrasound, laboratory)	No.			
	Emergency blood count	No. tests	3	15.8	47.4
	Troponin	No. tests	3	8.7	26.1
	CKmb	No. tests	3	8.5	25.5
	electrocardiogram	No. tests	3	2.5	7.5
	Glycaemia Control	No. tests	3	2.5	7.5
	<i>Normal Ward</i>		4		0
	Physicians	Patient days	4	10.83	43.32
	Nursing (3 hours nurse a day)	Patient days	12	20.37	244.4 4
	<i>Drugs</i>	Days (cost: price of a dd)			
	ASA 150 mg 24 hours	Days (cost: price of a dd)	4	0.025	0.1
	clopidogrel	Days (cost: price of a dd)	0	1	0
	atenolol 50 mg	Days (cost: price of a dd)	4	0.08	0.32
	transdermic nitrites	Days (cost: price of a dd)	4	0.43	1.72

	Enoxaprina 1 mg/Kg/12 hours	Days (cost: price of a dd)	4	1.64	6.56
	Sinvastatine 40 mg	Days (cost: price of a dd)	4	0.36	1.44
	omeprazol 20 mg	Days (cost: price of a dd)	4	0.18	0.72
	Enalapril 5 mg	Days (cost: price of a dd)	4	0.08	0.32
	<i>Diagnostic Procedures (e.g. imaging, laboratory)</i>	No.			
	Echocardiogram	No. tests	1	100	100
	Laboratory (blood count)	No. tests	3	15.8	47.4
	TROPONINAS	No. tests	2	8.7	17.4
	CKmb	No. tests	2	8.5	17
	electrocardiogram	No. tests	4	2.5	10
	Ergometry	No. tests	0	87	0
	Thorax Rx	No. tests	1	7	7
	<i>Early rehabilitation (if during hospital stay)</i>				
	Physiotherapist	Patient days			
Discharge planning	Drugs given to patient until contact with GP	Days (cost: price of a dd)			
	Medical aids given to patient	Units			
	Follow-up visits	No. visits	4	10.83	43.32
Overhead (including administration, catering, etc.) outpatient (visits)	Total, or: - On ward level - On departmental level - On hospital level	% over total costs	12%		34.37
Overhead (including administration, catering, etc.) Inpatient (stays)	Total, or: - On ward level - On departmental level - On hospital level	% over total costs	19%		296.7 1
Food and Laundry		Patient days	4	13	52
Total Cost per		€(euros)			2131. 0313

case					
------	--	--	--	--	--

HOSPITAL C

Table 23. AMI in the HOSPITAL C.

Phase	AMI	Units	No. of units used	Unit cost	Total costs
Emergency dpt.	Physician visits	No. visits	1	12.34	12.34
Initial diagnosis (Assessment)	<i>Diagnostic Procedures</i>				
	Imaging (Echocardiogram)	No. tests	2	1.9	3.8
	Imaging (Emergency Thorax Angiography-radiography)	No. tests	1	7.2	7.2
	Laboratory (blood count)	No. tests	2	16	32
	Laboratory (coagulation time)	No. tests	1	2.9	2.9
	Laboratory (Troponin, etc.)	No. tests	2	9.2	18.4
	Laboratory (CKmb.)	No. tests	2	8	16
	Other (Electrocardiography etc.)	No. tests			
Main Therapy	Lyses	Days (cost: price of a dd)			
	<i>Drugs</i>	Days (cost: price of a dd)			
	Emergency medication ASA	Days (cost: price of a dd)	1	0.05	0.05
	Emergency medication clopidogrel	Days (cost: price of a dd)	0	1	0
	Beta-blocker (propranolol 10mg/6 hours ev)	Days (cost: price of a dd)	1	1.68	1.68
	Transdermic nitrites	Days (cost: price of a dd)	0	0.43	0

	Nitrite endovenose (50 mg 3 n 50 cc 6ml/h)	Days (cost: price of a dd)	1	0.57	0.57
	Enoxaprina 1 mg/Kg/12 hours	Days (cost: price of a dd)	1	1.64	1.64
	Enalapril 5 mg	Days (cost: price of a dd)	1	0.08	0.08
	Sinvastatine 40 mg	Days (cost: price of a dd)	1	0.36	0.36
	Omeprazol 20 mg	Days (cost: price of a dd)	1	0.18	0.18
	Diazepam 5 mg	Days (cost: price of a dd)	1	0.03	0.03
	Oral Nitrites (1 comp sublingual)	Days (cost: price of a dd)	1	0.03	0.03
	Glycaemia Control	No. tests	0	1.9	0
	<i>Total time at emergency department</i>		2	20.37	20.37
Hospital care (convalescence)	<i>Intensive Care Unit</i>	Time (days)	3		0
	Physicians	Patient days*	6	21.67	130.0 2
	Nursing (12 hours/bed/day)	Patient days	36	20.37	733.3 2
	<i>Drugs</i>	Days (cost: price of a dd)			
	ASA	Days (cost: price of a dd)	3	0.05	0.15
	clopidogrel	Days (cost: price of a dd)	0	1	0

	atenolol 50 mg	Days (cost: price of a dd)	3	0.08	0.24
	Diltiazem 60 mg each 8 h	Days (cost: price of a dd)	3	0.17	0.51
	Isosorbide mononitrate 20 mg/8h	Days (cost: price of a dd)	3	0.26	0.78
	transdermic nitrites	Days (cost: price of a dd)	0	0.43	0
	Enoxaprina 1 mg/Kg/12 hours	Days (cost: price of a dd)	3	1.64	4.92
	Sinvastatine 40 mg	Days (cost: price of a dd)	3	0.36	1.08
	omeprazol 20 mg	Days (cost: price of a dd)	3	0.18	0.54
	Enalapril 5 mg	Days (cost: price of a dd)	3	0.08	0.24
	Furosemida 20 mg/8 hours ev	Days (cost: price of a dd)	3	0.87	2.61
	Diagnostic procedures (e.g. imaging, ultrasound, laboratory)	No.			
	Emergency blood count	No. tests	1	16	16
	Troponin	No. tests	0	9.2	0
	CKmb	No. tests	3	8	24
	electrocardiogram	No. tests	3	1.9	5.7
	Glycaemia Control	No. tests	3	2.9	8.7
	<i>Normal Ward</i>		5		0
	Physicians	Patient days	5	10.83	54.15
	Nursing (3 hours nurse a day)	Patient days	15	20.37	305.5 5

	<i>Drugs</i>	Days (cost: price of a dd)			
	ASA 150 mg 24 hours	Days (cost: price of a dd)	5	0.025	0.125
	clopidogrel	Days (cost: price of a dd)	0	1	0
	atenolol 50 mg	Days (cost: price of a dd)	5	0.08	0.4
	transdermic nitrites	Days (cost: price of a dd)	0	0.43	0
	Enoxaprina 1 mg/Kg/12 hours	Days (cost: price of a dd)	5	1.64	8.2
	Sinvastatine 40 mg	Days (cost: price of a dd)	5	0.36	1.8
	omeprazol 20 mg	Days (cost: price of a dd)	5	0.18	0.9
	Enalapril 5 mg	Days (cost: price of a dd)	5	0.08	0.4
	<i>Diagnostic Procedures (e.g. imaging, laboratory)</i>	<i>No.</i>			
	Echocardiogram	No. tests	1	98	98
	Laboratory (blood count)	No. tests	2	16	32
	TROPONINAS	No. tests	2	9.2	18.4
	CKmb	No. tests	2	8	16
	electrocardiogram	No. tests	5	1.9	9.5
	Ergometry	No. tests	1	91	91
	Thorax Rx	No. tests	1	7.2	7.2
	<i>Early rehabilitation (if during hospital stay)</i>				
	Physiotherapist	Patient days			

Discharge planning	Drugs given to patient until contact with GP	Days (cost: price of a dd)			
	Medical aids given to patient	Units			
	Follow-up visits	No. visits	4	10.83	43.32
Overhead (including administration, catering, etc.) outpatient (visits)	Total, or: - On ward level - On departmental level - On hospital level	% over total costs	12%		20.92
Overhead (including administration, catering, etc.) Inpatient (stays)	Total, or: - On ward level - On departmental level - On hospital level	% over total costs	20%		314.49
Food and Laundry		Patient days	5	13	65
Total Cost per case		€(euros)			2133.7955

HOSPITAL D

Table 24. AMI intervention in the HOSPITAL D.

Phase	AMI	Units	No. of units used	Unit cost	Total costs
Emergency dpt.	Physician visits	No. visits	4	12.34	49.36
Initial diagnosis (Assessment)	<i>Diagnostic Procedures</i>				
	Imaging (Echocardiogram)	No. tests	3	3	9
	Imaging (Emergency Thorax Angiography-radiography)	No. tests	1	6.4	6.4
	Laboratory (blood count)	No. tests	1	14.3	14.3
	Laboratory (coagulation time)	No. tests	1	2.7	2.7
	Laboratory (Troponine, etc.)	No. tests	2	8	16
	Laboratory (CKmb.)	No. tests	2	7.3	14.6
	Other (Electrocardiography etc.)	No. tests			
Main Therapy	Lyses	Days (cost: price of a dd)			

	<i>Drugs</i>	Days (cost: price of a dd)			
	Emergency medication ASA	Days (cost: price of a dd)	2	0.05	0.1
	Emergency medication clopidogrel	Days (cost: price of a dd)	2	1	2
	Beta-blocker (propranolol 10mg/6 hours ev)	Days (cost: price of a dd)	2	1.68	3.36
	Transdermic nitrites	Days (cost: price of a dd)	2	0.43	0.86
	Nitrite endovenose (50 mg 3 n 50 cc 6ml/h)	Days (cost: price of a dd)	0	0.57	0
	Enoxaprina 1 mg/Kg/12 hours	Days (cost: price of a dd)	4	1.64	6.56
	Enalapril 5 mg	Days (cost: price of a dd)	2	0.08	0.16
	Sinvastatine 40 mg	Days (cost: price of a dd)	2	0.36	0.72
	Omeprazol 20 mg	Days (cost: price of a dd)	2	0.18	0.36
	Diazepam 5 mg	Days (cost: price of a dd)	0	0.03	0
	Oral Nitrites (1 comp sublingual)	Days (cost: price of a dd)	0	0.03	0
	Glycaemia Control	No. tests	1	1.7	1.7
	<i>Total time at emergency department</i>		24	20.37	244.4 4

Hospital care (convalescence)	<i>Intensive Care Unit</i>	Time (days)	3		0
	Physicians	Patient days*	6	21.67	130.0 2
	Nursing (12 hours/bed/day)	Patient days	36	20.37	733.3 2
	<i>Drugs</i>	Days (cost: price of a dd)			
	ASA	Days (cost: price of a dd)	3	0.05	0.15
	clopidogrel	Days (cost: price of a dd)	0	1	0
	atenolol 50 mg	Days (cost: price of a dd)	3	0.08	0.24
	Diltiazem 60 mg each 8 h	Days (cost: price of a dd)	0	0.17	0
	Isosorbide mononitrate 20 mg/8h	Days (cost: price of a dd)	0	0.26	0
	transdermic nitrites	Days (cost: price of a dd)	3	0.43	1.29
	Enoxaprina 1 mg/Kg/12 hours	Days (cost: price of a dd)	3	1.64	4.92
	Sinvastatine 40 mg	Days (cost: price of a dd)	3	0.36	1.08
	omeprazol 20 mg	Days (cost: price of a dd)	3	0.18	0.54
	Enalapril 5 mg	Days (cost: price of a dd)	3	0.08	0.24

	Furosemida 20 mg/8 hours ev	Days (cost: price of a dd)	0	0.87	0
	Diagnostic procedures (e.g. imaging, ultrasound, laboratory)	No.			
	Emergency blood count	No. tests	3	14.3	42.9
	Troponin	No. tests	3	8	24
	CKmb	No. tests	3	7.3	21.9
	electrocardiogram	No. tests	3	3	9
	Glycaemia Control	No. tests	3	2.7	8.1
	<i>Normal Ward</i>		7		0
	Physicians	Patient days	7	10.83	75.81
	Nursing (3 hours nurse a day)	Patient days	21	20.37	427.7 7
	<i>Drugs</i>	Days (cost: price of a dd)			
	ASA 150 mg 24 hours	Days (cost: price of a dd)	7	0.025	0.175
	clopidogrel	Days (cost: price of a dd)	0	1	0
	atenolol 50 mg	Days (cost: price of a dd)	7	0.08	0.56
	transdermic nitrites	Days (cost: price of a dd)	7	0.43	3.01
	Enoxaprina 1 mg/Kg/12 hours	Days (cost: price of a dd)	7	1.64	11.48
	Sinvastatine 40 mg	Days (cost: price of a dd)	7	0.36	2.52
	omeprazol 20 mg	Days (cost: price of a dd)	7	0.18	1.26

	Enalapril 5 mg	Days (cost: price of a dd)	7	0.08	0.56
	<i>Diagnostic Procedures (e.g. imaging, laboratory)</i>	No.			
	Echocardiogram	No. tests	1	97	97
	Laboratory (blood count)	No. tests	2	14.3	28.6
	TROPONINAS	No. tests	2	8	16
	CKmb	No. tests	2	7.3	14.6
	electrocardiogram	No. tests	7	3	21
	Ergometry	No. tests	0	80	0
	Thorax Rx	No. tests	1	6.4	6.4
	<i>Early rehabilitation (if during hospital stay)</i>				
	Physiotherapist	Patient days			
Discharge planning	Drugs given to patient until contact with GP	Days (cost: price of a dd)			
	Medical aids given to patient	Units			
	Follow-up visits	No. visits	6	10.83	64.98
Overhead (including administration, catering, etc.) outpatient (visits)	Total, or: - On ward level - On departmental level - On hospital level	% over total costs	13%		56.89
Overhead (including administration, catering, etc.) Inpatient (stays)	Total, or: - On ward level - On departmental level - On hospital level	% over total costs	18%		336.8 9
Food and Laundry		Patient days	7	13	91
Total Cost per case		€(euros)			2606. 822

HOSPITAL E

Table 25. AMI intervention in the HOSPITAL E.

Phase	AMI	Units	No. of units used	Unit cost	Tota l costs
Emergency dpt.	Physician visits	No.	1	12.34	12.34

		visits			
Initial diagnosis (Assessment)	<i>Diagnostic Procedures</i>				
	Imaging (Echocardiogram)	No. tests	2	2.2	4.4
	Imaging (Emergency Thorax Angiography-radiography)	No. tests	1	7.9	7.9
	Laboratory (blood count)	No. tests	1	17	17
	Laboratory (coagulation time)	No. tests	1	2.8	2.8
	Laboratory (Troponine, etc.)	No. tests	1	10	10
	Laboratory (CKmb.)	No. tests	1	11	11
	Other (Electrocardiography etc.)	No. tests			
Main Therapy	Lyses	Days (cost: price of a dd)			
	<i>Drugs</i>	Days (cost: price of a dd)			
	Emergency medication ASA	Days (cost: price of a dd)	1	0.05	0.05
	Emergency medication clopidogrel	Days (cost: price of a dd)	1	1	1
	Beta-blocker (propranolol 10mg/6 hours ev)	Days (cost: price of a dd)	1	1.68	1.68
	Transdermic nitrites	Days (cost: price of a dd)	0	0.43	0
	Nitrite endovenose (50 mg 3 n 50 cc 6ml/h)	Days (cost: price of a dd)	1	0.57	0.57
	Enoxaprina 1 mg/Kg/12 hours	Days (cost: price of a dd)	1	1.64	1.64
	Enalapril 5 mg	Days (cost: price of a dd)	0	0.08	0

	Sinvastatine 40 mg	Days (cost: price of a dd)	0	0.36	0
	Omeprazol 20 mg	Days (cost: price of a dd)	0	0.18	0
	Diazepam 5 mg	Days (cost: price of a dd)	0	0.03	0
	Oral Nitrites (1 comp sublingual)	Days (cost: price of a dd)	0	0.03	0
	Glycaemia Control	No. tests	1	2.4	2.4
	<i>Total time at emergency department</i>		4	20.37	40.74
Hospital care (convalescence)	<i>Intensive Care Unit</i>	Time (days)	0		0
	Physicians	Patient days*	0	21.67	0
	Nursing (12 hours/bed/day)	Patient days	0	20.37	0
	<i>Drugs</i>	Days (cost: price of a dd)			
	ASA	Days (cost: price of a dd)	0	0.05	0
	clopidogrel	Days (cost: price of a dd)	0	1	0
	atenolol 50 mg	Days (cost: price of a dd)	0	0.08	0
	Diltiazem 60 mg each 8 h	Days (cost: price of a dd)	0	0.17	0
	Isosorbide mononitrate 20 mg/8h	Days (cost: price of a dd)	0	0.26	0

	transdermic nitrites	Days (cost: price of a dd)	0	0.43	0
	Enoxaprina 1 mg/Kg/12 hours	Days (cost: price of a dd)	0	1.64	0
	Sinvastatine 40 mg	Days (cost: price of a dd)	0	0.36	0
	omeprazol 20 mg	Days (cost: price of a dd)	0	0.18	0
	Enalapril 5 mg	Days (cost: price of a dd)	0	0.08	0
	Furosemida 20 mg/8 hours ev	Days (cost: price of a dd)	0	0.87	0
	Diagnostic procedures (e.g. imaging, ultrasound, laboratory)	No.			
	Emergency blood count	No. tests	0	17	0
	Troponin	No. tests	0	10	0
	CKmb	No. tests	0	11	0
	electrocardiogram	No. tests	0	2.2	0
	Glycaemia Control	No. tests	0	2.8	0
	<i>Normal Ward</i>		8		0
	Physicians	Patient days	8	10.83	86.64
	Nursing (3 hours nurse a day)	Patient days	24	20.37	488.8 8
	<i>Drugs</i>	Days (cost: price of a dd)			
	ASA 150 mg 24 hours	Days (cost: price of a dd)	8	0.025	0.2
	clopidogrel	Days (cost: price of a dd)	8	1	8

	atenolol 50 mg	Days (cost: price of a dd)	8	0.08	0.64
	transdermic nitrites	Days (cost: price of a dd)	0	0.43	0
	Enoxaprina 1 mg/Kg/12 hours	Days (cost: price of a dd)	8	1.64	13.12
	Sinvastatine 40 mg	Days (cost: price of a dd)	8	0.36	2.88
	omeprazol 20 mg	Days (cost: price of a dd)	8	0.18	1.44
	Enalapril 5 mg	Days (cost: price of a dd)	8	0.08	0.64
	<i>Diagnostic Procedures (e.g. imaging, laboratory)</i>	<i>No.</i>			
	Echocardiogram	No. tests	1	93	93
	Laboratory (blood count)	No. tests	3	17	51
	TROPONINAS	No. tests	5	10	50
	CKmb	No. tests	5	11	55
	electrocardiogram	No. tests	8	2.2	17.6
	Ergometry	No. tests	0	100	0
	Thorax Rx	No. tests	2	7.9	15.8
	<i>Early rehabilitation (if during hospital stay)</i>				
	Physiotherapist	Patient days			
Discharge planning	Drugs given to patient until contact with GP	Days (cost: price of a dd)			
	Medical aids given to patient	Units			
	Follow-up visits	No. visits	6	10.83	64.98
Overhead (including administration, catering, etc.) outpatient (visits)	Total, or: - On ward level - On departmental level - On hospital level	% over total costs	14%		23.21

Overhead (including administration, catering, etc.) Inpatient (stays)	Total, or: - On ward level - On departmental level - On hospital level	% over total costs				176.9 7
Food and Laundry		Patient days	8	13		104
Total Cost per case		€(euros)				1367. 513

Analysis of results:

AMI	HA	HB	HC	HD	HE	Average	%
STAFF COST	744.08	1341.32	1299.07	1725.70	693.58	1160.75	60.68%
DRUGS COST	20.88	24.63	27.52	42.15	31.86	29.41	1.54%
DIAGNOSTIC PROCEDURES COST	268.79	382.00	406.80	354.20	337.90	349.94	18.29%
MATERIAL AND DEVICES COST	0.00	0.00	0.00	0.00	0.00	0.00	0.00%
OVERHEAD COST	292.10	383.08	400.41	484.78	304.17	372.91	19.49%
TOTAL COST	1325.85	2131.03	2133.80	2606.82	1367.51	1913.00	100%
EMERGENCY ROOM TIME (hours)	12.00	12.00	2.00	24.00	4.00	10.80	
ICU time	0.00	3.00	3.00	3.00	0.00	1.80	
NORMAL WARD STAY	8.00	4.00	5.00	7.00	8.00	6.40	
TOTAL STAY	8.00	7.00	8.00	10.00	8.00	8.20	
OUTPATIENT VISITS	4.00	4.00	4.00	6.00	6.00	4.80	
	0.00	0.00	0.00	0.00	0.00	0.00	

1. **Average total cost** for stroke is €1913, ranging from €1325.85 in hospital 1 to €2606.82 in hospital 4. The lowest calculated cost for AMI in hospital 1 represents only 50% of cost in hospital 4 for this same diagnostic.

2. On the average, **cost distribution among input** types follows the following pattern: staff costs account for 60,68% of total cost, diagnostic and procedure cost account for 18,29%. Medicines only account for 1,54% of total cost of this diagnostic, structure cost are important in this case being a 19.49% of total costs.

3. The main reason for **variation in total cost** among provider costs is also related to the time devoted by clinical staff to these patients: in this case, hospital 3 and 4 use the intensive care unit for three days jointly with hospital 2, which makes the three of them to be the most expensive in this procedure. Hospital 2 receives higher complexity cases, however this does

not seem to justify the much overall higher length of stay (14 days, including 3 days in a ICU). Nevertheless, the lower rehabilitation number of sessions needed could be an indicator of a better health outcome for patients being treated by this provider.

4. **Diagnostic and procedure costs**, representing nearly one fifth of total costs, present also an important range of variation among hospitals, also indicating a heterogeneity in case mix and/or pattern of care: this cost varies between €268,8 in hospital 1 and €406,8 (a 51% higher cost) in hospital 3. These variations are also related with the ordinary use of some diagnostic tests during inpatient stay (i.e., echocardiogram) in hospital 3.

5. **Drugs costs** do not represent a high proportion of total cost of AMI.

6. **Overhead costs** are directly linked to length of stay and therefore increase cost differences between those hospitals with a longer stay (H2, H3, H3) and the other two (H1, H5).

Vignette 6- Cough

Procedure description:

Parents presenting at a GP/ paediatric GP office with their 2 yr. old boy having cough and fever (38.5°C) since two days. Drug prescriptions and whether a second visit is scheduled should be noted.

This type of symptoms imply from a medical perspective a paediatric visit with exploration and anamnesis. The usual diagnostic process will be the same independently of the pathology. Depending on the diagnoses the usual cases will be: high way cold, high way infection and low way infection (pneumonia). For each case, treatment and follow-up will be substantially different.

	LEVEL	ASSIGNED POPULATION
CAP A	RURAL	8.000
CAP B	URBAN	18.000
CAP C	URBAN	32.000
CAP D	RURAL	13.000

CAP: Primary Care Center

Primary Care Center A

Table 26. Cough at the Primary Care Center A.

Phase	Elements	Units	No. of units used	Unit cost	Total costs
Assessment	<i>Diagnostic Procedures</i>				
	Imaging (thorax radiology)	No. tests	0	6.5	0
	Laboratory (e.g. blood count, CRP, etc.)	No. tests			
	Other (ECG, lung-function, etc.)	No. tests	0	0	0
	Physician	Min.	10	1.055	10.55
	Other personnel (nurse etc.)	Min.	0	0	0
Therapy + further care	<i>Drugs prescribed (40% paid by patient, 60% by NHS)</i>	Days (cost: price of the packet)			

	Ibuprofen solution DDD	Days (cost: price of the packet)	5		3.8
	Dextrometorfano DDD	Days (cost: price of the packet)	5		3.75
	Amoxi + Clavulanico*** 125/31,25		7	0.428	2.99 6
	<i>Drugs or other goods given by provider</i>	Days (cost: price of a dd)			
	Other diagnostics prescribed				
	Second visit scheduled: O YES ✓NO				
	Personnel (for writing prescriptions etc.; if separate from above)				
Overhead	Running costs of ambulatory service	Min.	10	0.21	2.1
Total without antibiotic (usual case)					20.2
Total (includes medicines paid by patient)					23.1 96

*** Only in the case of a diagnosis of a possible pneumonia

Primary Care Center B

Table 27. Cough at the Primary Care Center B.

Phase	Elements	Units	No. of units used	Unit cost	Tot al cost s
Assessment	<i>Diagnostic Procedures</i>				
	Imaging (thorax radiology)	No. tests	0	7	0
	Laboratory (e.g. blood count, CRP, etc.)	No. tests			
	Other (ECG, lung-function, etc.)	No. tests	0	0	0
	Physician	Min.	10	1.055	10.5 5
	Other personnel (nurse etc.)	Min.	0	0	0

Therapy + further care	<i>Drugs prescribed (40% paid by patient, 60% by NHS)</i>	Days (cost: price of the packet)			
	Ibuprofen solution DDD	Days (cost: price of the packet)	5		3.80
	Dextrometorfano DDD	Days (cost: price of the packet)	5		3.75
	Amoxi + Clavulanico*** 125/31,25		8	0.428	3.424
	<i>Drugs or other goods given by provider</i>	Days (cost: price of a dd)			
	Other diagnostics prescribed				
	Second visit scheduled: O YES ✓NO				
	Personnel (for writing prescriptions etc.; if separate from above)				
Overhead	Running costs of ambulatory service	Min.	10	3.4	3.4
Total without antibiotic (usual case)					21.5
Total					24.9 24

*** Only in the case of a diagnosis of a possible pneumonia

Primary Care Center C

Table 28. Cough at the Primary Care Center C.

Phase	Elements	Units	No. of units used	Unit cost	Total costs
Assessment	<i>Diagnostic Procedures</i>				
	Imaging (thorax radiology)	No. tests	0	6.5	0
	Laboratory (e.g. blood count, CRP, etc.)	No. tests			
	Other (ECG, lung-function, etc.)	No. tests	0	0	0
	Physician	Min.	10	1.055	10.55

	Other personnel (nurse etc.)	Min.	0	0	0
Therapy + further care	<i>Drugs prescribed (40% paid by patient, 60% by NHS)</i>	Days (cost: price of the packet)			
	Ibuprofen solution DDD	Days (cost: price of the packet)	5		3.8
	Dextrometorfano DDD	Days (cost: price of the packet)	5		3.75
	Amoxi + Clavulanico*** 125/31,25		10	0.428	4.28
	<i>Drugs or other goods given by provider</i>	Days (cost: price of a dd)			
	Other diagnostics prescribed				
	Second visit scheduled: O YES ✓NO				
Personnel (for writing prescriptions etc.; if separate from above)					
Overhead	Running costs of ambulatory service	Min.	10	0.16	1.6
Total without antibiotic (usual case)					19.7
Total					23.98

*** Only in the case of a diagnosis of a possible pneumonia

Reimbursement for provider by purchaser (incl. patient co-payments if applicable):

Primary Care Center D

Table 29. Cough at the Primary Care Center D

Phase	Elements	Units	No. of units used	Unit cost	Total costs
Assessment	<i>Diagnostic Procedures</i>				
	Imaging (thorax radiology)	No. tests	0	N.A.	0
	Laboratory (e.g. blood count, CRP, etc.)	No. tests			
	Other (ECG, lung-function, etc.)	No. tests	0	0	0

	Physician	Min.	10	1.055	10.55
	Other personnel (nurse etc.)	Min.	0	0	0
Therapy + further care	<i>Drugs prescribed (40% paid by patient, 60% by NHS)</i>	Days (cost: price of the packet)			
	Ibuprofen solution DDD	Days (cost: price of the packet)	5		3.8
	Dextrometorfano DDD	Days (cost: price of the packet)	5		3.75
	Amoxi + Clavulanico*** 125/31,25		8	0.428	3.424
	<i>Drugs or other goods given by provider</i>	Days (cost: price of a dd)			
	Other diagnostics prescribed				
	Second visit scheduled: O YES ✓NO				
	Personnel (for writing prescriptions etc.; if separate from above)				
	Overhead	Running costs of ambulatory service	Min.	1	0.21
Total without antibiotic (usual case)					20.2
Total					23.624

*** Only in the case of a diagnosis of a possible pneumonia (by auscultation)

Analysis of results:

COUGH costs	CAP A	CAP B	CAP C	CAP D	Average	%
Staff	10.55	10.55	10.55	10.55	10.55	44.09%
Drugs	10.546	10.974	11.83	10.974	11.081	46.30%
Overhead	2.1	3.4	1.6	2.1	2.3	9.61%
TOTAL	23.196	24.924	23.98	23.624	23.931	100.00%

1. **Average total cost** for cough is €23.931, ranging from €23.196 in CAP A to €24.92 in CAP B. Therefore, there is no much difference in costs for this procedure.

2. On the average, **cost distribution** among input types follows the following pattern: staff costs account for 44.09% of total cost, diagnostic and procedure cost account for 0%. Medicines account for 46.30% of total cost of this procedure.

3. The main reason for **variation in total cost** among provider costs is related to **drugs costs** and **overhead**. The difference in drugs costs is explained by the different treatment days recommended by each GP/paediatric GP since the price for the daily doses is the same (prices are regulated and all GPs agree on the DD). Overhead differences are mainly affected by non clinical staff time which may depend on the size of the Primary Care Center. Economies of scale should affect in this case but this does not seem to occur for CAP B.

Vignette 7 - Ambulatory Physiotherapy

Procedure description:

Male 25-35 years after anterior cruciate ligament reconstruction, consulting for ambulatory rehabilitation after discharge from hospital (with a referral if necessary in the country). Repair and hospital stay were without complications and discharge occurred after average length of stay. Please specify the duration and frequency of physiotherapy (e.g. 4-6 weeks, 3 times per week with 1 hour per session).

HOSPITAL A

Table 30. Ambulatory Physiotherapy in the HOSPITAL A.

Phase	Elements	Units	No. of units used	Unit Cost	Total costs
Site of consultation/ operation	O Physicians' office ✓ Out-patient department of hospital				
Specialist (orthopaedic) visit		Visits	1	10.83	10.83
Rehabilitation visits (Physiotherapist)		Visits	3	10.83	32.49
<i>Diagnostic/the rapeutic procedures</i>					
MRI			1	120	120
Radiography		No. Tests	0	7.41	0
<i>Drugs</i>		Days (cost: price of a dd)			
Anti-inflammatories		Days (cost: price of a dd)	15	0.27	4.05
Omeprazol		Days (cost: price of a dd)	0	0.18	0
	Physiotherapist (1 session: 30 minutes)	Sessions	12	9.142	109.704

Follow-up Specialist (orthopaedic) visit		Visits	1	10.83	10.83
Overhead	Running costs of ambulatory service	% over total costs	13%		37.42 752
Total Costs		€(euros)			325.3 3152

HOSPITAL B**Table 31. Ambulatory Physiotherapy in the HOSPITAL B.**

Phase	Elements	Units	No. of units used	Unit Cost	Total costs
Site of consultation/ operation	O Physicians' office ✓ Out-patient department of hospital				
Specialist (orthopaedic) visit		Visits	1	10.83	10.83
Rehabilitation visits (Physiotherapist)		Visits	3	10.83	32.49
<i>Diagnostic/therapeutic procedures</i>					
MRI			1	115	115
Radiography		No. Tests	0	7	0
<i>Drugs</i>		Days (cost: price of a dd)			
Anti-inflammatories		Days (cost: price of a dd)	30	0.27	8.1
Omeprazol		Days (cost: price of a dd)	0	0.18	0
	Physiotherapist (1 session: 30 minutes)	Sessions	10	10.448	104.48
Follow-up Specialist (orthopaedic)		Visits	1	10.83	10.83

visit					
Overhead	Running costs of ambulatory service	% over total costs	12%		36.6249
Total Costs		€(euros)			318.3549

HOSPITAL C

Table 32. Ambulatory Physiotherapy in the HOSPITAL C.

Phase	Elements	Units	No. of units used	Unit Cost	Total costs
Site of consultation/ operation	O Physicians' office ✓ Out-patient department of hospital				
Specialist (orthopaedic) visit		Visits	1	10.83	10.83
Rehabilitation visits (Physiotherapist)		Visits	4	10.83	43.32
<i>Diagnostic/therapeutic procedures</i>					
MRI			1	125	125
Radiography		No. Tests	0	7.2	0
<i>Drugs</i>		Days (cost: price of a dd)			
Anti-inflammatories		Days (cost: price of a dd)	15	0.27	4.05
Omeprazol		Days (cost: price of a dd)	15	0.18	2.7
	Physiotherapist (1 session: 30 minutes)	Sessions	9	7.836	70.524
Follow-up Specialist (orthopaedic) visit		Visits	1	10.83	10.83
Overhead	Running costs of ambulatory service	% over	12%		34.74302

		total costs			
Total Costs		€(euros)			301.9 9702

HOSPITAL D**Table 33. Ambulatory Physiotherapy in the HOSPITAL D.**

Phase	Elements	Units	No. of units used	Unit Cost	Total costs
Site of consultation/ operation	O Physicians' office ✓ Out-patient department of hospital				
Specialist (orthopaedic) visit		Visits	1	10.83	10.83
Rehabilitation visits (Physiotherapist)		Visits	4	10.83	43.32
<i>Diagnostic/therapeutic procedures</i>					
MRI			1	120	120
Radiography		No. Tests	0	6.4	0
<i>Drugs</i>		Days (cost: price of a dd)			
Anti-inflammatory		Days (cost: price of a dd)	15	0.27	4.05
Omeprazol		Days (cost: price of a dd)	0	0.18	0
	Physiotherapist (1 session: 30 minutes)	Sessions	15	9.142	137.13
Follow-up Specialist (orthopaedic) visit		Visits	1	10.83	10.83
Overhead	Running costs of ambulatory service	% over total costs	13%		42.40 08
Total Costs		€(euros)			368.5 608

HOSPITAL E**Table 34. Ambulatory Physiotherapy in the Hospital E.**

Phase	Elements	Units	No. of units used	Unit Cost	Total costs
Site of consultation/ operation	O Physicians' office ✓ Out-patient department of hospital				
Specialist (orthopaedic) visit		Visits	1	10.83	10.83
Rehabilitation visits (Physiotherapist)		Visits	3	10.83	32.49
<i>Diagnostic/the rapeutic procedures</i>					
MRI			0	125	0
Radiography		No. Tests	0	7.9	0
<i>Drugs</i>		Days (cost: price of a dd)			
Anti-inflammatory		Days (cost: price of a dd)	30	0.27	8.1
Omeprazol		Days (cost: price of a dd)	0	0.18	0
	Physiotherapist (1 session: 30 minutes)	Sessions	15	7.836	117.54
Follow-up Specialist (orthopaedic) visit		Visits	4	10.83	43.32
Overhead	Running costs of ambulatory service	% over total costs	14%		27.5964
Total Costs		€(euros)			239.8764

Analysis of results:

Ambulatory physiotherapy	H1	H2	H3	H4	H5	Average	%
STAFF COST	163.85	158.63	135.50	202.11	204.18	172.86	55.61%
DRUGS COST	4.05	8.10	6.75	4.05	8.10	6.21	2.00%
DIAGNOSTIC PROCEDURES COST	120.00	115.00	125.00	120.00	0.00	96.00	30.89%
MATERIAL AND DEVICES COST	0.00	0.00	0.00	0.00	0.00	0.00	0.00%
OVERHEAD COST	37.43	36.62	34.74	42.40	27.60	35.76	11.50%
TOTAL COST	325.33	318.35	302.00	368.56	239.88	310.82	100%
OUTPATIENT VISITS	5.00	5.00	6.00	6.00	8.00	6.00	
REHABILITATION SESSIONS	12.00	10.00	9.00	15.00	15.00	12.20	

1. **Average total cost** for ambulatory physiotherapy is €3022, ranging from €239.88 in hospital 5 to €368.56 in hospital 4. The lowest calculated cost for ambulatory physiotherapy in hospital 5 represents only 65% of cost in hospital 4 for the same diagnostic.

2. On the average, **cost distribution** among input types follows the following pattern: staff costs account for 55.61% of total cost, diagnostic and procedure cost account for 30.89%. Medicines only account for 2% of total cost of this diagnose.

3. The main reason for **variation in total cost** among provider costs is also related to the **time devoted by clinical staff** to these patients: those existing differences are in this case mainly due to the number of sessions, and therefore on staff costs (for physiotherapist salaries vary among providers but differences are very low). There is what appears as an outlier case (hospital 1), which reported to perform an average of 45 sessions for each patient.

4. **Diagnostic and procedure costs**, representing nearly more than one fourth of total costs, present also a certain range of variation among hospitals, also indicating a heterogeneity in case mix and/or pattern of care: this cost varies between null costs in hospital 5 to €125 in hospital 3. The reason for null costs in hospital 5 is that this hospital does not carry a MRI, which is an important part of the total cost for this process, provided that this technology is not available. To get this diagnostic test done patients have to be sent to a quite far hospital and therefore this is avoided by this hospital.

5. **Drugs costs** do not represent a high proportion of total cost of ambulatory physiotherapy.

There are not much differences in this case, and those existing are mainly due to the number of sessions and therefore on staff costs (for physiotherapist salaries vary among providers but differences are very low).

Vignette 8 – Colonoscopy

Procedure description:

Male 55-70 year old with positive Faecal Occult Blood test is referred to an internist's/ gastroenterologist's office/ hospital out-patient department for diagnostic colonoscopy. Start of vignette: patient presents for the first time in office/ out-patient department. Please include all visits including the one where the colonoscopy is performed (i.e. most likely two), specify explicitly if and which sedatives, e.g. Benzodiazepines (flumazenil), fluids etc. are used/ prescribed. Cases with polypectomy during colonoscopy, pathological examinations and follow-up visits are excluded.

The following tables describe the data collected by provider:

HOSPITAL A

Table 35. Colonoscopy in the HOSPITAL A.

Phase	Elements	Units	No. of units used	Unit Cost	Total costs
Site of consultation	O Physicians' office ✓ Out-patient department of hospital				
Assessment + Preparation	<i>Diagnostic Procedures</i>	No. tests			
	Imaging (Thorax radiography)	No. tests	1	7.41	7.41
	Imaging (ECG)	No. tests	1	3	3.00
	Laboratory (blood count)	No. tests	1	16.2	16.20
	Laboratory (coagulation time)	No. tests	1	2.7	2.70
	Physician (digestive specialist)	Min.	10	1.083	10.83
	Anaesthetist	Min.	10	1.083	10.83
Examination (colonoscopy)	Total Operation room time	Min.	20		0.00
	Physician (digestive specialist)	Hours of staff	0.3	43.42	13.03
	Nurse	Hours of staff	0.3	20.37	6.11
	Auxiliary nurse	Hours of staff	0.3	12.27	3.68
	Anaesthetist	Hours of staff	0.3	33.25	9.98
	Use of instrument (running and depreciation costs)	No.			

	Drugs provided (especially sedatives)	Days (cost: price of a dd)			
	Propofol 1 mg/Kg	Days (cost: price of a dd)	1	9	9.00
	Midazolam 2-5 mg	Days (cost: price of a dd)	0	0.47	0.00
	Fentanilo 50 mcg	Days (cost: price of a dd)	0	0.37	0.00
	Reanimation time	Hours	0.75	20.373 6	15.28
	Follow-up visits	No. Visits	1	10.83	10.83
Overhead	Running costs of ambulatory service	% over total costs	13%		15.45
Total Cost per case		€(euros)			134.3 3

* Note: hours of staff: proportion of hours devoted by the indicated staff (i.e. 9 surgeons means 3 surgeons 3 hours so total of 9 equivalent hours of surgeon)

HOSPITAL B

Table 36. Colonoscopy in the HOSPITAL B.

Phase	Elements	Units	No. of units used	Unit Cost	Total costs
Site of consultation	O Physicians' office ✓ Out-patient department of hospital				
Assessment + Preparation	<i>Diagnostic Procedures</i>	No. tests			
	Imaging (Thorax radiography)	No. tests	0	7	0.00
	Imaging (ECG)	No. tests	0	2.5	0.00
	Laboratory (blood count)	No. tests	1	15.8	15.80
	Laboratory (coagulation time)	No. tests	1	2.5	2.50
	Physician (digestive specialist)	Min.	10	1.083	10.83
	Anaesthetist	Min.	10	1.083	10.83

Examination (colonoscopy)	Total Operation room time	Min.	30		0.00
	Physician (digestive specialist)	Hours of staff	0.5	43.42	21.71
	Nurse	Hours of staff	0.5	20.37	10.19
	Auxiliary nurse	Hours of staff	0.5	12.27	6.14
	Anaesthetist	Hours of staff	0	33.25	0.00
	Use of instrument (running and depreciation costs)	No.			
	Drugs provided (especially sedatives)	Days (cost: price of a dd)			
	Propofol 1 mg/Kg	Days (cost: price of a dd)	0	9	0.00
	Midazolam 2-5 mg	Days (cost: price of a dd)	1	0.47	0.47
	Fentanilo 50 mcg	Days (cost: price of a dd)	0	0.37	0.00
	Reanimation time	Hours	0.5	20.373 6	10.19
	Follow-up visits	No. Visits	0	10.83	0.00
Overhead	Running costs of ambulatory service	% over total costs	12%		11.52
Total Cost per case		€ (euros)			100.1 7

* Note: hours of staff: proportion of hours devoted by the indicated staff (i.e. 9 surgeons means 3 surgeons 3 hours so total of 9 equivalent hours of surgeon)

HOSPITAL C

Table 37. Colonoscopy in the HOSPITAL C.

Phase	Elements	Units	No. of unit s	Unit Cost	Tota l costs
-------	----------	-------	------------------------	--------------	--------------------

			used		
Site of consultation	O Physicians' office ✓ Out-patient department of hospital				
Assessment + Preparation	<i>Diagnostic Procedures</i>	No. tests			
	Imaging (Thorax radiography)	No. tests	0	7.2	0.00
	Imaging (ECG)	No. tests	0	1.9	0.00
	Laboratory (blood count)	No. tests	0	16	0.00
	Laboratory (coagulation time)	No. tests	0	2.9	0.00
	Physician (digestive specialist)	Min.	10	1.083	10.83
	Anaesthetist	Min.	10	1.083	10.83
Examination (colonoscopy)	Total Operation room time	Min.	20		0.00
	Physician (digestive specialist)	Hours of staff	0.3	43.42	13.03
	Nurse	Hours of staff	0.3	20.37	6.11
	Auxiliary nurse	Hours of staff	0.3	12.27	3.68
	Anaesthetist	Hours of staff	0.3	33.25	9.98
	Use of instrument (running and depreciation costs)	No.			
	Drugs provided (especially sedatives)	Days (cost: price of a dd)			
	Propofol 1 mg/Kg	Days (cost: price of a dd)	0	9	0.00
	Midazolam 2-5 mg	Days (cost: price of a dd)	1	0.47	0.47
	Fentanilo 50 mcg	Days (cost: price of a dd)	0	0.37	0.00
Reanimation time	Hours	0.75	20.373 6	15.28	
	Follow-up visits	No. Visits	0	10.83	0.00
Overhead	Running costs of ambulatory service	% over total costs	12%		9.13
Total Cost per case		€(euros)			79.33

* Note: hours of staff: proportion of hours devoted by the indicated staff (i.e. 9 surgeons means 3 surgeons 3 hours so total of 9 equivalent hours of surgeon)

HOSPITAL D**Table 38. Colonoscopy in the HOSPITAL D.**

Phase	Elements	Units	No. of units used	Unit Cost	Total costs
Site of consultation	O Physicians' office ✓ Out-patient department of hospital				
Assessment + Preparation	<i>Diagnostic Procedures</i>	No. tests			
	Imaging (Thorax radiography)	No. tests	1	6.4	6.40
	Imaging (ECG)	No. tests	1	3	3.00
	Laboratory (blood count)	No. tests	1	14.3	14.30
	Laboratory (coagulation time)	No. tests	1	2.7	2.70
	Physician (digestive specialist)	Min.	10	1.083	10.83
	Anaesthetist	Min.	10	1.083	10.83
Examination (colonoscopy)	Total Operation room time	Min.	20		0.00
	Physician (digestive specialist)	Hours of staff	0.3	43.42	13.03
	Nurse	Hours of staff	0.3	20.37	6.11
	Auxiliary nurse	Hours of staff	0.3	12.27	3.68
	Anaesthetist	Hours of staff	0.3	33.25	9.98
	Use of instrument (running and depreciation costs)	No.			
	Drugs provided (especially sedatives)	Days (cost: price of a dd)			
	Propofol 1 mg/Kg	Days (cost: price of a dd)	1	9	9.00
	Midazolam 2-5 mg	Days (cost: price of a dd)	1	0.47	0.47
	Fentanilo 50 mcg	Days (cost: price of a dd)	1	0.37	0.37
	Reanimation time	Hours	0.5	20.3736	10.19
		Follow-up visits	No. Visits	0	10.83
Overhead	Running costs of ambulatory service	% over total costs	13%		13.11

Total Cost per case		€(euros)			113.99
---------------------	--	----------	--	--	--------

* Note: hours of staff: proportion of hours devoted by the indicated staff (i.e. 9 surgeons means 3 surgeons 3 hours so total of 9 equivalent hours of surgeon)

HOSPITAL E

Table 39. Colonoscopy in the HOSPITAL E.

Phase	Elements	Units	No. of units used	Unit Cost	Total costs
Site of consultation	O Physicians' office ✓ Out-patient department of hospital				
Assessment + Preparation	<i>Diagnostic Procedures</i>	No. tests			
	Imaging (Thorax radiography)	No. tests	0	7.9	0.00
	Imaging (ECG)	No. tests	0	2.2	0.00
	Laboratory (blood count)	No. tests	1	17	17.00
	Laboratory (coagulation time)	No. tests	1	2.8	2.80
	Physician (digestive specialist)	Min.	10	1.083	10.83
	Anaesthetist	Min.	10	1.083	10.83
Examination (colonoscopy)	Total Operation room time	Min.	30		0.00
	Physician (digestive specialist)	Hours of staff	0.5	43.42	21.71
	Nurse	Hours of staff	0.5	20.37	10.19
	Auxiliary nurse	Hours of staff	0.5	12.27	6.14
	Anaesthetist	Hours of staff	0	33.25	0.00
	Use of instrument (running and depreciation costs)	No.			
	Drugs provided (especially sedatives)	Days (cost: price of a dd)			
	Propofol 1 mg/Kg	Days (cost: price of a dd)	0	9	0.00
	Midazolam 2-5 mg	Days (cost: price of a dd)	1	0.47	0.47
	Fentanilo 50 mcg	Days (cost: price of a dd)	1	0.37	0.37

	Reanimation time	Hours	0.75	20.373 6	15.28
	Follow-up visits	No. Visits	0	10.83	0.00
Overhead	Running costs of ambulatory service	% over total costs	14%		12.43
Total Cost per case		€(euros)			108.0 4

* Note: hours of staff: proportion of hours devoted by the indicated staff (i.e. 9 surgeons means 3 surgeons 3 hours so total of 9 equivalent hours of surgeon)

Analysis of results:

Colonoscopy	H1	H2	H3	H4	H5	Average	%
STAFF COST	80.56	69.88	69.73	64.64	74.97	71.96	65.07%
DRUGS COST	9.00	0.47	0.47	9.84	0.84	4.12	3.73%
DIAGNOSTIC PROCEDURES COST	29.31	18.30	0.00	26.40	19.80	18.76	16.97%
MATERIAL AND DEVICES COST	3.41	3.41	3.41	3.41	3.41	3.41	3.08%
OVERHEAD COST	15.45	11.52	9.13	13.11	12.43	12.33	11.15%
TOTAL COST	137.74	103.58	82.74	117.40	111.45	110.58	100%
Intervention time (minutes)	20.00	30.00	20.00	20.00	30.00	24.00	
Outpatient visits	21.00	20.00	20.00	20.00	20.00	20.20	

1. **Average total cost** for colonoscopy is €110.58, ranging from €82.74 in hospital 3 to €137.74 in hospital 1. The lowest calculated cost for colonoscopy in hospital 3 represents only 60% of cost in hospital 1 for this same diagnostic.

2. On the average, **cost distribution** among input types follows the following pattern: staff costs account for 65.07% of total cost, diagnostic and procedure cost account for 16.97%. Medicines only account for 3.73% of total cost of this diagnostic.

3. The **main reason for variation** in total cost among provider costs is also related to the **diagnostic and procedures cost**. The higher difference appears in the blood test since hospital 3 does not use this diagnostic test in the assessment. This is mainly due to the role of the anaesthetist which when involved requires a set of diagnostic procedures. Hospitals not using anaesthetist imply that there is always one available at the hospital in case of problems.

4. The second source of cost variation among providers lies in the **staff costs**: differences in this case are not very high and are mainly due to the number of outpatient visits (whether the patient is called prior to the intervention and for a follow up visit or not), however, intervention time does not differ much and therefore has a lower effect on costs.

5. **Drugs costs** do not represent a high proportion of total cost of colonoscopy, however, there are big differences if using an anaesthetic (propofol) or just a relaxing drug (Midazolam), or both.

Vignette 9 - Tooth filling

12 y/o child presents with a toothache in a lower molar tooth at dentist's office; after diagnosis, the dentist decides to provide an Amalgam filling.

DENTIST A

Table 40. Tooth filling in Dentist A

Phase	Elements	Units	Unit Cost	No. of units used	Total costs
Assessment	Imaging (e.g. X-ray)	No. tests	2.22	1	2.22
	Dentist	Min.	1	30	30
	Other personnel (auxiliary)	Min.	0.1	30	3
Therapy	Dentist	Min.	1	30	30
	Other personnel	Min.	0.125	30	3.75
	Material (amalgam)	No. prepared units	1.5	2	3
	Other consumables	No. prepared units	0.2	5	1
After care	Drugs prescribed	DD*			
	Drugs given by provider	DD			
	Second visit scheduled: O YES ✓ NO				
Overhead	Running costs of ambulatory service	Min.**	1.1	60	66
Total Costs		euros			138.97

*DD daily dosis prescribed, **Min: Length of total ambulatory contact in minutes (hours)

DENTIST B**Table 41. Tooth filling in Destist B**

Phase	Elements	Units	Unit Cost	No. of units used	Total costs
Assessment	Imaging (e.g. X-ray) Rveledao manual	No. tests	2.80	1	2.80
	Dentist	Min.	0.83	30	25
	Other personnel (reception, auxiliary)	Min.	0.1	30	3
Therapy	Dentist	Min.	0.83	30	25
	Other personnel	Min.	0.1	30	3
	Material (amalgam)	No. prepared units	1.5	2	3
	Other consumables	No. prepared units	0.2	5	1
After care	Drugs prescribed	DD*			
	Drugs given by provider	DD			
	Second visit scheduled: O YES ✓ NO				
Overhead	Running costs of ambulatory service	Min.**	0.86 6	60	52
Total Costs		Euros			114. 8

*DD daily dosis prescribed, **Min: Length of total ambulatory contact in minutes (hours)

DENTIST C**Table 42. Tooth filling in Destist C**

Phase	Elements	Units	Unit Cost	No. of units used	Total costs
Assessment	Imaging (e.g. X-ray) Rveledao manual	No. tests	2.03	1	2.03
	Dentist	Min.	1	30	30
	Other personnel (reception, auxiliary)	Min.	0.1	30	3
Therapy	Dentist	Min.	1	40	40
	Other personnel	Min.	0.15	40	6
	Material (amalgam)	No. prepared units	1.5	2	3
	Other consumables	No. prepared units	0.2	5	1
After care	Drugs prescribed	DD*			
	Drugs given by provider	DD			

	Second visit scheduled: O YES ✓ NO				
Overhead	Running costs of ambulatory service	Min.**	0.57	70	40
					125.03

*DD daily dosis prescribed, **Min: Length of total ambulatory contact in minutes (hours)

DENTIST D

Table 43. Tooth filling in Destist D

Phase	Elements	Units	Unit Cost	No. of units used	Total costs
Assessment	Imaging (e.g. X-ray) Rveledao manual	No. tests	3	1	3
	Dentist	Min.	1	25	25
	Other personnel (reception, auxiliary)	Min.	0.12	25	3
Therapy	Dentist	Min.	1	40	40
	Other personnel	Min.	0.12	40	4.8
	Material (amalgam)	No. prepared units	1.5	2	3
	Other consumables	No. prepared units	0.23	5	1.15
After care	Drugs prescribed	DD*			
	Drugs given by provider	DD			
	Second visit scheduled: O YES ✓ NO				
Overhead	Running costs of ambulatory service	Min.**	0.64	6560	42
Total Costs					121.95

*DD daily dosis prescribed, **Min: Length of total ambulatory contact in minutes (hours)

Analysis of results:

Colonoscopy	D1	D2	D3	D4	Average	%
STAFF COST	66,75	56,00	79,00	72,80	68,64	54,83%
DRUGS COST	0,00	0,00	0,00	0,00	0,00	0,00%
DIAGNOSTIC PROCEDURES COST	2,22	2,80	2,03	3,00	2,51	2,01%
MATERIAL AND DEVICES COST	4,00	4,00	4,00	4,15	4,04	3,23%
OVERHEAD COST	66,00	52,00	40,00	42,00	50,00	39,94%
TOTAL COST	138,97	114,80	125,03	121,95	125,19	100%
Intervention time (minutes)	6,11	6,11	10,19	0,00	5,60	

1. **Average total cost** for tooth filling is €125.19, ranging from €14.8 in dentist B to €138.97 in dentist A. The lowest calculated cost for tooth filling in dentist B represents 82% of cost in dentist A for this same diagnostic.
2. On the average, **cost distribution** among input types follows the following pattern: staff costs account for 54.83% of total cost, diagnostic and procedure cost account for 2.01%. Since this procedure in Spain is private overhead is much more important than in the other procedures. Private institutions account infrastructure cost (both materials and buildings rental or amortization) and on the opposite public ones do not account buildings amortization.
3. There is no much variation in costs among providers although the **main reason for variation** is related to intervention time and overhead costs (their geographical location means different rental rates).

Vignette 10 - Normal Delivery

Healthy woman, 25-34 years old, presents to hospital after 39 weeks of an uncomplicated first pregnancy with labour pains. Start of case vignette: hospital door. Upon examination of the woman, the baby presentation is normal (i.e. cephalic/ vertex; one foetus) and a vaginal “normal” delivery is carried out without complications (no transfer to paediatric department or new born intensive care unit). End of vignette: discharge of mother and child (both are well).

HOSPITAL A

Table 44. Normal delivery in Hospital A

Phase	Elements	Units	No. of units used/ patient	Unit Cost	Total costs
Pre-delivery (admission and planning)	<i>Diagnostic Procedures</i>				
	Laboratory (blood count)	No.	1	16.2	16.2
	Laboratory (blood coagulation,)	No.	1	2.7	2.7
	Cardiotocography (cost included in amortisation and medical equipment overheads)	No.	1	0	0
	<i>Care before delivery</i>		180		
	Obstetrician input	Minutes			
	Midwife input	Minutes			
	Other (nursing)	Minutes	10	20.37	3.395
	<i>Drugs, infusions, injections, etc. Drug A, Drug B, etc.</i>	DD**			
	Bupivacain + Fentanil 50 mg	Daily dose	1	1.56	1.56
	<i>Blood products</i>				
	Vitamine K	DD	1		
Delivery	Delivery Team (altogether or separately)	Min.	30		
	Obstetrician	Min.	30	57.74	28.87
	Midwife	Min.	30	20.37	10.19
	Nurse	Min.	30	20.37	10.19
	Anaesthetist	Min.	30	44.22	22.11
	Consumables including those for epidural	Min.			
Normal ward for mother and child	Obstetrician	Patient days	2		
	Nursing	Patient days (3 hours a day)	2 x 2 persons mother and child)	20.37	244.48
	Drugs	DD**			
	Diagnostic procedures of mother and child (e.g. imaging, laboratory: blood count, bilirubine)	No.			
	Therapeutic procedures (e.g. punctures, drainages, special wound dressing)	No.			
Overhead (including administration, catering, etc.)	Total, or: - On ward level - On departmental level - On hospital level	% over total costs	20%		67.94
	Food and laundry		2	13	26
Total Costs		euros			420,64

*The unit patient days include personnel costs directly spent with the respective case per day and personnel costs which are not directly spent with the respective case per day (but are allocated to it proportionally) e.g. staff assemblies, studying documents.

HOSPITAL B

Table 45. Normal delivery in Hospital B

Phase	Elements	Units	No. of units used/patient	Unit Cost	Total costs
Pre-delivery (admission and planning)	<i>Diagnostic Procedures</i>				
	Laboratory (blood count)	No.	1	15.8	15.8
	Laboratory (blood coagulation,)	No.	1	2.5	2.5
	Cardiotocography (cost included in amortisation and medical equipment overheads)	No.	1	0	0
	<i>Care before delivery</i>		180		
	Obstetrician input	Minutes			
	Midwife input	Minutes			
	Other (nursing)	Minutes	10		
	<i>Drugs, infusions, injections, etc. Drug A, Drug B, etc.</i>	DD**			
	Bupivacain + Fentanil 50 mg	Daily dose	1	1.56	1.56
	<i>Blood products</i>				
	Vitamine K	DD	1		
Delivery	Delivery Team (altogether or separately)	Min.	30		
	Obstetrician	Min.	30	57,74	28,87
	Midwife	Min.	30	20,37	10,19
	Nurse	Min.	30	20,37	10,19
	Anaesthetist	Min.	30	44,22	22,11
	Consumables including those for epidural	Min.			
Normal ward for mother and child	Obstetrician	Patient days	3		
	Nursing	Patient days (3 visits a day)	3 x 2 persons mother and child)	20.37	366.748
	Drugs	DD**			
	Diagnostic procedures of mother and child (e.g. imaging, laboratory: blood count, bilirubine)	No.			
	Therapeutic procedures (e.g. punctures, drainages, special wound dressing)	No.			
Overhead (including administration, catering, etc.)	Total, or: - On ward level - On departmental level - On hospital level	% over total costs	19%		87.01
	Food and laundry		3	13	39
Total Costs		euros			577.95

Table 46. Normal delivery in Hospital C

Phase	Elements	Units	No. of units used/ patient	Unit Cost	Total costs
Pre-delivery (admission and planning)	<i>Diagnostic Procedures</i>				
	Laboratory (blood count)	No.	1	16	16
	Laboratory (blood coagulation,)	No.	1	2.9	2.9
	Cardiotocography (cost included in amortisation and medical equipment overheads)	No.	1	0	0
	<i>Care before delivery</i>		180		
	Obstetrician input	Minutes			
	Midwife input	Minutes			
	Other (nursing)	Minutes	10		
	<i>Drugs, infusions, injections, etc. Drug A, Drug B, etc.</i>	DD**			
	Bupivacain + Fentanil 50 mg	Daily dose	1	1.56	1.56
	<i>Blood products</i>				
	Vitamine K	DD	1		
Delivery	Delivery Team (altogether or separately)	Min.	30		
	Obstetrician	Min.	30	57,74	28,87
	Midwife	Min.	30	20,37	10,19
	Nurse	Min.	30	20,37	10,19
	Anaesthetist	Min.	30	44,22	22,11
	Consumables including those for epidural	Min.			
Normal ward for mother and child	Obstetrician	Patient days	2		
	Nursing	Patient days (3 hours a day)	2 x 2 persons (mother and child)	20.37	244.48
	Drugs	DD**			
	Diagnostic procedures of mother and child (e.g. imaging, laboratory: blood count, bilirubine)	No.			
	Therapeutic procedures (e.g. punctures, drainages, special wound dressing)	No.			
Overhead (including administration, catering, etc.)	Total, or: - On ward level - On departmental level - On hospital level	% over total costs	20%		6406
	Food and laundry		2	13	26
Total Costs		euros			413.36

HOSPITAL D

Table 47. Normal delivery in Hospital D

Phase	Elements	Units	No. of units used/patient	Unit Cost	Total costs
Pre-delivery (admission and planning)	<i>Diagnostic Procedures</i>				
	Laboratory (blood count)	No.	1	14.3	14.3
	Laboratory (blood coagulation,)	No.	1	2.7	2.7
	Cardiotocography (cost included in amortisation and medical equipment overheads)	No.	1	0	0
	<i>Care before delivery</i>		180		
	Obstetrician input	Minutes			
	Midwife input	Minutes			
	Other (nursing)	Minutes	10		
	<i>Drugs, infusions, injections, etc. Drug A, Drug B, etc.</i>	DD**			
	Bupivacain + Fentanil 50 mg	Daily dose	1	1.56	1.56
	<i>Blood products</i>				
	Vitamine K	DD	1		
Delivery	Delivery Team (altogether or separately)	Min.	30		
	Obstetrician	Min.	30	57,74	28,87
	Midwife	Min.	30	20,37	10,19
	Nurse	Min.	30	20,37	10,19
	Anaesthetist	Min.	30	44,22	22,11
	Consumables including those for epidural	Min.			
Normal ward for mother and child	Obstetrician	Patient days	2		
	Nursing	Patient days (3 hours a day)	2 x 2 persons mother and child)	20.37	244.48
	Drugs	DD**			
	Diagnostic procedures of mother and child (e.g. imaging, laboratory: blood count, bilirubine)	No.			
	Therapeutic procedures (e.g. punctures, drainages, special wound dressing)	No.			
Overhead (including administration, catering, etc.)	Total, or: - On ward level - On departmental level - On hospital level	% over total costs	18%		60.19
	Food and laundry		2	13	26
Total Costs		euros			407.6

HOSPITAL E

Table 48. Normal delivery in Hospital E

Phase	Elements	Units	No. of units used/patient	Unit Cost	Total costs
Pre-delivery (admission and planning)	<i>Diagnostic Procedures</i>				
	Laboratory (blood count)	No.	1	17	17
	Laboratory (blood coagulation,)	No.	1	2.8	2.8
	Cardiotocography (cost included in amortisation and medical equipment overheads)	No.	1	0	0
	<i>Care before delivery</i>		180		
	Obstetrician input	Minutes			
	Midwife input	Minutes			
	Other (nursing)	Minutes	10		
	<i>Drugs, infusions, injections, etc. Drug A, Drug B, etc.</i>	DD**			
	Bupivacain + Fentanil 50 mg	Daily dose	1	1.56	1.56
	<i>Blood products</i>				
	Vitamine K	DD	1		
Delivery	Delivery Team (altogether or separately)	Min.	30		
	Obstetrician	Min.	30	57,74	28,87
	Midwife	Min.	30	20,37	10,19
	Nurse	Min.	30	20,37	10,19
	Anaesthetist	Min.	30	44,22	22,11
	Consumables including those for epidural	Min.			
Normal ward for mother and child	Obstetrician	Patient days	3		
	Nursing	Patient days (3 hours a day)	2 x 2 persons (mother and child)	20.37	366,7248
	Drugs	DD**			
	Diagnostic procedures of mother and child (e.g. imaging, laboratory: blood count, bilirubine)	No.			
	Therapeutic procedures (e.g. punctures, drainages, special wound dressing)	No.			
Overhead (including administration, catering, etc.)	Total	% over total costs	21%		92.91
	Food and laundry		3	13	39
Total Costs		euros			565.36

Analysis of results:

Normal delivery	H1	H2	H3	H4	H5	Average	%
STAFF COST	319.24	438.08	315.84	315.84	438.08	365.42	77.26%
DRUGS COST	1.56	1.56	1.56	1.56	1.56	1.56	0.33%
DIAGNOSTIC PROCEDURES COST	18.90	18.30	18.90	17.00	19.80	18.58	3.93%
OVERHEAD COST	80,94	100,01	77,06	73,19	105,91	87.42	18.48%
TOTAL COST	420,64	557,95	413,36	407,60	565,36	472.98	100%

1. **Average total cost** for Normal delivery is €472.98, ranging from €407.6 in hospital 4 to €565.35 in hospital 5.

2. On the average, **cost distribution** among input types follows the following pattern: staff costs account for 77.26% of total cost, and overhead costs 18.48%.

3. The **main reason for variation** in total cost among provider costs is also related to the **staff** and especially to the number of days in normal ward.

5. **Drugs costs** do not represent a high proportion of total cost of Normal delivery.

C) REIMBURSEMENT FOR PROVIDER BY PURCHASER.

Health care system in Catalonia is a particular case in Spanish Regional Health Systems, because of the clear separation between purchasing and providing functions. The Catalan Health Authority purchases health services from providers, regardless of whether they are publicly owned. Hospital care services are provided by a publicly financed network of hospitals (Xarxa Hospitalària d'Utilització Pública, XHUP from now). The current hospitals payment system in the XHUP was introduced in 1997 as a prospective method of purchasing hospital care services. In broad terms, the payment system recognizes two different blocks: activity and programmes¹. In the activity block, activities carried out by hospitals in four product lines are valued separately: hospitalisation, outpatient consultations, emergencies, and specific techniques treatments and processes.

The purchasing of outpatient consultations to hospitals is based on contracting first visits, with a price paid for every visit that differs between hospitals according to their structure-related level. Specific techniques and treatments refer to certain activities for which a price per process is set on a DRG basis (ambulatory minor surgery, day hospital, and treatments and diagnostic procedures of high complexity like Brachitherapy, radiotherapy, diagnostic angiography, etc.). A Health Department Order annually passes all these tariffs and prices. However, updating is normally linked to consumer price index changes, since there is no systematic method or formula.

With regard to hospitalisation budget allocation (about 70 per cent of total activity budget), Catalan hospitals are paid per number of discharges. The discharge price includes two adjustment factors: one associated with the hospital case-mix (RRI: relative resources intensity) and another derived from the characteristics of each hospital structure (SRI: structure relative index). Thirty-five per cent of total resources are assigned by case-mix and the other 65 per cent attending structural differences.

An extension of this description of the payment system can be found in document phase 6. This system makes it impossible to determine how much each hospital is receiving for a specific procedure. On one side to admit a new inpatient raise the number of discharges, but depending on its complexity may cost more than the average payment per discharge, on the

¹ The programmes block includes health programmes that the Regional Health Department is especially interested in, as well as education and research.

other it might be blocking the bed for a cheaper higher complexity procedure. Although we do not know any study on cream skimming in Catalonia, apparently it doesn't exist.

D) CONCLUSIONS AND INTERPRETATION OF RESULTS

COSTS	H1	H2	H3	H4	H5	Average
Appendectomy	679,99	690,93	550,64	n.a.	540,99	615,64
Hip replacement	3.727,96	3.404,95	3.873,79	3.300,60	3.557,26	3.572,91
Cataracts	668,56	584,86	569,22	637,28	606,67	613,32
Stroke	1.770,76	2.666,28	1.775,55	2.299,28	1.147,32	1.931,84
AMI	1.325,85	2.131,03	2.133,80	2.606,82	1.367,51	1.913,00
Ambulatory Rehabilitation	325,33	318,35	302,00	368,56	239,88	310,82
Colonoscopy	137,74	103,58	82,74	117,40	111,45	110,58
Cough	CAPA 668,562552	CAPB 584,861068	CAPC 569,222968	CAPD 637,278652		614,98

A higher range of provider variation in procedure cost is observed in two high cost procedures such as stroke and AMI, but also a high degree of variation has been observed for ambulatory physiotherapy and colonoscopy. Appendectomy, hip replacement and cataracts present a lower level of cost variation at provider level. Variation at this level can be attributed to practice variation and also to case-mix differences. The method employed in this report does not allow to disentangle the responsibility of both sources of cost variation.

Hip replacement and cataracts are the lowest labour intensive procedures given that they use high cost medical devices (implant, intra-ocular lenses) which account for a high proportion of total cost.

None of the procedures included in this report resulted to be intensive in the use of pharmaceuticals.

For the most expensive procedures, hospital 1 is the one that accounts for lower costs. This could be explained by probable lower case-mix (complexity and severity). Hospital 5 and hospital 1 derive more complex and severe urgent patients to other providers.

Hospital 4 appears to be the hospital with higher length of stay and follow-up visits, these facts can be related to the following reasons: this hospital is the only one attending a mix of public and private patients (approximately 50/50), and secondly, most of these private patients come from an insurer with a very old population.

Hospital 2 is the one that manages to get better prices for devices and diagnostic procedures. However, it usually has higher procedure and diagnostic costs in these categories because of higher utilization.

Main cost differences appear to be related to supply availability. Technology in general, when it is available in the hospital, it is always used, and this seems to be a determinant reason for its utilization, instead of need.

Unitary prices are similar and differences are explained by resources utilisation. Length of stay, intervention time and follow-up visits differ quite a lot across providers influencing resources utilization and overhead costs.

A final comment has to be added about costing methodologies and activity in Catalonia and Spain in general. Since main determinant of costs are salaries, which are directly compensated in budgets (based on capacity, which includes staff) management of health services seems not to be really worried about processes costs and differences between them and other providers. At the same time, information is very difficult to obtain specially that related to costs (utilization was provided by medical staff which is less reluctant to provide information, but with a higher level of uncertainty).

Management is mainly worried about getting better prices for devices and drugs which both can get some manageable surplus on their budgets.

A big effort should be done from the Health Care System administration to introduce cost per process methodologies to be able to increase the efficiency of the system and introduce proper policies that target existing inefficiencies.