Costs and prices of healthcare services in the Netherlands: a micro costing approach based on case-vignettes

A contribution to Work Package 9 of the EU funded research project 'HealthBASKET': Assessment of services delivered and costs

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Preface

This report describes the results of a micro costing study that aimed to determine the resource utilisation, unit costs and prices of 10 case-vignettes describing healthcare services in the Netherlands. This report has been prepared by the institute for Health Policy and Management of Erasmus MC in Rotterdam as part of work package 9 of the EU funded research project 'HealthBASKET (full title: Health Benefits and Service Costs in Europe, contract no. FP6 501588).

Content

Abbreviations

AMI | Acute Myocardial Infarction

Caps | Capsule

Cardio | Cardiology department

CTG / ZAio | Healthcare Tariff Board / Healthcare Authority in formation (College Tarieven Gezondheidszorg / ZorgAutoriteit in oprichting)

DBC | Diagnosis Treatment Combination (Diagnose Behandel Combinatie)

DD | Daily Dose

DIS | DBC Information System (DBC Informatie Systeem)

ENT | Ear, Nose, and Throat

Physio | Physiotherapist

GE | Gastro-Enterology department

GP | General Practitioner

ICU | Intensive Care Unit

Inje | Injection

IU | International Units

Lab | Laboratory services

na | Not applicable

Neu | Neurology department

NFS | Not Further Specified

Obs | Obstetrics department

OP | Operation

Oph | Ophthalmology department

Orth | Orthopaedic department

PTCA | Percutanerous Transluminal Coronary Angioplasty

Surg | Surgical department

Tabl | Tablet

1. Introduction

Due to medicalisation, ageing of the population and technological and pharmaceutical developments, Western countries have been confronted with a rapid increase in the costs of healthcare during the last decades. The armamentarium of the medical profession has grown enormously and medications have become available for which, until recently, treatment was not possible. These developments coincided with increasing pressure on budgets of national governments and the awareness that limits must be set to the growth of the costs of healthcare [1]. For that reason, decision-makers have searched for explicit criteria to define and assess the content of health benefit packages. For rational decision-making, national and EU policy-makers need reliable comparisons about available health services, how these health services are defined, what their costs are and which prices they will have to pay for them [2].

The aim of the 'HealthBASKET' project is to provide more information about the content of the health benefit package in EU countries, and to compare costs and prices of healthcare services across countries. More specifically, the aims of the project are to [2]:

- collect and describe how different countries define the services provided within the system by analysing both the structure and contents of benefit "catalogues" (or "baskets") as well as the process of defining these benefits catalogues;
- explore the possibilities of building a European taxonomy of benefits, based on that analysis and other relevant classifications, to enable a common language for cost comparisons;
- review methodologies used to assess costs and prices of services across countries and to identify "best practice" in the analysis of costs at the micro-level with the scope of international comparability;
- assess costs variations between and within countries, using a selection of "case-vignettes" representing need for care in both inpatient and out-patient settings.

The first three objectives of the study have been addressed in work packages 1 to 7 of the 'HealthBASKET' project. The fourth objective of the project is addressed in work package 9. The rationale for this stage of the project is the incomparability of resource utilisation and costs across settings and countries of the European Union. Many authors have expressed their worries about the quality and comparability of

costing approaches in costing studies and economic evaluations [1]. The incomparability may not necessarily be a problem as long as differences in outcomes reflect real differences in the use of resources and costs. However, it is clear that some of the observed differences have more to do with study methodology than with real differences [3]. Badia et al. reviewed economic evaluations of hepatitis B vaccination programs and found numerous discrepancies between studies that were not related to their aim. They concluded that 'this kind of heterogeneity ought to be minimised, otherwise economic evaluations of the same problem in the same setting could produce different results, undermining their impact on the decision-maker and even the credibility of the evaluations' [4]. Hjelmgren et al. evaluated national guidelines for economic evaluations and concluded that 'especially the valuation of healthcare resources appears to be a difficult problem' [5]. If individual cost data are available at all, it is usually unclear whether differences are due to differences in the actual services delivered, to varying definitions of which cost categories are included or to actual differences in costs per service.

Work package 9 of the HealthBASKET project explores the issue of incomparability of costs across settings. In particular, this part of the project explores the reasons underlying variations in the costs of individual services, and addresses the question to what extent differences in resource use and costs of healthcare services remain to exist if the same costing methodology is used in all settings and countries. In addition, this part of the project explores whether it is possible to apply a common costing methodology in the nine participating EU member states. To compare the costs across member states, 10 episodes of care have been defined and described in so-called case-vignettes. In each country, information on the resources used and the costs associated with each episode of care is collected in five to ten representative healthcare providers.

This report describes the methodology and results for the Netherlands. Further details about the case-vignettes and the methodology used to collect resource use and costs are provided in chapter 2. Chapter 3 contains the primary outcomes of the study. Where applicable, our findings are compared with relevant national guidelines. For each case-vignette tables concerning the average costs per case-vignette across all healthcare providers and concerning the costs of each separate healthcare provider are presented. Underlying details of the calculations are provided in the appendices. In chapter 4, the findings for the Netherlands are discussed and related to the research questions.

2. Methods

2.1. Design of the study

The aim of this study is to estimate costs and prices of 10 different episodes of care in the Netherlands and to compare costs between healthcare providers. To achieve this aim, 10 episodes of care have been defined and described in case-vignettes. Of each case-vignette, the use of resources and the costs of these resources have been determined in five to ten healthcare provider organizations. The 10 case-vignettes are summarised in table 1. A complete description of the case-vignettes is presented in Box 1.

Table 1. Diagnosis and type of care of the 10 case-vignettes

Need for care	Age group	Type of Care		
1. Appendectomy	Youth	In-patient	Surgery	Emergency
2. Normal delivery	Young adult	In-patient	Obstetrics	Elective
3. Hip-replacement	Elderly	In-patient	Surgery	Elective
4. Cataract	Elderly	Out-patient (day case)	Surgery	Elective
5. Stroke	Elderly	In-patient	Medical	Emergency
6. AMI (PTCA)	Adult	In-patient	Medical	Emergency
7. Cough	Child	Out-patient	Pediatrics / GP	Emergency
8. Colonoscopy	Elderly	Out-patient	Diagnostic	Elective
9. Tooth filling	Child	Out-patient	Dental	Emergency
10.Physiotherapy (knee)	Young adult	Out-patient	Rehabilitative	-

The case-vignettes are chosen such that they include a variety of diagnoses and settings. By definition, the case-vignettes appendectomy, hip replacement, stroke, and AMI (vignette 1, 3, 5 and 6) concern inpatient hospital treatment. The case-vignette normal delivery is defined as inpatient treatment, but is performed either in daycare or at home in the Netherlands when no complications occur. The standard setting for case-vignettes cataract surgery and colonoscopy (vignette 4 and 8) in the Netherlands is day-care performed in the hospital. The settings for case-vignettes 7, 9 and 10 are the practices of GPs, dentists and physiotherapists respectively.

Box 1: Description of case-vignettes

Vignette 1: Appendectomy

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.

Vignette 2: 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).

Vignette 3: Hip replacement

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).

Vignette 4: Cataract surgery

(day-surgery/out-patient procedure): Male, 70-75 years old, has consulted a hospital clinic/ ophtalmologist 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 (or ophtalmologist office if applicable) including any pre-operative assessment (possibly in separate visits). The cataract operation is performed in daycare / as an outpatient procedure.

Vignette 5: Stroke

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) ischaemic neurological deficits are excluded. End of vignette: discharge to rehabilitative institution or home.

Vignette 6: Acute myocardial infarction

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 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.

Vignette 7: Cough

Parents presenting at a GP/ paediatric GP office with their 2 yr. old boy having cough and fever (38.5°C) since two days. The case-vignette includes the costs of the initial and (if any) subsequent visits to the GP and the costs of medications prescribed during the visits.

Vignette 8: Colonoscopy

Male 55-70 year old with positive Faecal Occult Blood test is referred to an internist's/ gastro-enterologist office / hospital out-patient department for diagnostic colonoscopy. Start of vignette: patient presents for the first time in office / out-patient department. Cases with polypectomy during colonoscopy, pathological examinations and follow-up visits are excluded.

Vignette 9: Tooth filling

Ca. 12 year old child presents with a toothache in a lower molar tooth at dentist office; after diagnosis, the dentist decides to provide an amalgam filling.

Vignette 10: Physiotherapy after anterior cruciate ligament reconstruction

Male 25-35 years after anterior cruciate ligament reconstruction, referred to ambulatory rehabilitation after discharge from hospital. Repair and hospital stay were without complications and discharge occurred after average length of stay. The treatment episode includes duration and frequency of physiotherapy (e.g. 4-6 weeks, 3 times per week with 1 hour per session).

2.2. Data collection

For the approach used to collect data about resource utilisation and costs a distinction is made between episodes of care provided in hospitals (case-vignettes 1-6 and 8) and episodes of care provided in other settings (case-vignettes 7, 9 and 10).

Case-vignettes concerning hospital care

In February 2005, a case-mix system was introduced in the Netherlands for the reimbursement of hospitals' and medical specialists' services. This case-mix system is based on diagnosis treatment combinations (DBCs), defined as the whole set of activities and interventions of the hospital and medical specialist resulting from the first consultation and diagnosis of the medical specialist at the hospital. Because of the introduction of the DBC system, all hospitals in the Netherlands started to register the type and number of healthcare services provided to patients and to record the DBCs for each patient. For details about the DBC system and the DBC registration, we refer to work packages 2 and 6 of the HealthBASKET project [6, 7].

For the current study, the DBC database served as the starting point for the collection of resource utilisation and cost data for case-vignettes in the hospital setting (vignette 1-6). This database contains data about diagnosis treatment combinations, the use of healthcare resource utilisation for each DBC and unit costs of healthcare services. Currently, this database contains data of approximately 80 (79%) Dutch hospitals. Because one case-vignette may involve more than one DBC, we first identified all DBCs matching the case-vignette descriptions. Appendix 1 contains an overview of the DBC coding system and the relevant DBCs for each case-vignette. For each DBC code corresponding with the case-vignette description, the following data were collected:

- usage and unit costs of imaging procedures
- usage and unit costs of laboratory tests
- usage and unit costs of other diagnostic procedures

For the current study, we used information from moderate sized hospitals. Moderate is defined as hospitals having an annual budget between € 60 and 120 million. Data were used of all DBCs of these hospitals in the database of which the closing date was in 2005. Because for colonoscopy no DBC exists, no data could be retrieved from the DBC database for this case-vignette.

The second step in the collection of resource utilisation and cost data of case-vignettes in the hospital setting was to approach medical specialists. For each case-vignette, about 20 medical specialists from different hospitals were randomly selected and asked to cooperate. Only medical specialists from general (non-university) hospitals were selected. From all medical specialists agreeing to cooperate, data was collected using standardised questionnaires. Data that was asked for included:

- the size of the hospital (number of beds)
- the size of the clinical department (number of beds)
- length of inpatient stay for a person matching the case-vignette
- the time physicians, nursing personnel , operating room assistants and other personnel spent on a single patient as described in the case-vignette (nursing only included time in addition to the regular occupation of the ward that was not already covered in the nursing costs per inpatient day)
- the duration of the surgical intervention (if applicable)
- the use and costs of medical materials (i.e. lens implant, hip prosthesis, etc)
- the prescription of drugs, including daily dose, type, duration and costs
- the deployment of additional paramedical services like rehabilitation and physiotherapy

To estimate the costs of nursing staff of inpatient days we collected additional information from the financial administration from the hospital and / or the manager responsible for the deployment and budget of nursing care. Costs of nursing staff per inpatient day were based on information about the number of beds of the clinical departments, average occupation and the labour costs registered at the clinical department.

Estimates of the costs of nutrition and hospital stay, costs of overheads and capital costs were based on the annual accounts 2005 of the hospitals. Costs of nutrition and hospital stay were expressed as a cost per inpatient day and included foods, kitchen equipment, laundry and other costs of hotel services. Running costs of the operating theatre (equipment, general materials) were included in the costs of overheads and capital and not valued separately.

Case-vignettes concerning non-hospital care

The settings for case-vignettes 7, 9 and 10 are the practices of GPs, dentists and physiotherapists respectively. The initial approach to select sites for the data collection involved the selection of healthcare providers from the web of contacts of the researchers involved in the project. Additional sites were selected by identification through the Internet and healthcare providers were asked to cooperate. Information was collected using standardised questionnaires for each case-vignette. Data that was asked for included:

- the time spent on a patient as described in the case-vignette by the GP / dentist / physiotherapist and supportive personnel
- the number of times a patient visits the GP / dentist / physiotherapist
- the usage, type and costs of materials (e.g. amalgam filling)
- the prescription of drugs, including type, duration and costs
- the performance of any additional procedures
- the costs of overheads

2.3. Labour costs

Medical specialists, GPs, dentists, physiotherapists and midwives are usually independent and not on the payroll of the healthcare provider. For that reason, costs of these practitioners were based on time estimates and multiplied with standardised costs per time unit. Costs per time unit were based on the normative income and the number of workable hours per year as issued by CTG / ZAio [8-13]. Costs of nurses and assistants were also based on time estimates and standardised costs per time unit [14-17]. All costs per time unit were based on 2005 cost data. Costs per time unit for independent practitioners and employees are summarised in table 2. Specifications of these calculations are provided in appendix 2.

Table 2. Costs per time unit of practitioners and employees (year: 2005)

	Cost per hour in €	Cost per minute in €
Medical specialist	147.50	2.46
GP	66.17	1.10
Dentist	58.94	0.98
Physiotherapist	35.56	0.59
Midwife	39.68	0.66
Fellow	32.58	0.54
OP assistant	28.58	0.48
Nurse	24.87	0.41
GP assistant	21.02	0.35
Dental assistant	20.43	0.34

2.4. Overheads and capital costs

The way overheads and capital costs were incorporated in the calculations differed between the case-vignettes performed in the hospital setting and the case-vignettes concerning non-hospital care.

Costs of overheads and capital in the hospital setting were based on the annual accounts 2005 of the participating hospitals. Overheads included general expenses, administration and registration, energy, maintenance, insurance, and the personnel costs of non-patient services, like secretary services, management, administration and other supportive departments. To be specific, based on the standard account scheme of Dutch hospitals, the following cost categories were considered as overheads:

- salary costs, social premium costs and other personnel expenses of:
    - management and supportive staff
    - administrative personnel
    - automation personnel
    - educative personnel
    - area and housing related positions, like security, cleaning, reception, etc.
- general expenses, including:
    - administration and registration
    - communication

    - accountancy and consultancy
    - insurance
    - audiovisual equipments and materials
    - other general expenses
- area and housing related costs, including
    - maintenance of the area, hospitals and equipment
    - energy costs

Capital costs included the depreciation costs of buildings, machinery and equipment and the costs of interest. The economic life duration of buildings was assumed 30 years. That of machinery and equipment was assumed 10 years, which equals the official depreciation period for medical equipment as prescribed by the Dutch Healthcare Authority. Depreciation costs were based on historical purchase prices and linear depreciation. The interest rate was determined at 4%.
The annual costs of overheads and capital were derived from the annual accounts of the hospitals and expressed as a percentage of the costs of patient care (i.e. as a percentage of all hospital cost that were not included in the overheads and capital costs). These percentages were used to calculate the overheads and capital costs for each case vignette and multiplied with the patient-related costs of each vignette. It is important to note that medical specialists are usually independent and not on the payroll of the hospital. Hence, the mark-up percentages for overheads and capital costs as based on the annual accounts of the hospitals, express a mark-up over the hospital costs only. For that reason, to calculate the overheads and capital costs for each case vignette, the mark-up percentages are applied to the patient-related costs of each vignette, exclusive of the costs of medical specialists.

Costs of overheads of case-vignettes concerning non-hospital care were directly derived from the GP, dental and physiotherapeutic practices. Costs that were asked for included the costs of supportive personnel, insurance, telecommunication and administration. Capital costs (depreciation and interest) could not be obtained from the individual centres. For that reason, the normative practice costs were used as issued by the Healthcare Authority [14-17]. As a consequence, the capital costs for the case-vignettes concerning non-hospital care are not valued separately but included in the costs per hour of the GP, dentist and physiotherapist (see appendix 2).

2.5. Tariffs

In addition to the costs of case-vignettes, the tariffs charged by healthcare providers to patients and / or their healthcare insurers have been calculated. Tariffs of case-vignettes concerning hospital care are based on DBC prices. Case-vignettes 1 (appendectomy), 2 (normal delivery), 5 (stroke) and 6 (AMI) concern DBCs on list A (for which fixed tariffs apply), and prices for these DBCs are issued by CTG / ZAio [18]. If multiple DBCs correspond to one case-vignette, the tariff is calculated as the average across DBCs, weighted by the frequency of occurrence. In case of emergency care, the tariffs for emergency care and regular care are summed. Specifications of the calculation of tariffs for case-vignettes concerning DBCs on list A are provided in appendix 3. Case-vignette 3 (hip replacement) and 4 (cataract) concern DBCs on list B. No fixed tariffs apply to these DBCs. Estimated prices for these DBCs are based on the recommended price for list B DBCs as issued by Healthcare Insurers Netherlands [19]. For colonoscopy (case-vignette 8) a DBC price is not available. The price of this case-vignette is based on the tariff hospitals may charge to other healthcare providers in case of mutual service provision [18, 20]. Tariffs of case-vignette 7 (cough) and 9 (tooth filling) are based on official tariffs of GP and dental care as issued by CTG / ZAio [21, 22]. For physiotherapy (case-vignette 10) no fixed tariffs apply and prices result from negotiations between healthcare insurers and physiotherapeutic practices. The tariff for this case-vignette is based on the average price physiotherapists charge to healthcare insurers and was obtained from the physiotherapists participating in the current study.

2.6. Analysis and presentation of results

In the results chapter two tables per case-vignette are presented. The first table contains an overview of the average resource use and costs of each case-vignette. Cost categories presented in the tables include diagnostic procedures, drugs, inpatient stay, personnel, materials and devices. The use of therapeutic procedures was captured in the ‘other diagnostic procedures’ category. If applicable, a distinction is made according to the phase of treatment, e.g. pre- and post therapy. For case-vignettes with a large number of different diagnostic procedures and drug prescriptions, only the most frequently applied diagnostic procedures and drugs are shown. In the case of laboratory services, also a category ‘other laboratory’ is stated. This category contains the summed costs of all other diagnostic procedures not specified. Unit costs for diagnostic procedures are derived from the DBC database

and are based on average unit cost calculations across hospitals. Unit costs for personnel are stated as costs per minute, based on normative income. All other unit costs are defined as the average costs among healthcare providers.

The second table of each case-vignette provides general information on the healthcare providers included in our analyses. General information comprises number of beds (at the hospital and department level), capacity utilization (at the hospital level) and number of specialists (at the department level). For the calculation of capacity utilization, we divided the 'produced' nursing days of the hospital by the maximum available nursing days in 2005. Maximum available nursing days were calculated by multiplying the maximum number of beds a hospital is allowed to have with 365 days. In practice, the actual number of beds in the hospital may be lower than the allowable number of beds and, for that reason our calculation may have underestimated the actual capacity utilization. The tables also present estimates of the costs of each individual healthcare provider. Cost categories are presented on an aggregate level (i.e. diagnostic procedures, drug costs, personnel costs pre- and post therapy, etc.). Additionally, information about the variation in costs between healthcare providers is provided.

Details of resource use and costs underlying the information presented in the results section can be found in appendix 4. This appendix contains specifications of drug prescriptions (case-vignettes 1-8), inpatient stay (case-vignettes 1-6, 8), costs of labour, materials and devices (case-vignette 1-10) and the costs of overheads and capital costs (case-vignette 1-10). For each case-vignette, drugs prescribed to patients by each healthcare provider are specified. In some cases, the medical specialist reported the prescription of a drug without specifications about type, dose or duration of the prescription. In these cases, the costs and / or duration of the prescription of the same drug in other settings was used to calculate the cost per day or the total costs of drug prescription. When 'forever' is stated as the duration of the prescription, costs of drugs are included to a maximum period of 365 days. Because drug prices could usually not be obtained from the hospital pharmacists, prices were derived from the database of one hospital pharmacy. In case of extramurally prescribed drugs, costs were based on list prices. Costs of patient care services were based on time and cost estimates of the participating healthcare providers. Costs of non-patient care were expressed as a percentage of the total costs of patient care, excluding the costs of medical specialists.

In the tables in the appendices presenting quantities, missing values are noted by '-'. To calculate average total costs in all the participating centres, missing cost categories were imputed using the average of the observed values. In the tables in appendix, imputed values are presented in *italic.* In addition to the quantities and costs per healthcare provider, the tables in appendix 4 also present the average and standard deviation across all healthcare providers. In case of missing values, the standard deviation is calculated using only the observed values.

Costs are based on 2005 Euro. National price indices were used to convert costs of other years to 2005. All analyses were performed from the perspective of the healthcare provider as defined in the case-vignette. This means that the costs of patients (e.g. time costs, productivity losses, travel expenses) and costs made by other healthcare providers (e.g. rehabilitation centre after hospital discharge in case of stroke) were not taken into account. Two exceptions are made to this guiding principle. Costs of drugs that are prescribed in an ambulant setting during the period considered in the case-vignette were included, even though these costs are not born by the prescribing healthcare provider. In case of care provided in hospitals, costs of the hospital and medical specialist are taken into account. This was the case despite the fact that medical specialists are not on the payroll of the hospital.

3. Results

3.1. Respondents

The numbers of settings from which data were obtained for each case-vignette are summarized in table 3. In this table a distinction is made into direct costs of labour and medical materials, costs of nutrition and inpatient days, and overheads and capital costs. The number of settings from which data about direct costs of labour and medical materials were obtained varied from 5 for tooth filling to 10 for appendectomy. Because data about the latter two categories had to be obtained from the financial administration and other departments, it appeared not possible to calculate these costs for all participating centres. Hence, data about costs of nutrition / inpatient days and overheads and capital costs were generally based on only a selection of the healthcare providers.

Table 3: Number of settings per case-vignette from which information about the various cost categories was obtained

Case-vignette	Costs of nutrition / inpatient stay	Direct costs of labour and medical materials	Overheads (and capital costs)
1. Appendectomy	5	10	4
2. Normal delivery	7	7*	4
3. Hip replacement	5	7	4
4. Cataract	6	7	4
5. Stroke	5	7	3
6. AMI	5	6	1
7. Cough	n.a.	7	5
8. Colonoscopy	8	9	6
9. Tooth filling	n.a.	5	5
10. Physiotherapy	n.a.	8	4

* In addition, time estimates of 7 midwives from outside the hospital were obtained

3.2. Appendectomy

Acute appendicitis is most frequently seen in patients between 5 and 24 years of age. Up until the age of 25 years, more men than women are caught by the disease. The incidence at the GP practice in the Netherlands is estimated at 1 per 1,000 patients per year and yearly 15,000 appendectomies are performed. 'Best practice' recommendations are issued by Health Insurers Netherlands and advise on the performance of an echography, CT abdomen, laboratory services (leukocytes, C-reactive proteins and bloodcell count) and diagnostic laparoscopy. Although the performance of laparoscopic surgery is increasing, the appendix is usually removed through an open surgical procedure [23].

Table 4 gives an overview of resource use and costs for an appendectomy in healthy males of 14-25 years of age. All patients were admitted to the surgical department of the hospital through the emergency department and underwent an open surgical procedure. Average costs per patient amount to € 2,002. Costs of diagnostic procedures, inpatient stay and treatment staff each account for a third of the total costs of patient care. An echography and CT abdomen are only performed in 19% and 13% of the patients respectively. Diagnostic laparoscopies are applied in three quarters of the patients and responsible for the greatest share of costs for diagnostic procedures. Drug costs add up to € 34 per patient. A great share of the drug costs is assigned to antibiotics (79%), due to a high costs / dose equation. Antibiotics, heparin, and painkillers are prescribed to all of the patients.

Half of the labour costs occur during operation, which is in line with the amount of staff involved. All of the operations involve a surgeon, at least one fellow and operation assistant. Not all operations require an anaesthesiologist, because in some hospitals an anaesthesiologist is only called for in case of a complication. However, a fellow anaesthesiologist is always present. One third of the time spent with the patients is attributed to nurses.

Table 5 shows the variation in costs between healthcare providers. Average length of stay varies from 1.5 to 3 days. Average total costs vary from € 1,552 to € 2,207. It should be taken in mind that information on costs of inpatient days and costs of non-patient care were not obtained from all participating centres and that imputation tends to decrease the variation between settings.

The fee charged to the health insurer is twice as high as the total costs calculated in our study.

Table 4: Resource use and costs case vignette 1 Appendectomy

Phase	Appendectomy	Average number of units per patient	Unit costs in euro (€)	Average costs per patient in euro (€)	Subtotal average costs per patient in euro (€)
Site of consultation		In-patient department of hospital			
Diagnostic procedures	**Imaging**				
	Echography abdomen	0,21	49,86	10,29	
	Abdomen overview	0,19	39,83	7,47	
	CT abdomen	0,15	39,00	5,76	
	Thorax, including radioscopy	0,16	119,45	19,23	
					42,75
	Laboratory				
	Leucocytes, single definition	2,57	1,47	3,78	
	HB (incl. HT and	1,68	1,49	2,51	
	Natrium	1,67	1,50	2,50	
	Creatinine	1,51	1,50	2,27	
	Urine screening	0,87	2,00	1,75	
	Kalium	1,49	1,50	2,23	
	Glucose	1,02	1,49	1,52	
	C-reactive proteins (CRP)	1,54	4,05	6,24	
	Ureum	1,15	1,49	1,71	
	Sedimentation rate	0,88	1,49	1,31	
	Blood group AB0 + Rhesus	0,69	2,98	2,07	
	Indirect Coombstest	0,58	4,10	2,39	
	Sediment	0,63	1,49	0,93	
	Other laboratory	na	na	22,49	
					53,68
	Other				
	Histol/cytolog. research	0,96	32,63	31,46	
	Diagnostic laparoscopy	0,80	474,13	380,56	
	E.C.G.	0,10	39,00	3,89	
					415,90
Drugs	**Drugs**				
	Antibiotics	1,00	27,34	27,34	
	Heparin	1,00	5,60	5,60	
	Painkillers	1,00	1,06	1,06	
	Anti-emetica	0,10	3,96	0,40	
					34,40
Inpatient stay	**Nutrition and hotelcosts**	2,40	37,22	90,22	
	Nursing staff ~ normal ward	2,40	118,09	285,63	
					375,86
Pre OP	**OP-Team** (minutes)				
	Surgeon	38,00	2,46	93,42	
	Nurse	33,00	0,41	13,53	
					106,95
OP	**OP-Team** (minutes)				
	Surgeon	36,45	2,46	89,61	
	Anaesthesiologist	30,45	2,46	74,86	
	Fellow	54,00	0,54	29,16	
	OP assistant	70,20	0,48	33,70	
	Nurse	11,70	0,41	4,80	
					232,12
Post OP	**OP-Team** (minutes)				
	Surgeon	37,00	2,46	90,96	
	Nurse	111,20	0,41	45,59	
					136,55
SUBTOTAL	**Patient care**				**1398,21**
	Non-patient care				
	Overheads			397,32	
	Capital costs			206,73	
					604,06
TOTAL					**2002,26**
Fee charged to health insurer (DBC)					**4285,00**

Table 5: Resource use and costs per healthcare provider case vignette 1 Appendectomy

		Surg 1	Surg 2	Surg 3	Surg 4	Surg 5	Surg 6	Surg 7	Surg 8	Surg 9	Surg 10	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Number of beds	Hospital	400	300	300	900	600	400	1000	600	400	400				
	Department	36	35	50	6	20	36	70	96	66	34				
Capacity ulilization	Hospital	52%	51%	67%	49%	64%	-	56%	71%	81%	49%	1,00	0,60	0,60	0,11
Number of surgeons	Department	7,0	5,0	6,0	-	10,0	5,0	16,0	10,0	7,0	5,0	1,00	7,89	7,89	3,62
Nursing days	Case	2,0	3,0	2,5	2,0	2,5	2,5	2,0	3,0	1,5	3,0	1,00	2,40	2,40	0,52
Costs															
Diagnostic procedures	Imaging	42,75	42,75	42,75	42,75	42,75	42,75	42,75	42,75	42,75	42,75	1,00	42,75	42,75	11,06
	Laboratory	53,68	53,68	53,68	53,68	53,68	53,68	53,68	53,68	53,68	53,68	1,00	53,68	53,68	12,27
	Other	415,90	415,90	415,90	415,90	415,90	415,90	415,90	415,90	415,90	415,90	1,00	415,90	415,90	7,24
Drugs	Drugs	11,04	58,13	2,55	4,82	55,72	32,06	25,77	8,48	67,91	10,18	1,00	37,97	34,40	24,63
Inpatient stay	Nutrition and hotelcosts	74,00	138,00	55,00	80,00	72,50	*90,22*	88,00	111,00	46,50	147,00	1,00	90,22	90,22	34,96
	Nursing staff ~ normal ward	228,25	375,96	272,50	213,96	337,50	*285,63*	*285,63*	*285,63*	*285,63*	*285,63*	1,00	285,63	285,63	69,73
Pre OP	OP-Team	172,10	61,47	73,75	86,05	86,05	86,05	147,50	86,05	98,35	172,10	1,00	106,95	106,95	41,00
OP	OP-Team	219,20	208,70	207,80	221,00	122,71	184,32	260,88	245,58	362,23	288,75	1,00	232,12	232,12	63,97
Post OP	OP-Team	*172,10*	95,90	*73,75*	102,45	168,03	178,30	79,90	135,25	229,50	130,33	1,00	136,55	136,55	50,16
Patient care		**1389,03**	**1450,49**	**1197,68**	**1220,61**	**1354,84**	**1368,92**	**1400,01**	**1384,32**	**1602,44**	**1546,32**	1,00	1.401,77	1.398,20	125,03
Non-patient care		***604,06***	***604,06***	**354,56**	**408,00**	**430,81**	***604,06***	***604,06***	**244,86**	***604,06***	***604,06***	1,00	604,06	604,06	90,09
TOTAL		**1993,09**	**2054,55**	**1552,23**	**1628,62**	**1785,65**	**1972,97**	**2004,07**	**1629,18**	**2206,50**	**2150,38**	1,00	2.005,82	2.002,26	232,45

3.3. Normal delivery

In the Netherlands, pregnant women are usually attending regular controls at an independent midwife practice. A midwife of the midwife practice typically is in charge of the care before, during and after delivery. Only when complications can be expected, (additional) consultations at the hospital are necessary. Therefore we asked both gynaecologists / obstetricians and midwives to cooperate in our study.

In 2004 over 191,000 Dutch women gave birth of which 46% concerned a first pregnancy. Women were on average 29.4 years of age at the birth of their first child. The Royal Dutch Organisation of Midwives issued various guidelines concerning normal delivery. All these guidelines relate to possible complications during delivery, like anemia, infections and the necessity of a Caesarian section [24].

Table 6 gives an overview of resource use and costs for a normal delivery at the hospital in healthy females of 25-34 years of age. All females visit the hospital for an outpatient delivery as soon as the labour pains commence. In the Netherlands, women regularly give birth at home. However, for this case-vignette only women who present to the hospital are considered. Total costs amount to € 708. Labour costs account for 82% of the total costs of patient care, which results from an intensive patient contact before, during, and after delivery.

Cardiotocographies are performed in 6 out of 10 patients, representing half of the total costs for diagnostic procedures. Although sintocinon and painkillers are prescribed to all of the patients, drug costs are negligible. Time spent on patients varies widely between healthcare providers. Still, half of the labour costs occur before delivery, which is in line with the intensive patient contact during pregnancy. Ninety % of the time spent with the patients is attributed to midwives and nurses (46% and 44% respectively). Medical specialists are only involved in a third of the deliveries, representing only 12% of the labour costs. Given the fact that no complications incurred, this low share of costs for gynaecologists / obstetricians could be expected. No information could be obtained on the percentage of ruptures taking place.

The fee charged to the health insurer of the patients is virtually equal to the total costs resulting from our study.

Table 6: Resource use and costs case vignette 2 Normal delivery

Phase	Normal delivery	Average number of units per patient	Unit Costs in euro (€)	Average costs per patient in euro (€)	Subtotal average costs per patient in euro (€)
Site of consultation		Out-patient department of hospital			
Diagnostic	**Imaging**				
	Abdomen overview	0,004	39,83	0,16	
	Thorax, including radioscopy	0,005	39,00	0,21	
	Echography abdomen	0,004	49,86	0,19	
					0,57
	Laboratory				
	HB (incl. HT and IND.)/ERYs/MCV	0,78	1,49	1,16	
	Indirect Coombstest	0,17	4,10	0,70	
	Blood group AB0 + Rhesus	0,19	2,98	0,55	
	Art. blood gasses: Ph/PCO2/PO2/BICARB.	0,50	4,05	2,01	
	O2-saturation arterial blood	0,17	4,05	0,69	
	Other laboratory	na	na	14,99	
					20,11
	Other				
	Cardiotocography	0,85	36,99	31,26	
	Histol/cytolog. research	0,10	32,63	3,12	
	Echography a-vue	0,06	28,16	1,79	
					36,17
Drugs	**Drugs**				
	Sintocinon	1,00	0,62	0,62	
	Painkillers	1,00	0,16	0,16	
					0,78
Inpatient stay	**Nutrition and hotelcosts**	0,82	37,86	32,21	
					32,21
Pre delivery	**Delivery Team** (minutes)				
	Obstetrician	7,50	2,46	18,44	
	Midwife	109,86	0,69	76,34	
	Nurse	102,86	0,41	42,17	
	Fellow	10,71	0,54	5,79	
					142,73
Delivery	**Delivery Team** (minutes)				
	Obstetrician	8,57	2,46	21,07	
	Midwife	116,00	0,69	80,60	
	Nurse	120,00	0,41	49,20	
	Fellow	28,93	0,54	15,62	
					166,50
Post delivery	**Delivery Team** (minutes)				
	Obstetrician	2,57	2,46	6,32	
	Midwife	72,86	0,69	50,63	
	Nurse	66,43	0,41	27,24	
	Fellow	6,79	0,54	3,66	
					87,85
SUBTOTAL	**Patient care**				**486,92**
	Non-patient care				
	Overheads			146,66	
	Capital costs			74,88	
					221,54
TOTAL					**708,46**
Fee charged to health insurer (DBC)					**711,05**

Table 7: Resource use and costs per healthcare provider case vignette 2 Normal delivery

		Obs 1	Obs 2	Obs 3	Obs 4	Obs 5	Obs 6	Obs 7	MW 8	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Number of beds	Hospital	700	300	300	1000	900	600	1400	-	-	-	-	-	-	-				
	Department	24	24	14	18	25	11	12	7	-	18	16	6	-	6				
Capacity ulilization	Hospital	63%	51%	67%	65%	49%	71%	56%	-	-	-	-	-	-	-	1,00	0,60	0,60	0,08
Number of obstetricians	Department	9,0	5,0	5,0	14,0		7,0	16,0	-	-	-	-	-	-	-	1,00	9,33	9,33	4,68
Nursing days	Case	0,5	1,0	1,0	1,0	1,0	1,0	0,5	0,5	0,5	1,0	1,0	1,0	1,0	0,5	1,00	0,82	0,82	0,25
Costs																			
Diagnostic procedures	Imaging	0,57	0,57	0,57	0,57	0,57	0,57	0,57	0,57	0,57	0,57	0,57	0,57	0,57	0,57	1,00	0,57	0,57	0,40
	Laboratory	20,11	20,11	20,11	20,11	20,11	20,11	20,11	20,11	20,11	20,11	20,11	20,11	20,11	20,11	1,00	20,11	20,11	6,52
	Other	36,17	36,17	36,17	36,17	36,17	36,17	36,17	36,17	36,17	36,17	36,17	36,17	36,17	36,17	1,00	36,17	36,17	14,50
Drugs	Drugs	*0,78*	*0,78*	*0,78*	*0,78*	*0,78*	*0,78*	*0,78*	*0,78*	*0,78*	*0,78*	*0,78*	*0,78*	*0,78*	*0,78*	1,00	0,78	0,78	0,00
Inpatient stay	Nutrition and	23,50	46,00	22,00	41,00	40,00	37,00	16,00	*32,21*	*32,21*	*32,21*	*32,21*	*32,21*	*32,21*	*32,21*	1,00	32,21	32,21	7,81
Pre delivery	Delivery Team	64,80	172,15	213,84	75,36	44,98	44,98	795,51	52,12	73,80	125,08	41,69	104,23	116,74	72,96	1,00	142,73	142,73	194,59
Delivery	Delivery Team	106,20	122,95	185,49	140,09	444,88	134,93	66,29	2,78	123,00	179,07	125,08	187,61	83,38	429,22	1,00	166,50	166,50	124,67
Post delivery	Delivery Team	5,40	63,95	59,61	70,05	93,89	44,98	198,88	93,81	73,80	137,38	83,38	83,38	83,38	137,98	1,00	87,85	87,85	46,36
Patient care		**257,53**	**462,68**	**538,57**	**384,13**	**681,38**	**319,51**	**1134,30**	**238,54**	**360,44**	**531,36**	**339,99**	**465,07**	**373,35**	**730,01**	1,00	486,92	486,92	236,17
Non-patient care		**141,64**	***221,28***	**234,55**	***221,28***	**431,42**	**81,08**	***221,28***	***221,28***	***221,28***	***221,28***	***221,28***	***221,28***	***221,28***	***221,28***	1,00	221,54	221,54	73,55
TOTAL		**399,17**	**683,96**	**773,12**	**605,42**	**1112,80**	**400,58**	**1355,59**	**459,83**	**581,72**	**752,65**	**561,28**	**686,35**	**594,63**	**951,29**	1,00	671,42	708,46	272,03

3.4. Hip replacement

In the Netherlands approximately 260,000 people of at least 55 years of age suffer from hip osteoarthritis. The yearly incidences of hip osteoarthritis are estimated at 0.9 per 1,000 in men and 1.6 per 1,000 in women. In 2003, 23,600 total hip replacements were performed [25]. Of the 'best practice' recommendations issued by Health Insurers Netherlands, two seem relevant in the light of our case-vignette. For patients older than 60 years of age, a cemented hip implant is preferred. Patients suffering from complications and / or comorbidities are offered a personalised rehabilitation programme, whereas all other patients are included in group sessions for rehabilitation [19].

Table 8 gives an overview of resource use and costs for a hip replacement in healthy females of 65-75 years of age. All patients are admitted directly to the orthopaedical department of the hospital after being on a waiting list. Average costs per patient amount to € 5,628. The costs for the prothesis account for almost half of the total costs of patient care. The remaining costs for patient care are due to inpatient stay and labour costs (26% and 19% respectively).

Laboratory services are performed in a majority of the patients. However, medical imaging of the thorax and ECGs – both carried out in 3 out of 10 patients – bring about the highest costs per patient for diagnostic procedures (19% and 12% respectively). A great share of the drug costs are assigned to heparin (81%), due to a long duration of the prescription. Heparin, antibiotics, and painkillers are prescribed to all of the patients.

Most of the labour costs occur during and after operation (41% and 43% respectively). All of the operations involve a surgeon, at least one fellow and operation assistant. Anaesthesiologists are only involved in 1 out of 7 operations, likely because in most hospitals an anaesthesiologist is only called for in case of a complication. However, a fellow anaesthesiologist is always present. Half of the time staff spent on the patient is appointed to nursing days after the operation. This also involves rehabilitation time with a physiotherapist during admission, carried out in 6 out of 7 patients. The average length of stay varied from 4 days in setting 5 to 7 days in setting 1, 6 and 7.

Other costs that vary widely between providers are the costs of the hip prosthesis (€ 1,000 to € 4,000; table 9). The variation in costs of the prothesis could not be explained by the type of prothesis that was used. In line with the 'best practice' recommendations, most of the healthcare providers used a cemented hip implant. An uncemented hip implant was only applied in hospital 2 and a partially cemented implant only in hospital 3.

The fee charged to the health insurer of the patients is somewhat higher than the total costs resulting from our study, € 6,842 versus € 5,596 respectively.

Table 8: Resource use and costs case vignette 3 Hip replacement

	Hip replacement	Average number of units per patient	Unit costs in euro (€)	Average costs per patient in euro (€)	Subtotal average costs per patient in euro (€)
Site of consultation		In-patient department of hospital			
Diagnostic	**Imaging**				
	Thorax, including radioscopy	0,48	39,00	18,67	
	Lumbosacral spine, incl. overview	0,14	42,38	5,78	
	Knee and / or lower leg	0,15	38,35	5,90	
	Arthrography hip joint	0,03	81,00	2,56	
					32,90
	Laboratory				
	HB (incl. HT and IND.)/ERYs/MCV	3,35	1,49	4,99	
	Indirect Coombstest	1,07	4,10	4,37	
	Creatinine	0,85	1,50	1,27	
	Kalium	0,93	1,50	1,40	
	Natrium	0,93	1,50	1,39	
	Blood group AB0 + Rhesus	0,64	2,98	1,91	
	Glucose	1,44	1,49	2,14	
	Sedimentation rate	0,52	1,49	0,77	
	Sediment	0,36	1,49	0,54	
	Cross match, complete	0,41	2,88	1,17	
	Culture test>3 media, bacteriological	0,25	17,26	4,34	
	Urine screening	0,24	2,00	0,48	
	Other laboratory	na	na	20,35	
					45,12
	Other				
	E.C.G.	0,30	39,00	11,80	
	Histol/cytolog. research	0,15	32,63	4,82	
	INR-definition	0,27	9,11	2,46	
					19,07
Drugs	**Drugs**				
	Heparin	1,00	84,37	84,37	
	Antibiotics	1,00	15,27	15,27	
	Painkillers	1,00	0,88	0,88	
	Aneasthetics	1,00	3,60	3,60	
					104,12
Inpatient stay	**Nutrition and hotelcosts**	5,86	36,00	212,00	
	Nursing staff ~ normal ward	5,86	101,80	538,40	
					750,40
Pre OP	**OP-Team** (minutes)				
	Surgeon	66,43	2,46	163,41	
	Nurse	72,86	0,41	29,87	
					193,29
OP	**OP-Team** (minutes)				
	Surgeon	107,14	2,46	263,57	
	Anaesthesiologist	12,60	2,46	31,63	
	Fellow	235,71	0,54	127,29	
	OP assistant	105,00	0,48	50,40	
	Nurse	83,57	0,41	34,26	
					507,15
Devices	**Hip prothesis**	1,00	1825,00	1825,00	
					1825,00
Post OP	**OP-Team** (minutes)				
	Surgeon	85,71	2,46	210,86	
	Nurse	332,60	0,41	136,37	
	Physiotherapist	321,43	0,59	189,64	
					536,87
SUBTOTAL	**Patient care**				**4013,92**
	Non-patient care				
	Overheads			1147,80	
	Capital costs			434,41	
					1582,21
TOTAL					**5596,13**
Fee charged to health insurer (DBC)					**6842,00**

Table 9: Resource use and costs per healthcare provider case vignette 3 Hip replacement

		Orth 1	Orth 2	Orth 3	Orth 4	Orth 5	Orth 6	Orth 7	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Number of beds	Hospital	700	600	500	300	1000	400	600				
	Department	35	35	35	12	10	24	-				
Capacity ulilization	Hospital	63%	58%	62%	51%	56%	51%	60%	1,00	0,57	0,57	0,05
Number of surgeons	Department	6,0	5,0	4,0	3,0	8,0	3,0	6,0	1,00	5,00	5,00	1,83
Nursing days	Case	7,0	5,0	5,0	6,0	4,0	7,0	7,0	1,00	5,86	5,86	1,21
Costs												
Diagnostic procedures	Imaging	32,90	32,90	32,90	32,90	32,90	32,90	32,90	1,00	32,90	32,90	11,23
	Laboratory	45,12	45,12	45,12	45,12	45,12	45,12	45,12	1,00	45,12	45,12	9,42
	Other	19,07	19,07	19,07	19,07	19,07	19,07	19,07	1,00	19,07	19,07	24,95
Drugs	Drugs	20,36	50,62	100,52	68,92	*104,12*	148,24	99,64	1,00	104,12	104,12	44,71
Inpatient stay	Nutrition and hotelcosts	329,00	*220,80*	155,00	276,00	176,00	*220,80*	168,00	1,00	220,80	212,00	69,11
	Nursing staff ~ normal ward	588,02	505,11	445,00	641,88	512,00	*538,40*	*538,40*	1,00	538,40	538,40	76,97
Pre OP	OP-Team	319,80	196,80	86,10	258,30	172,20	49,20	270,60	1,00	193,29	193,29	99,09
OP	OP-Team	458,10	484,95	423,00	727,80	388,80	447,30	620,10	1,00	702,63	507,15	121,80
Post OP	OP-Team	811,00	353,70	233,78	1286,10	521,95	190,25	361,28	1,00	536,86	536,86	390,11
Devices	Hip prothesis	1100,00	1000,00	*1825,00*	*1825,00*	*1825,00*	4000,00	1200,00	1,00	1.825,00	1.825,00	1.452,30
Patient care		**3723,37**	**2909,07**	**3365,49**	**5181,08**	**3797,16**	**5691,27**	**3355,11**	1,00	4.218,20	4.013,91	1.031,31
Non-patient care		**1441,06**	***1582,21***	**700,89**	***1582,21***	***1582,21***	**3031,22**	**1155,66**	1,00	1.582,21	1.582,21	1.012,95
TOTAL		**5164,43**	**4491,28**	**4066,38**	**6763,29**	**5379,37**	**8722,50**	**4510,78**	1,00	5.800,41	5.596,12	1.638,49

3.5. Cataract

The number of people in the Netherlands with cataract is estimated at 300,000. In 2003, 1 out of 23 people of at least 65 years of age underwent a cataract operation. National guidelines of cataract are developed by the Dutch Ophtalmological Association and 'best practice' recommendations are issued by Health Insurers Netherlands. The use of a pupil dilating agent is strongly recommended, whereas the benefit of anti inflammation is not yet demonstrated. Also the benefit of laboratory services is not evident. Generally, a foldable posterior chamber lens implant is preferred. An interior chamber lens implant is only indicated when the natural lens capsule is damaged. An unfoldable lens implant should be used when no foldable lens implant is available. This can be the case, for example, when a deviant strength is required [26].

Table 10 gives an overview of resource use and costs for a cataract in healthy males of 70-75 years of age. All patients are presented to the ophtalmological department of the hospital for an outpatient operation after having visited the hospital on average one time before for pre assessment and after being on a waiting list. In the Netherlands, no operations are performed at an ophthalmologist office.

Average costs per patient amount to € 608. Labour costs account for 72% of the total costs of patient care, due to an intensive patient contact during the outpatient admission. Costs for diagnostic procedures are negligible. Although the benefit of anti inflammation is not evident, its costs are responsible for 70% of the drug costs due to long term prescription. Also pupil dilating agents and anaesthetics are prescribed to all patients.

On average, a patient spends 0.5 days at the hospital. Half of the labour costs occur during operation, which is in line with the amount of staff involved. All of the operations involve a surgeon, at least one fellow and operation assistant. Anaesthesiologists are only involved in 5 out of 7 operations, likely because in most hospitals an anaesthesiologist is only called for in case of a complication. One third of the staff time spent with the patient is attributed to nurses. Five out of 7 patients also see a physiotherapist for rehabilitation after operation.

Table 11 shows the variation in costs between healthcare providers. Estimates of the average costs per patient vary from € 219 to € 541. Costs of the lens implant are

obtained from all a participating centres and vary from € 73 to € 200. It is likely that this variation was caused by the use of different lens implants, although no hospital specific information was available to verify this assumption.

The fee charged to the health insurer of the patients is twice as high as the total costs resulting from our study. The difference is almost entirely due to the lower costs of the lens implant in our study (average € 105.50 versus € 513 in the calculation of the DBC tariff).

Table 10: Resource use and costs case vignette 4 Cataract

Phase	Cataract	Average number of units per patient	Unit costs in euro (€)	Average costs per patient in euro (€)	Subtotal average costs per patient in euro (€)
Site of consultation		Out-patient department of hospital			
Diagnostic procedures	**Laboratory**				
	Glucose	0.05	1.49	0.08	
	HB/ERYs/MCV	0.05	1.49	0.08	
	Sedimentation rate	0.05	1.49	0.08	
	Other laboratory	na	na	0.56	
					0.79
Drugs	**Drugs**				
	Anti inflammation	1.00	9.48	9.48	
	Pupil dilating agent	0.43	2.87	2.87	
	Aneasthetics	0.29	1.20	1.20	
					13.55
Inpatient stay	**Nutrition and hotelcosts**	0.50	35.50	17.75	
					17.75
Pre OP	**OP-Team** (minutes)				
	Surgeon	26.00	2.46	63.96	
	Nurse	45.00	0.41	18.45	
					82.41
OP	**OP-Team** (minutes)				
	Surgeon	29.57	2.46	72.75	
	Anaesthesiologist	17.14	2.46	42.17	
	Fellow	57.00	0.54	30.78	
	OP assistant	53.14	0.48	25.51	
	Nurse	12.86	0.41	5.27	
					176.48
Devices	**Intra-ocular lens**	1.00	105.50	105.50	
					105.50
Post OP	**OP-Team** (minutes)				
	Surgeon	26.00	2.46	63.96	
	Nurse	31.71	0.41	13.00	
	Physiotherapist	22.44	0.59	13.32	
					90.28
SUBTOTAL	**Patient care**				**486.76**
	Non-patient care				
	Overheads			84.20	
	Capital costs			37.08	
					121.28
TOTAL					**608.04**
Fee charged to health insurer (DBC)					**1041.00**

Table 11: Resource use and costs per healthcare provider case vignette 4 Cataract

		Oph 1	Oph 2	Oph 3	Oph 4	Oph 5	Oph 6	Oph 7	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Number of beds	Hospital	400	600	600	400	400	500	1000				
Capacity ulilization	Hospital	52%	51%	71%	49%	51%	55%	-	1,00	0,55	0,55	na
Number of ophtalmologists	Department	6,0	5,0	5,0	2,0	3,0	3,0	9,0	1,00	4,71	4,71	na
Nursing days	Case	0,5	0,5	0,5	0,5	0,5	0,5	0,5	1,00	0,50	0,50	na
Costs												
Diagnostic procedures	Laboratory	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,05	15,80	0,79	0,45
Drugs	Drugs	5,53	11,06	11,06	13,93	5,53	15,13	15,13	1,00	13,55	13,55	4,13
Inpatient stay	Nutrition and hotelcosts	18,50	15,00	18,50	24,50	12,00	18,00	*17,75*	1,00	17,75	17,75	4,18
Pre OP	OP-Team	86,10	73,80	*98,40*	147,60	49,20	41,82	79,95	1,00	89,79	82,41	37,55
OP	OP-Team	165,48	342,00	224,88	194,46	168,66	80,46	59,40	1,00	200,37	176,48	94,14
Post OP	OP-Team	121,50	98,40	128,40	86,10	79,70	62,76	55,10	1,00	100,81	90,28	27,74
Devices	Intra-ocular lens	200,00	95,00	100,00	100,00	100,00	73,50	70,00	1,00	105,50	105,50	43,62
Patient care		**397,90**	**541,05**	**482,03**	**467,38**	**315,88**	**218,96**	**228,12**	1,00	543,57	486,76	127,41
Non-patient care		***121,28***	**111,00**	**162,49**	***121,28***	**117,61**	**94,00**	***121,28***	1,00	121,28	121,28	29,22
TOTAL		**519,18**	**652,05**	**644,52**	**588,66**	**433,49**	**312,96**	**349,40**	1,00	664,85	608,04	138,03

3.6. Stroke

In the Netherlands, the yearly incidences of stroke in people of at least 55 years of age are estimated at 7.7 per 1,000 in men and 6.8 per 1,000 in women. The average yearly incidences of all ages amount 2.0 per 1,000 in men and 2.3 per 1,000 in women [25]. 'Best practice' recommendations of stroke are developed by the Institute of Quality in Healthcare. Those recommendations contain a detailed description of possible diagnostic and treatment options for stroke. In the light of our case-vignette, four are worth mentioning. Firstly, patients are only admitted for trombolysis within 24-hours after clinical symptoms commence. In this case, a CT of the brains is strongly recommended. Secondly, acetyl-salicyl acid should be administered in the acute phase of a stroke to decrease mortality. Thirdly, the administration of tissue plasminogen activator (tPA) in trombolysis is only allowed under very strict conditions. Lastly, the rehabilitation process should commence as early in the acute phase as possible and should at least include physiotherapy, ergotherapy, speech therapy and nutrition support [27].

Table 12 gives an overview of resource use and costs for a stroke in so far healthy females of 60-70 years of age. All patients are admitted to the neurological department of the hospital through the emergency department and are offered a rehabilitation programme. The average length of inpatient stay is 15.86 days. Average length of inpatient stay differs greatly across hospitals; from 9 days in hospital 1 to 30 days in hospital 4. All participating centres have a stroke unit. Approximately 20% of the total number of inpatient days is spent at this unit.

Average costs per patient amount to € 6,873. This is the weighted average of conservative treatment and trombolysis. In our study sample, trombolysis was performed in 29% of the patients. This is considerably higher than the 5% as recommended in the guidelines. The proportions of patients treated with trombolysis differed greatly across the participating hospitals; from 1% in hospital 3 to 80% in hospitals 6 and 7.

Costs of inpatient stay account for two thirds of the total costs of patient care. About one quarter of the costs of patient care result from the costs of treatment staff. CTs of the brains – carried out in almost all patients – cause the highest costs per patient for diagnostic procedures (44%). Laboratory services and ECGs are also performed in a majority of the patients. Although only 3 out of 7 neurologists prescribe

antihypertensiva, costs for this drug group represent the greatest share of drug costs. Acetyl-salicyl acid is only prescribed to 7 out of 10 patients and tPA in none of the patients.

The average time spent on patients varies widely between healthcare providers. About two-thirds of the direct treatment costs constitute the costs of medical specialists. Other professions that are directly involved in patient care include fellows, transfer nurses, physiotherapists, ergotherapists, speech therapists and nutrition specialists.

On average, the costs of patient care of conservative treatment are about 1.5 times higher than the costs of trombolysis. This is the result of more intensive hospital care. The summed staff time in minutes is 1,080 for conservative treatment and 750 minutes for trombolysis. This finding is remarkable, because in hospitals providing both therapies, costs of trombolysis are higher than the costs of conservative treatment. Hence, the higher costs of conservative treatment are likely to be an artefact of the selection of hospitals in our study and due to the fact that hospitals providing only conservative treatment had higher average costs per patient than hospitals providing conservative treatment and trombolysis.

The fee charged to the health insurer is slightly higher than the total costs resulting from our study (€ 7,260 versus € 6,873 respectively).

Table 12: Resource use and costs case vignette 5 Stroke

Phase	Stroke	Average number of units per patient	Unit costs in euro (€)	Average costs per patient in euro (€)	Subtotal average costs per patient in euro (€)
Site of consultation		In-patient department of hospital			
Diagnostic procedures	**Imaging**				
	CT brains	1,20	94,78	113,92	
	Thorax, including radioscopy	0,60	39,00	23,23	
	Echography carotids	0,16	58,05	9,14	
	MRI brains	0,10	155,79	15,81	
					162,10
	Laboratory				
	Glucose	3,59	1,49	5,34	
	Natrium	1,94	1,50	2,90	
	Creatinine	1,86	1,50	2,79	
	Kalium	1,93	1,50	2,90	
	Leucocytes, single definition	1,66	1,47	2,44	
	HB (incl. HT and IND.)/ERYs/MCV	1,60	1,49	2,38	
	Trombocytes count	1,30	1,49	1,94	
	Ureum	1,43	1,49	2,13	
	Other laboratory	na	na	33,30	
					56,12
	Other				
	E.C.G.	0,78	39,00	30,44	
	Duplex blood vessles in extremities	0,09	66,90	5,98	
	E.E.G.	0,05	39,00	1,76	
					38,17
Drugs	**Drugs**				
	Acetyl-salicyl acid	0,71	1,11	0,79	
	Heparin	0,86	3,79	3,79	
	Lipitor	0,43	5,40	2,32	
	Antihypertension	0,43	18,51	7,96	
					14,86
Inpatient stay	**Nutrition and hotelcosts**	15,86	42,00	675,67	
	Nursing staff ~ normal ward				
	Clinic	13,07	133,04	1959,10	
	Stroke unit	2,79	175,00	503,57	
					3138,34
Hospital care					
	Conservative / drugs (minutes)	71% of the patients			
	Neurologist	232,50	2,46	571,95	
	Revalidation specialist	67,50	2,46	166,05	
	Other specialists	65,00	2,46	159,90	
	Fellow	233,14	0,54	125,90	
	Nurse	20,00	0,41	8,20	
	Transfer nurse	35,00	0,41	14,35	
	Physiotherapist	208,00	0,59	122,72	
	Ergotherapist	95,00	0,57	54,15	
	Speech therapist	97,00	0,59	57,23	
	Nutrition specialist	28,57	0,48	13,71	
					1294,16
	Trombolysis (minutes)	29% of the patients			
	Neurologist	138,75	2,46	341,33	
	Revalidation specialist	40,00	2,46	98,40	
	Other specialists	45,00	2,46	110,70	
	Fellow	115,00	0,54	62,10	
	Nurse	20,00	0,41	8,20	
	Transfer nurse	26,67	0,41	10,93	
	Physiotherapist	157,50	0,59	92,93	
	Ergotherapist	103,75	0,57	59,14	
	Speech therapist	91,25	0,59	53,84	
	Nutrition specialist	8,57	0,48	4,11	
					841,67
SUBTOTAL	**Patient care**				
	Conservative / drugs			4703,75	
	Trombolysis			4251,26	
					4572,53
	Non-patient care				
	Overheads			1691,49	
	Capital costs			609,20	
					2300,69
TOTAL					**6873,22**
Fee charged to health insurer (DBC)					**7260,00**

Table 13: Resource use and costs per healthcare providers case vignette 5 Stroke

Conservative / drugs

		Neu 1	Neu 2	Neu 3	Neu 4	Neu 5	Neu 6	Neu 7	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Number of beds	Hospital	700	400	300	600	1000	600	400				
	Department	6	36	4	45	4	28	-				
Capacity ulilization	Hospital	63%	52%	51%	64%	56%	71%	49%	1,00	0,58	0,58	0,08
Number of neurologists	Department	8,0	5,0	4,0	5,0	9,0	6,0	4,0	1,00	5,86	5,86	1,95
Nursing days	Case ~ Clinic	7,0	8,0	17,5	28,0	11,0	7,0	13,0	1,00	13,07	13,07	7,60
	Case ~ Stroke unit	2,0	2,0	3,5	2,0	3,0	5,0	2,0	1,00	2,79	2,79	1,15
Costs												
Diagnostic procedures	Imaging	162,10	162,10	162,10	162,10	162,10	162,10	162,10	1,00	162,10	162,10	14,31
	Laboratory	56,12	56,12	56,12	56,12	56,12	56,12	56,12	1,00	56,12	56,12	6,56
	Other	38,17	38,17	38,17	38,17	38,17	38,17	38,17	1,00	38,17	38,17	37,85
Drugs	Drugs	19,20	28,96	28,96	6,89	6,66	4,90	4,46	1,00	28,81	14,86	11,20
Inpatient stay	Nutrition and hotelcosts	423,00	*675,67*	966,00	870,00	616,00	444,00	735,00	1,00	675,67	675,67	202,75
	Nursing staff ~ normal ward	1020,75	1360,68	3237,50	4132,58	2219,00	1000,00	350,00	1,00	2.462,67	2.462,67	1.363,30
Hospital care		367,65	*1234,32*	1668,30	3585,60	834,60	304,05	645,70	1,00	1.317,43	1.294,16	1.252,17
Patient care		**2086,99**	**3556,01**	**6157,15**	**8851,45**	**3932,65**	**2009,34**	**1991,55**	1,00	4.740,97	4.703,75	2.581,95
Non-patient care		**1025,97**	***2300,69***	***2300,69***	**4785,75**	***2300,69***	**1090,35**	***2300,69***	1,00	2.300,69	2.300,69	2.152,37
TOTAL		**3112,96**	**5856,70**	**8457,84**	**13637,20**	**6233,34**	**3099,69**	**4292,24**	1,00	7.041,66	7.004,44	3.720,94

Table 14: Resource use and costs per healthcare provider case vignette 5 Stroke

Trombolysis

		Neu 1	Neu 4	Neu 8	Neu 13	Neu 15	Neu 16	Neu 18	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Number of beds	Hospital	700	400	300	600	1000	600	400				
	Department	6	36	4	45	4	28	-				
Capacity ulilization	Hospital	63%	52%	51%	64%	56%	71%	49%	1,00	0,58	0,58	0,08
Number of neurologists	Department	8,0	5,0	4,0	5,0	9,0	6,0	4,0	1,00	5,86	5,86	1,95
Nursing days	Case ~ Clinic	7,0	8,0	17,5	28,0	11,0	7,0	13,0	1,00	13,07	13,07	7,60
	Case ~ Stroke unit	2,0	2,0	3,5	2,0	3,0	5,0	2,0	1,00	2,79	2,79	1,15
Costs												
Diagnostic Procedures	Imaging	162,10	162,10	162,10	162,10	162,10	162,10	162,10	1,00	162,10	162,10	14,31
	Laboratory	56,12	56,12	56,12	56,12	56,12	56,12	56,12	1,00	56,12	56,12	6,56
	Other	38,17	38,17	38,17	38,17	38,17	38,17	38,17	1,00	38,17	38,17	37,85
Drugs	Drugs	19,20	28,96	28,96	6,89	6,66	4,90	4,46	1,00	28,81	14,86	11,20
Inpatient stay	Nutrition and hotelcosts	423,00	*675,67*	966,00	870,00	616,00	444,00	735,00	1,00	675,67	675,67	222,10
	Nursing staff ~ normal ward	1020,75	*1360,68*	3237,50	4132,58	2219,00	1000,00	350,00	1,00	2.462,67	2.462,67	1.363,30
Hospital care		367,65	*831,08*	1815,90	*831,08*	*831,08*	458,15	682,60	1,00	842,36	841,67	669,77
Patient care		**2086,99**	**3152,77**	**6304,75**	**6096,93**	**3929,13**	**2163,44**	**2028,45**	1,00	4.265,90	4.251,26	1.854,55
Non-patient care		**1025,97**	***2300,69***	***2300,69***	**4785,75**	***2300,69***	**1090,35**	***2300,69***	1,00	2.300,69	2.300,69	2.152,37
TOTAL		**3112,96**	**5453,46**	**8605,44**	**10882,68**	**6229,82**	**3253,79**	**4329,14**	1,00	6.566,59	6.551,95	2.876,52

3.7. Acute myocardial infarction

In the Netherlands, the yearly incidences of AMI are estimated at 2.2 per 1,000 in men and 1.3 per 1,000 in women [25]. National guidelines for AMI are issued by the Dutch Association for Cardiology. Treatment of AMI should commence as early as possible, preferably pre hospitalisation at home or in the ambulance. Treatment starts with the performance of an ECG and administration of anti-coagulantia and acetyl-salicyl acid. Although the benefit of PTCA over trombolysis is not demonstrated, a PTCA is believed to achieve a faster recovery of coronary perfusion, to decrease chances of refractory infarction and stroke and to reduce mortality. Comprehensive cardiac rehabilitation – tailored to the individual and the clinical picture – is strongly recommended [28].

Table 15 gives an overview of resource use and costs for an AMI in so far healthy males of 50-60 years of age. All patients are admitted to the cardiological department of the hospital through the emergency department and are offered rehabilitation with a physiotherapist. Average length of stay of this group of patients is 5.67 days. Of these, about one third is spent at the ICU. Total costs amount to € 5,454. This is the weighted average of patients on conservative treatment (2%), trombolysis (7%) and PTCA (91%). Costs for inpatient stay account for 40% of the total costs and are mainly due to the high costs of ICU stay.

ECGs are performed in 98% of the patients and represent 40% of the costs for diagnostic procedures. Anti-coagulantia are prescribed to all of the patients and account for 80% of the total drug costs. The majority of the patients also receives Lipitor, B/Blocking agent and acetyl-salicyl acid.

Average costs for PTCA are approximately 1.5 times as high as the costs of conservative treatment and trombolysis. This is due to the higher costs of staff involvement and the costs of the intervention. Most of the staff costs are made during ICU stay. For conservative / drug treatment, about 67% of the staff costs are made in this stage. For PTCA and trombolysis these percentages are 60% and 53% respectively.

A stent is implanted in all PTCA patients and its average costs per patient contribute to 27% of the total costs of PTCA. Costs of the stent vary widely between hospitals (€ 500 in hospital 3 to € 2,100 in hospital 5; table 18). Five out of 6 healthcare providers

used a drug eluting stent, whereas a bare metal stent was only applied in hospital 4. The costs of the stent in this latter hospital were not noticeably different from the stent costs in the other hospitals. No information was available on the number of PTCAs and the number of cardiac catheter examinations performed per case.

Other considerable differences between providers were found in the estimates of time staff spent on a single patient. On the other hand, the estimated duration of inpatient hospital stay hardly differed across hospitals. Estimates of the average number of inpatient days were in between 5 and 7 days in all hospitals. As a result, the variation in overall costs between healthcare providers was relatively modest (see tables 16-18).

The costs for non-patient care amount only 7% of the total costs, which can be explained by the fact that we were able to obtain mark-up percentages for non-patient care of only one hospital and this hospital had relatively very low costs for patient care.

The fee charged to the health insurer is approximately 1.5 times higher than calculated in our study (€ 8,722 versus € 5,454 respectively).

Table 15a: Resource use and costs case vignette 6 AMI

Phase	AMI	Average number of units per patient	Unit costs in euro (€)	Average costs per patient in euro (€)	Subtotal average costs per patient in euro (€)
Site of consultation		In-patient department of hospital			
Diagnostic procedures	**Imaging**				
	Thorax, including radioscopy	0,94	39,00	36,50	
	Arteriae Coronariae	0,11	277,84	31,01	
	Laevocardiography	0,11	293,34	33,16	
					100,67
	Laboratory				
	Kalium	3,24	1,50	4,86	
	Natrium	3,24	1,50	4,86	
	Creatinine	3,09	1,50	4,64	
	Ureum	2,72	1,49	4,05	
	ASAT, SGOT, Transaminase	2,86	1,50	4,28	
	ALAT, SGPT, Transaminase	2,86	1,49	4,26	
	HB (incl. HT and IND.)/ERYs/MCV	2,18	1,49	3,25	
	CK-MB, Creatine-phosphokinase ISO-enzym	2,69	6,97	18,76	
	Creatine-phosphokinase	3,18	1,47	4,68	
	Milkacid dehydrogenase (LDH)	2,64	1,49	3,93	
	Leucocytes, single definition	1,77	1,47	2,60	
	Glucose	4,19	1,49	6,25	
	Alkaline phosphatase	0,81	1,49	1,20	
	Trombocytes count	1,00	1,49	1,49	
	Gamma-glutamyl-transpeptidase	0,76	1,49	1,13	
	C-reactive proteins (CRP)	1,00	4,05	4,07	
	Cholesterol, total	0,52	1,59	0,82	
	Triglycerids	0,53	2,00	1,05	
	Cholesterol, HDL	0,42	3,00	1,27	
	Other laboratory		5,09	na	
					77,46
	Other				
	E.C.G.	3,53	39,00	137,62	
	Echocardiography	0,57	39,05	22,20	
	Diagnostic ergometrics	0,34	34,94	11,76	
					171,58
Drugs	**Drugs**				
	Anti-coagulantia	1,00	331,69	331,69	
	Lipitor / Zocor	0,83	32,85	27,27	
	B/Blocking agent	0,83	73,00	60,59	
	Acetyl-salicyl acid	0,83	13,14	4,34	
					423,89
Inpatient stay	**Nutrition and hotelcosts**	5,67	42,40	249,60	
	Nursing staff ~ normal ward				
	Clinic	3,75	128,67	511,97	
	ICU	1,92	714,67	1431,08	
					2192,66

Table 15b: Resource use and costs case vignette 6 AMI

Phase	AMI	Average number of units per patient	Unit costs in euro (€)	Average costs per patient in euro (€)	Subtotal average costs per patient in euro (€)
ICU					
	Conservative / drugs (minutes)	2% of the patients			
	Cardiologist	46,67	2,46	114,80	
	Fellow	20,00	0,54	10,80	
	Physiotherapist	540,00	0,59	318,60	
					444,20
	Trombolysis (minutes)	7% of the patients			
	Cardiologist	40,00	2,46	98,40	
	Fellow	60,00	0,54	32,40	
	Physiotherapist	292,50	0,59	172,58	
					303,38
	PTCA (minutes)	91% of the patients			
	Cardiologist	37,00	2,46	91,02	
	Fellow	56,67	0,54	30,60	
	Nurse	240,00	0,41	98,40	
	Physiotherapist	262,50	0,59	154,88	
					374,90
Devices	**PTCA**				
	Stent	1,00	1533,33	1533,33	
					1533,33
Post ICU	**Conservative / drugs** (minutes)	2% of the patients			
	Cardiologist	52,50	2,46	129,15	
	Fellow	75,00	0,54	40,50	
	Physiotherapist	90,00	0,59	53,10	
					222,75
	Trombolysis (minutes)	7% of the patients			
	Cardiologist	50,63	2,46	124,54	
	Fellow	67,50	0,54	36,45	
	Physiotherapist	75,00	0,59	44,25	
					205,24
	PTCA (minutes)	91% of the patients			
	Cardiologist	58,00	2,46	142,68	
	Fellow	85,00	0,54	45,90	
	Nurse	240,00	0,41	98,40	
	Physiotherapist	86,25	0,59	50,89	
					337,87
SUBTOTAL	**Patient care**				
	Conservative / drugs			3633,19	
	Trombolysis			3474,86	
	PTCA			5212,34	
					5059,13
	Non-patient care				
	Overheads			278,49	
	Capital costs			116,04	
					394,53
TOTAL					**5453,66**
Fee charged to health insurer (DBC)					**8722,00**

Table 16: Resource use and costs per healthcare provider case vignette 6 AMI

Conservative / drugs

		Cardio 1	Cardio 2	Cardio 3	Cardio 4	Cardio 5	Cardio 6	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Number of beds	Hospital	600	400	300	1000	400	500				
	Department	26	26	13	44	19	28				
Capacity ulilization	Hospital	58%	52%	51%	56%	49%	55%	1,00	0,54	0,54	0,03
Number of cardiologists	Department	5,0	5,0	4,0	12,0	3,0	5,0	1,00	5,67	5,67	3,20
Nursing days	Case ~ Clinic	3,0	3,0	5,0	4,0	4,5	3,0	1,00	3,75	3,75	0,88
	Case ~ ICU	2,0	2,0	1,0	2,0	2,5	2,0	1,00	1,92	1,92	0,49
Costs											
Diagnostic procedures	Imaging	100,67	100,67	100,67	100,67	100,67	100,67	1,00	100,67	100,67	37,37
	Laboratory	77,46	77,46	77,46	77,46	77,46	77,46	1,00	77,46	77,46	13,75
	Other	171,58	171,58	171,58	171,58	171,58	171,58	1,00	171,58	171,58	105,30
Drugs	Drugs	364,54	437,54	437,54	446,30	404,69	422,21	1,00	450,68	423,89	30,38
Inpatient stay	Nutrition and hotelcosts	*267,00*	185,00	276,00	264,00	343,00	*267,00*	1,00	267,00	249,60	64,78
	Nursing staff ~ normal ward	1527,14	1510,43	1155,00	2149,30	3168,50	1636,00	1,00	1.943,06	1.943,06	717,78
Hospital care	ICU	*673,80*	*673,80*	60,00	*673,80*	466,20	147,60	1,00	444,20	444,20	213,77
	post-ICU	*534,15*	*534,15*	198,90	*534,15*	292,20	43,05	1,00	222,75	222,75	125,88
Patient care		**3716,34**	**3690,62**	**2477,14**	**4417,25**	**5024,29**	**2865,56**	1,00	3.677,39	3.633,19	944,48
Non-patient care		***394,53***	***394,53***	***394,53***	***394,53***	***394,53***	**394,53**	1,00	394,53	394,53	na
TOTAL		**4110,87**	**4085,15**	**2871,67**	**4811,78**	**5418,82**	**3260,09**	1,00	4.071,92	4.027,72	944,48

Table 17: Resource use and costs per healthcare provider case vignette 6 AMI

Trombolysis

		Cardio 2	Cardio 4	Cardio 8	Cardio 15	Cardio 18	Cardio 20	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Number of beds	Hospital	600	400	300	1000	400	500				
	Department	26	26	13	44	19	28				
Capacity ulilization	Hospital	58%	52%	51%	56%	49%	55%	1,00	0,54	0,54	0,03
Number of cardiologists	Department	5,0	5,0	4,0	12,0	3,0	5,0	1,00	5,67	5,67	3,20
Nursing days	Case ~ Clinic	3,0	3,0	5,0	4,0	4,5	3,0	1,00	3,75	3,75	0,88
	Case ~ ICU	2,0	2,0	1,0	2,0	2,5	2,0	1,00	1,92	1,92	0,49
Costs											
Diagnostic Procedures	Imaging	100,67	100,67	100,67	100,67	100,67	100,67	1,00	100,67	100,67	37,37
	Laboratory	77,46	77,46	77,46	77,46	77,46	77,46	1,00	77,46	77,46	13,75
	Other	171,58	171,58	171,58	171,58	171,58	171,58	1,00	171,58	171,58	105,30
Drugs	Drugs	364,54	437,54	437,54	446,30	404,69	422,21	1,00	450,68	423,89	30,38
Inpatient stay	Nutrition and hotelcosts	*267,00*	185,00	276,00	264,00	343,00	*267,00*	1,00	267,00	249,60	64,78
	Nursing staff ~ normal ward	1527,14	1510,43	1155,00	2149,30	3168,50	1636,00	1,00	1.943,06	1.943,06	717,78
Hospital care	ICU	*200,89*	*200,89*	90,00	185,85	417,00	110,70	1,00	303,38	303,38	149,84
	post-ICU	*175,95*	*175,95*	198,90	169,65	292,20	43,05	1,00	205,24	205,24	102,86
Patient care		**2885,23**	**2859,51**	**2507,14**	**3564,80**	**4975,09**	**2828,66**	1,00	3.519,05	3.474,86	904,16
Non-patient care		***394,53***	***394,53***	***394,53***	***394,53***	***394,53***	**394,53**	1,00	394,53	394,53	na
TOTAL		**3279,76**	**3254,04**	**2901,67**	**3959,33**	**5369,62**	**3223,19**	1,00	3.913,58	3.869,38	904,16

Table 18: Resource use and costs per healthcare provider case vignette 6 AMI

PTCA

		Cardio 2	Cardio 4	Cardio 8	Cardio 15	Cardio 18	Cardio 20	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Number of beds	Hospital	600	400	300	1000	400	500				
	Department	26	26	13	44	19	28				
Capacity ulilization	Hospital	58%	52%	51%	56%	49%	55%	1,00	0,54	0,54	0,03
Number of cardiologists	Department	5,0	5,0	4,0	12,0	3,0	5,0	1,00	5,67	5,67	3,20
Nursing days	Case ~ Clinic	3,0	3,0	5,0	4,0	4,5	3,0	1,00	3,75	3,75	0,88
	Case ~ ICU	2,0	2,0	1,0	2,0	2,5	2,0	1,00	1,92	1,92	0,49
Costs											
Diagnostic Procedures	Imaging	100,67	100,67	100,67	100,67	100,67	100,67	1,00	100,67	100,67	37,37
	Laboratory	77,46	77,46	77,46	77,46	77,46	77,46	1,00	77,46	77,46	13,75
	Other	171,58	171,58	171,58	171,58	171,58	171,58	1,00	171,58	171,58	105,30
Drugs	Drugs	364,54	437,54	437,54	446,30	404,69	422,21	1,00	450,68	423,89	30,38
Inpatient stay	Nutrition and hotelcosts	*267,00*	185,00	276,00	264,00	343,00	*267,00*	1,00	267,00	249,60	64,78
	Nursing staff ~ normal ward	1527,14	1510,43	1155,00	2149,30	3168,50	1636,00	1,00	1.943,06	1.943,06	717,78
Hospital care	ICU	*191,01*	278,40	60,00	185,85	357,00	73,80	1,00	374,90	374,90	128,57
	post-ICU	*230,61*	529,20	198,90	169,65	218,40	36,90	1,00	337,87	337,87	181,35
Stent		2000,00	*1533,33*	500,00	*1533,33*	2100,00	*1533,33*	1,00	1.533,33	1.533,33	566,86
Patient care		**4930,01**	**4823,60**	**2977,14**	**5098,13**	**6941,29**	**4318,94**	1,00	5.256,54	5.212,34	1.283,10
Non-patient care		***394,53***	***394,53***	***394,53***	***394,53***	***394,53***	**394,53**	1,00	394,53	394,53	na
TOTAL		**5324,54**	**5218,13**	**3371,67**	**5492,66**	**7335,82**	**4713,47**	1,00	5.651,06	5.606,87	1.283,10

3.8. Cough

In the Netherlands, the yearly incidence of people with cough presenting at the GP office is estimated to be 34 per 1,000. The incidence is highest in children up to 4 years of age (< 1 years of age: 230 per 1,000; 1-4 years of age: 185 per 1,000) [29]. National guidelines of cough in children are developed by the Dutch General Practitioners Association. In the light of our case-vignette, three recommendations in these guidelines are worth mentioning. Firstly, examination of a child older than 3 months but younger than 6 years of age by a GP before the third day of cough and fever is not deemed necessary. Telephonic instructions of a GP assistant to the parents are sufficient. Secondly, fever does not need to be treated. Administration of anti-pyretic medications is not necessary and painkillers should only be prescribed under exceptional circumstances. Thirdly, referral to a paediatrician is only indicated in case of suspicion of meningitis, dehydration, severe illnesses, hemoptoes or urinary tract infections [30].

Table 19 gives an overview of resource use and costs for a 2-year old boy having cough and fever since two days, presenting at the GP practice. Total costs amount to € 24. Diagnostic procedures are only performed in a minority of the patients and corresponding costs are negligible. Drug costs almost entirely consist of the costs of antibiotics and bronchodilating agents. Painkillers are prescribed to half of the patients.

The average duration of a visit to the GP is 10 minutes. In addition, the GP assistant examines about 60% of the patients with an average duration of 6 minutes. After first examination, a minority of the patients is scheduled for a second visit (18%) or referred to an ear, nose, and throat specialist (2%) or a paediatrician (1%).

Overall, the variation in costs between GP practices for this case-vignette is relatively small and average costs vary between € 16.67 and € 33.83. Costs of non-patient care do not include capital costs. Overheads are calculated as a mark-up to the costs of patient care and vary from approximately 32% to 45%.

The fee charged to the health insurer of the patients is virtually equal to the total costs resulting from our study (€ 26 versus € 24 respectively).

In the Netherlands, GPs can charge a yearly fee to the health insurer for each registered patient. For patients up to the age of 65 this fee amounts to € 55.93. With an average number of visits per patient of 3.59 in 2005, the proportional share of this fee per visit equals € 15.57. In addition, GPs receive a fee per visit € 10,26. These findings are in line with the estimation that the tariffs per visit cover approximately 38% of the total costs of the GP practice [31].

Table 19: Resource use and costs case vignette 7 Cough

Phase	**Cough**	**Average # units per patient**	**Unit Costs in euro (€)**	**Average costs per patient in euro (€)**	**Subtotal average costs per patient in euro (€)**
Site of consultation		General practitioner's practice			
Diagnostic procedures	**Imaging, NFS**	0,06	58,05	3,63	
					3,63
	Laboratory, NFS	0,05	2,47	0,13	
					0,13
Drugs	**Drugs**				
	Painkillers	0,47	0,05	0,02	
	Antibiotics	0,18	6,72	1,20	
	Bronchodilating agent	0,07	20,28	1,45	
	Cough medicine	0,04	0,07	0,00	
					2,67
Examination	**First visit** (minutes)				
	General practitioner	10,33	0,91	9,41	
	Assistant	3,43	0,35	1,20	
					10,61
Post examination					
	Second visit (visit)	0,18	2,00	0,36	
					0,36
	Referral				
	Ear, Nose and Throat specialist	2%			
	Pediatrician	1%			
SUBTOTAL	**Patient care**				**17,41**
	Non-patient care				
	Overheads			6,22	
	Capital costs			-	
					6,22
TOTAL					**23,63**
Fee charged to health insurer					**25,83**

Table 20: Resource use and costs per healthcare provider case vignette 7 Cough

		GP 1	GP 2	GP 3	GP 4	GP 5	GP 6	GP 7	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Number of GPs	Practice	-	1	2	3	3	4	1				
Costs												
Diagnostic procedures	Imaging			2,90	5,81	2,90		2,90	0,06	58,05	3,63	1,45
	Laboratory				0,25	0,02		0,12	0,05	2,47	0,13	0,11
Drugs	Drugs	6,10	0,03	0,67	9,48	0,35	0,05	2,05	1,00	2,67	2,67	3,69
Examination		13,17	9,11	14,36	9,81	9,11	9,64	9,11	1,00	10,62	10,62	2,20
Post examination		6,58	0,91	0,72	2,94	0,46	1,45	0,91	0,18	2,00	0,36	2,18
Patient care		**25,85**	**10,05**	**18,66**	**28,29**	**12,85**	**11,13**	**15,10**	1,00	75,81	17,41	7,20
Non-patient care		**6,27**	**7,75**	**5,54**	**5,54**	**6,27**	**5,54**	**6,65**	1,00	6,22	6,22	0,81
TOTAL		**32,12**	**17,80**	**24,19**	**33,83**	**19,11**	**16,67**	**21,75**	1,00	82,03	23,63	6,86

3.9. Colonoscopy

Colonoscopies are considered the gold standard for the detection of colorectal cancer, but are also performed to identify inflammations, polyps and hemorrhages. Incidences of colorectal cancer in the Netherlands were estimated at 0.64 per 1,000 in men and 0.58 per 1,000 in women in 2003 [32]. National guidelines of colonoscopies are issued by the Dutch Association for Gastro-Enterology. The necessity of colonic lavage should be made on an individual basis. The administration of sedatives is recommended but not required [33].

Table 21 gives an overview of resource use and costs for a colonoscopy in healthy males of 55-70 years of age. Colonoscopies are performed at the outpatient gastro-enterological department of the hospital. Before colonoscopy, patients visited the hospital on average one time for pre assessment and were on a waiting list. Because colonoscopies are not included in the DBC database, no detailed information was specified for diagnostic procedures. The usage of laboratory services is directly based on estimates of gastro-enterologists. The unit costs are based on an average costs for laboratory services derived from other case-vignettes.

Total costs amount to € 151. Labour costs account for 85% of the total costs of patient care. Costs of the gastro-enterologist are approximately 85% of the total labour costs. Sixty % of the labour costs occur during examination. In all hospitals a colonoscopy is performed by the gastro-enterologist. In 8 out of 9 hospitals a nurse assists the gastro-enterologist during the intervention.

On average, patients stay at the hospital for 0.5 days. No medical imaging services were performed and costs of laboratory services were minor. Despite the situation that all patients received fentanyl (anaesthetic / analgesic) and dormicum (anaesthetic / sedative), also drug costs were negligible. Drug costs are accounted for by the healthcare provider. Information on the number of colonic lavages was not available.

The costs for non-patient care amount to only 9% of the total costs.

The fee charged to the health insurer is € 387 and more than twice as high as the average costs of colonoscopy as calculated in the current study.

Phase	Colonoscopy	Average # units per patient	Unit Costs in euro (€)	Average costs per patient in euro (€)	Subtotal average costs per patient in euro (€)
Site of consultation		Out-patient department of hospital			
Diagnostic procedures	**Laboratory, NFS**	0,78	2,28	1,78	
					1,78
Drugs	**Drugs**				
	Fentanyl	1,00	0,17	0,17	
	Dormicum	1,00	0,30	0,30	
	Pethidine	0,11	0,73	0,08	
					0,55
Inpatient stay	**Nutrition and hotelcosts**	0,50	35,13	17,56	
					17,56
Pre examination	**Examination-Team** (minutes)				
	Gastro-enterologist	11,25	2,46	27,69	
	Nurse	7,82	0,41	3,20	
					30,89
Examination	**Examination-Team** (minutes)				
	Gastro-enterologist	24,17	2,46	59,45	
	Nurse	27,81	0,41	11,40	
					70,85
Post examination	**Examination-Team** (minutes)				
	Gastro-enterologist	6,13	2,46	15,08	
	Nurse	5,04	0,41	2,07	
					17,14
SUBTOTAL	**Patient care**				**138,77**
	Non-patient care				
	Overheads			8,66	
	Capital costs			3,60	
					12,26
TOTAL					**151,03**
Fee charged to health insurer					**387,00**

Table 22: Resource use and costs per healthcare provider case vignette 4 Colonoscopy

		GE 1	GE 2	GE 3	GE 4	GE 5	GE 6	GE 7	GE 8	GE 9	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Number of beds	Hospital	800	500	300	900	400	400	500	600	1400				
Capacity ulilization	Hospital	67%	70%	67%	49%	49%	51%	55%	60%	56%	1,00	0,58	0,58	na
Number of gastro-enterologists	Department	4	6	2	-	1	1	2	14	3	1,00	4,13	4,13	na
Nursing days	Case	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	1,00	0,50	0,50	na
Costs														
Diagnostic procedures	Laboratory	*1,78*	1,78	1,78	*1,78*	1,78	1,78	1,78	1,78	1,78	1,00	1,78	1,78	na
Drugs	Drugs	0,47	0,62	0,47	0,31	1,20	0,47	0,47	0,47	0,47	1,00	0,55	0,55	0,26
Inpatient stay	Nutrition and hotelcosts	*17,56*	27,00	11,00	20,00	24,50	12,00	18,00	12,00	16,00	1,00	17,56	17,56	5,60
Pre examination	OP-Team	49,20	16,40	16,40	73,80	2,05	82,00	32,80		4,51	0,89	40,28	30,89	30,77
Examination	OP-Team	90,20	71,75	57,40	73,80	86,10	73,80	55,35	71,75	57,40	1,00	72,26	70,85	12,39
Post examination	OP-Team	24,60	14,35	14,35	24,60	2,05	28,70	32,80		12,30	0,89	23,02	17,14	10,16
Patient care		**183,81**	**131,90**	**101,40**	**194,29**	**117,68**	**198,75**	**141,20**	**86,00**	**92,46**	1,00	155,45	138,78	44,06
Non-patient care		***12,26***	**12,73**	**10,67**	**1,65**	***12,26***	**25,89**	**15,82**	**6,79**	***12,26***	1,00	12,26	12,26	8,29
TOTAL		**196,07**	**144,64**	**112,08**	**195,94**	**129,94**	**224,64**	**157,02**	**92,79**	**104,72**	1,00	167,71	151,04	46,15

3.10. Tooth filling

This case-vignette describes a ca. 12-year old child with a toothache in a lower molar tooth. However, all dentists cooperating in our study stated that 12-year old children usually do not need a filling, because they loose their milk teeth around their 10-12th life year. Milk teeth are typically removed as a preferred treatment and adult teeth rarely show cavities in this age group because they are relatively 'new'. Furthermore the case-vignette suggests that the dentist is providing an amalgam filling. Four out of 5 dental practices that participated in our study do not provide amalgam fillings anymore since the introduction of composite (white) fillings. The one practice that still uses amalgam fillings, expects that this will no longer be the case in the near future. Therefore, costs and prices for this case-vignette are mainly based on composite fillings.

To our knowledge, no guideline exists concerning this case-vignette. An overview of resource use and costs is given in table 23. Total costs amount to € 64. Labour costs account for 58% of the total costs of patient care. The remaining costs of patient care mainly consist of the costs of an X-ray that was performed in approximately 50% of the patients (€ 21). Costs of other diagnostic procedures like percussion and cold / vitality test were not valued separately but included in the cost of pre therapy assessment.

Only 1 out of 10 patients receives an amalgam filling, which is almost 3 times cheaper than a composite filling. Three quarters of the patients also receive local anaesthetics, but costs of the anaesthetic are negligible.

Twenty-seven % of the labour costs consist of the costs of assistants, who spent nearly as much time on the patient as the dentist. After tooth filling, about 1 out of 10 patients comes to the dentist for a second visit.

Overall, the variation in costs between dental practices for this case-vignette is relatively small and average costs vary between € 78 and € 114. Only the costs of practice 1 are considerably higher (€ 148). This is mainly due to the time needed for tooth filling which is almost twice as high as the estimated time in other practices. The higher costs of overheads are another reason for the higher overall costs in this practice.

The fee charged to the health insurer or the patient pretty well equals the total costs as calculated in our study (€ 61 versus € 64 respectively).

Table 23: Resource use and costs case vignette 9 Tooth filling

Phase	Tooth filling	Average # units per patient	Unit Costs in euro (€)	Average costs per patient in euro (€)	Subtotal average costs per patient in euro (€)
Site of consultation		Dentist's practice			
Diagnostic procedures	**Imaging**				
	X-ray	0,54	39,00	21,06	
					21,06
	Other				
	Percussion	0,42	na	na	
	Cold test, vitality test	0,48	na	na	
Materials	**Materials**				
	Composite	0,90	2,28	2,05	
	Amalgam	0,10	0,82	0,08	
	Anaesthetic	0,78	0,51	0,40	
					2,53
Pre therapy	**Assessment** (minutes)				
	Dentist	9,48	0,74	7,03	
	Assistant	6,81	0,35	2,38	
					9,41
Therapy	**Therapy** (minutes)				
	Dentist	18,47	0,74	13,70	
	Assistant	17,69	0,35	6,18	
					19,88
Post therapy					
	Second visit (visit)	0,10	29,50	2,95	
					2,95
SUBTOTAL	**Patient care**				**55,83**
	Non-patient care				
	Overheads			7,74	
	Capital costs			-	
					7,74
TOTAL					**63,57**
Fee charged to health insurer					**60,73**

Table 24: Resource use and costs per healthcare provider case vignette 9 Tooth filling

		Dentist 1	Dentist 2	Dentist 3	Dentist 4	Dentist 5	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Number of dentists	Practice	3	1	2	2	2				
Costs										
Diagnostic procedures	Imaging	39,00	7,80	7,80	39,00	11,70	0,54	39,00	21,06	16,45
Materials	Materials	5,00	1,36	2,03	2,80	3,59	1,00	3,61	2,53	1,41
Pre therapy		10,91	12,54	8,95	5,46	10,23	1,00	9,62	9,41	2,66
Therapy		32,74	18,65	21,82	10,91	15,28	1,00	19,88	19,88	8,25
Post therapy		43,65	31,19	30,77	16,37	25,51	0,10	29,50	2,95	9,91
Patient care		**131,30**	**71,55**	**71,38**	**74,54**	**66,30**	1,00	101,60	55,83	27,16
Non-patient care		**16,67**	**11,35**	**4,20**	**3,25**	**3,22**	1,00	7,74	7,74	6,04
TOTAL		**147,97**	**82,90**	**75,57**	**77,79**	**69,52**	1,00	109,34	63,57	32,34

3.11. Ambulatory physiotherapy

Yearly, 5,500 cruciate ligament ruptures take place in the Netherlands and the number of cruciate ligament reconstructions is estimated at 1,600. No national guidelines on ambulatory physiotherapy exist as yet, but every centre has its own protocols. Protocols contain directives with respect to the content of the treatment programme. They generally do not comment on frequency or duration of the therapy.

Table 25 gives an overview of resource use and costs for ambulatory physiotherapy after anterior cruciate ligament reconstruction in healthy males of 25-35 years of age. Total costs amount to € 670. Costs of patient care only exist of labour costs of the physiotherapist. The average number of visits per patient is 27. The average duration of a subsequent visit is nearly the same as the time of the first visit. However, there is a considerable variation in the time spent by physiotherapists on first and subsequent visits.

The average costs for this case-vignette vary from € 325 in practice 3 to almost € 1350 in practice 2. The higher costs in practice 2 are entirely due to the higher number of subsequent visits (14 in practice 3 and 46 in practice 2) and the longer duration of a visit (30 minute in practice 3 and 60 minutes in practice 2).

Costs of non-patient care only included the costs of overheads. These costs also showed a wide variation between practices ranging from 6% of the costs of patient care in practice 1 to 45% of the costs of patient care in practice 8.

The fee charged to the health insurer or the patient is somewhat lower than the total costs as calculated in our study, € 908 versus € 670 respectively.

Table 25: Resource use and costs case vignette 10 Ambulatory physiotherapy

Phase	**Ambulatory physiotherapy**	**Average # units per patient**	**Unit Costs in euro (€)**	**Average costs per patient in euro (€)**	**Subtotal average costs per patient in euro (€)**
Site of consultation		Physiotherapist's practice			
Therapy	**First visit** (minutes)				
	Physiotherapist	43.13	0.43	18.73	
					18.73
	Subsequent visits (minutes)				
	Physiotherapist	1241.14	0.43	539.12	
					539.12
SUBTOTAL	**Patient care**				**557.85**
	Non-patient care				
	Overheads			112.54	
	Capital costs			-	
					112.54
TOTAL					**670.39**
Fee charged to health insurer					**907.85**

Table 26: Resource use and costs per healthcare provider case vignette 10 Ambulatory physiotherapy

		Physio 1	Physio 2	Physio 3	Physio 4	Physio 5	Physio 6	Physio 7	Physio 8	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Number of therapists	Practice	5	-	5	12	9	8	1	17				
Costs													
Therapy	First visit	19.55	13.03	13.03	13.03	26.06	21.72	17.37	26.06	1.00	18.73	18.73	5.56
	Subsequent visits	354.45	1204.07	182.44	478.89	517.99	*539.12*	345.32	690.65	1.00	539.12	539.12	308.93
Patient care		**373.99**	**1217.10**	**195.47**	**491.92**	**544.05**	**560.83**	**362.70**	**716.71**	1.00	557.85	557.85	308.82
Non-patient care		**22.44**	***129.64***	***129.64***	**34.43**	***129.64***	**2.39**	***129.64***	**322.52**	1.00	112.54	112.54	101.15
TOTAL		**396.43**	**1346.75**	**325.11**	**526.36**	**673.69**	**563.22**	**492.34**	**1039.23**	1.00	670.39	670.39	348.82

4. Discussion

The present study aimed to estimate utilisation, unit costs and prices of 10 case-vignettes describing healthcare services in both inpatient and outpatient settings in the Netherlands. In case-vignettes concerning inpatient hospital care, costs of inpatient stay, labour costs of (para-) medical staff and implants were the most important cost drivers. Since all labour costs were standardised per time unit, differences between healthcare providers were solely due to differences in the amount of time spent per patient. In case-vignettes for stroke and AMI costs of inpatient days (including costs of nursing staff, nutrition and other hotel costs like laundry) contributed to 46% and 40% of total costs respectively. For the case-vignettes appendectomy and hip replacement these proportions were 27% and 13% respectively. In appendectomy the costs of (para-) medical staff were the largest contributor to the total costs (35%), whereas in hip replacement the costs of the prothesis were the most important cost driver, responsible for 33% of total costs.

In case-vignettes performed in outpatient (hospital) settings, the labour costs of (para-) medical personnel were the most important cost driver. Again, differences between healthcare providers were fully caused by differences in the amount of time spent. For all case-vignettes performed in outpatient settings (i.e. normal delivery, cataract, cough, colonoscopy and tooth filling) this cost category contributed to approximately 55% of the total costs. Only for physiotherapy this proportion was even higher, and labour costs contributed to 83% of the total costs.

Of case-vignettes performed in the hospital setting, costs of non-patient care included the costs of overheads and capital costs. Estimates of these costs were obtained using the same approach in all hospitals and costs of overheads and capital were expressed as a proportion (‘mark-up’) of the hospital costs of patient care. These proportions varied only slightly per hospital and for each case-vignette the average mark-up was in between 51% and 68%. Expressed as a proportion of total costs, the share of costs of non-patient care varied from 20% to 33%. Only the costs of non-patient care for colonoscopy and AMI were considerably lower (9% and 7% respectively) and it seems likely that for these case-vignettes the costs of overheads and capital are underestimated. For colonoscopy this can be explained from the relatively high costs of medical specialists as the mark-up is only applied to the hospital costs. Costs of non-patient care for AMI could only be obtained from one

hospital and it is unlikely that this proportion is representative for other hospitals in the study. In the light of the current study it appeared not possible to apply more advanced approaches, for instance step-down calculation, for the calculation of overheads and capital costs. For such an approach we would have needed more specific information to allocate costs of overheads and capital to our case-vignette. This kind of information, such as the size of hospital areas (m^2) or full time equivalents from medical and supportive department, could usually not be obtained.

Calculations of the costs of non-patient care in settings outside the hospital (i.e. the practices of GPs, dentists and physiotherapists) only included costs of overheads. Information about capital costs, like costs of interest and depreciation, were simply not available. Estimates of the proportion of overhead costs (expressed as a mark-up of the costs of patient care) varied from 12% in the dental practice to 26% in the GP practice. In physiotherapeutic practices, the proportion was 17%. The higher costs of overheads in the GP practice are likely to be due to the shorter duration of an average visit (i.e. more patients visiting the practice per time unit) and a higher number of patients calling the practice by telephone.

In addition to the costs of each case-vignette, we also presented the tariff healthcare providers charged to health insurers or patients. Tariffs for normal delivery, stroke, cough and tooth filling are close to the costs found in our study. In contrast, costs estimates of appendectomy, hip replacement, cataract, AMI, colonoscopy and physiotherapy were substantially lower than this tariff. A possible explanation for this latter finding lies in the description of our case-vignettes describing straightforward cases without complications. Healthcare costs unrelated to the case-vignette description were ignored in our calculations. In general, it is known that costs of treatment are skewed and few patients with complications may have a considerable impact on the average costs per patient. DBC tariffs also include the procedures undertaken in case of complications and may involve a longer average admission time than was found in our study. To investigate whether this could have been the case, we compared the average number of inpatient days for each inpatient case-vignette as found in our study (based on estimates of physicians) with the average length of stay as registered in the DBC database. Indeed, we found that in all case-vignettes concerning inpatient hospital care and in which the tariff was substantially higher than the costs of our case-vignette, the average length of stay was higher in the DBC registration than in our case-vignettes. For all these case-vignettes

(appendectomy, hip replacement, AMI) the difference was in between two and three days.

Another explanation of the higher tariffs can be found in the inclusion in the DBC tariff of the entire treatment path including visits and diagnostic procedures before treatment or hospital admission. In general, these costs were excluded from our case-vignette calculations. A third explanation can be found in the grouping of DBCs for reimbursement. Because of the large number of DBCs, they are clustered in a limited number of product groups with the same tariff. For that reason the tariff may not be very specific for the case-vignette considered.

A specific aim of the study was to explore the variation in costs across healthcare providers. For that reason, we presented a table for each case-vignette containing cost estimates of all individual healthcare providers. In general, there appeared to be consensus among medical specialists on the duration of hospital admissions. The average number of hospital days ranged from 1.5 to 3 days for appendectomy, from 4 to 7 days for hip replacement and from 5 to 7 days for AMI. Only for stroke, the range was much greater, and estimates varied from 9 to 30 days. This latter finding is not surprising, as it is known that length of stay for stroke is highly dependent on the organisation of care within the hospitals and the availability of and cooperation with other healthcare providers like rehabilitation homes and homes for the elderly [34]. Much more variation was found in the costs of treatment staff. Especially for case-vignettes within the hospital setting, time and cost estimates of the different professions varied largely. As we used standardised questionnaires, and as all estimates were specific for the case-vignettes in this study, we cannot explain these differences. Apparently, treatment protocols and profession involvement varies largely across hospitals.

The case-vignettes for hip replacement, cataract and AMI included the costs of an implant. Although costs of implants varied widely between the providers of our study sample, these cost variations could not be assigned to the use of different types of implants. This finding is remarkable, because other sources reported considerable cost differences according to the type of implant. For instance, an uncemented hip implant was reported to be more expensive than a cemented hip implant (€ 3100 versus € 1200-2200 respectively [19]. As for PTCA treatment in AMI, a drug eluting stent is reported to be more than twice as expensive as a bare metal stent (€ 1700 versus € 800 respectively). It remains unknown why we did not find these differences

in our study. It may have been the case that medical specialists cooperating in our study had little insight in the costs of medical devices they apply and provided incorrect information. Nevertheless, our data suggest that there are considerable differences in costs of medical devices between hospitals and this variation may also be due to purchasing quantities, price negotiation skills and other factors.

To investigate whether the variation in costs was consistent with other studies, we compared our findings with a cost analysis we performed earlier. The objective of this earlier study was to calculate unit costs of inpatients days involving 22 wards and 11 ICUs of general and university hospitals in the Netherlands [35]. In this analysis, unit costs were calculated in the same way in all hospitals as much as possible, and estimates were provided for separate cost categories, like costs of medical staff, nursing staff, nutrition costs, etc. As in the current study, cost categories showed wide variations between estimates of the different general hospitals. Especially the costs of nursing and overheads varied largely, with estimates ranging from € 46 to € 170 and from € 19 to € 110 respectively. However, the variation in costs of medical staff was much smaller, ranging from € 19 to € 28. This latter finding can be explained by the fact that in the earlier study only costs were taken into account that were specifically attributed to inpatient nursing days, whereas in the current study costs of the entire treatment path are considered.

The variation in time involvement for the case-vignettes performed outside the hospitals was much smaller. For these case-vignettes, the variation in costs was largely due to the number of patients returning for a second visit (GP and dental practices) and the number of visits (physiotherapeutic practice).

One of the aims of work package 9 of the HealthBASKET project is to compare the costs of case-vignettes across countries. Uniform case-vignette descriptions were used to assure that in all countries costs of the same episodes of care were calculated. For two case-vignettes, the situation in the Netherlands may be different from the case-vignette definition. The case-vignette for normal delivery describes a healthy woman giving birth at the hospital without complications. However, in the Netherlands a great share of women gives birth at home. These are deliveries in which no complications are expected beforehand. One third of all deliveries take place at home and this proportion remained stable in the past 15 years [36]. If women deliver in the hospital this usually takes place in day-care. A midwife assists women during delivery and often an obstetrician is not involved. Uncomplicated

deliveries requiring inpatient hospital stay are rare. The cost estimation of normal delivery in the current study is based on day cases. This estimation is likely to be considerably lower than the costs of delivery performed in an inpatient setting as described in the case-vignette and as may be the case in other countries.

The case-vignette on tooth fillings describes the provision of an amalgam filling, though in the Netherlands a gradual changeover has taken place from amalgam towards composite fillings during the last decades [37]. Dental schools have even skipped training in placing amalgam restorations out of the curriculum [38]. The changeover to composite seems justified since it is believed to avoid clinical problems and recent studies have shown comparable longevity for amalgam and composite restorations.

To facilitate across country comparisons, a common methodology was prescribed for usage in all the participating countries. To perform the study in the Netherlands it appeared necessary to adapt the methodology to the local situation. Hence, the methodology as used for the current study differs in some ways from the proposed methodology. Firstly, the guidelines to work package 9 advised to use hospitals with ca. 200 to 400 beds. In our study a total of 23 hospitals participated with an average of 492 beds per hospital (range: ca. 100 to 1000). The number of beds per hospital has increased drastically in the past decades due to mergers between hospitals. Since the start of the 80s approximately 40 mergers took place between Dutch hospitals, involving 80 hospitals. In this period the total number of hospitals decreased from 172 to 129 (including university and categoral hospitals). As a result, the average number of beds per hospital increased to approximately 453 [39], which is close to the average number of hospital beds in our selection. Moreover, we selected hospitals situated in large cities, smaller cities and hospitals in peripheral areas. These hospitals were mostly located in the Western and Southern part of the country. Because the variation between healthcare providers related to regional and demographical differences is small, it seems unlikely that the uneven spread over the country has affected our results. Hence, we believe to have achieved a profound insight in costs and prices of the 10 case-vignettes at the micro-level of a representative selection of hospitals.

Secondly, to make it more attractive for healthcare providers to cooperate in our study, we only asked for information that could not be obtained elsewhere. For instance, information about diagnostic procedures was collected from the DBC

database (see below). As a result, the willingness to cooperate in the study was high. A total number of 63 respondents (44 physicians, 7 midwives, 5 dentists, and 7 physiotherapists) agreed to participate, representing 48 different settings (22 hospitals, 7 midwife practices, 7 GP practices, 5 dental practices, and 7 physiotherapeutic practices). The number of settings used per case-vignette varied from 10 for appendectomy to 5 for tooth filling. The large number of settings in which resource use data were collected is, in our view, a strength of this methodology and results provide insight into the range of costs, variations between cost categories and differences between healthcare providers.

Finally, the guidelines to work package 9 instructed to include separate tables for individual healthcare providers. As the vast majority of the healthcare providers made estimations based on the average of the last 10 patients instead of assessing resource use data of 10 individual patients, we decided to omit tables showing values for each specific healthcare provider. As an alternative, we included for each case-vignette at least one table containing costs of each individual healthcare providers. This way of presenting results allows a rapid interpretation of the variation in costs across providers. Further details of resource use and costs that were used in the calculations were provided in the appendices.

The DBC database was used to estimate the use of diagnostic procedures that were carried out for the different case-vignettes. A major advantage of using this database was the large number of patients and hospitals from which data were available. Another advantage was that it was time saving as the database consists of standardised categories giving us a clear overview on resource use, costs and prices of each individual service. The large number of DBCs allowed us to make a specific selection of DBC codes relevant to our case-vignettes. A disadvantage of this approach is that we only have little experience with the use of DBC data. DBC registration is relatively new to most of the Dutch hospitals and quality assessment of the DBC registration is still under development.

An important research question of this project was to investigate whether it was possible to apply a common costing methodology in all participating countries. To answer this question it is necessary, as a next step, to compare the outcomes of the Netherlands with those of other countries. This report shows that it is possible to apply the methodology to the Netherlands.

A disadvantage of the methodology is that it is time consuming. Whereas, obtaining time estimates of involvement of medical specialists and other professions was relatively easy and straightforward, this was not the case for obtaining cost information. Especially information about costs of drugs and costs of non-patient care were difficult to obtain. This was mainly due to the fact that this kind of information could only be obtained from the administrative departments that did not as easily cooperate as medical specialists and other professionals. Another disadvantage of this methodology is that is may be difficult to capture the profound complexity of case-vignettes like AMI. For this case-vignette, different treatment modalities, each requiring intensive treatment, are available and it may be difficult for professionals to provide reliable estimates of time involvement and the costs of drugs and medical materials for all treatment modalities. Hence, for this case-vignette it can be questioned whether we have been able to identify and incorporate all resource use and costs relevant to this case-vignette.

Regarding the methodology, a final comment can be made. If the costing methodology is to be applied in future studies, it may be more efficient to identify the important cost drivers of each episode of care beforehand. Information about the most important cost drivers can usually be obtained from publications or grey literature or by performing short interviews with experts. Targeting the collection of data to these cost categories may increase efficiency, while the loss of information due to not collecting detailed information about all cost categories may be negligible. This may improve the feasibility of this costing methodology and stimulate its application in future studies.

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Appendices

Appendix 1: Identification of DBCs for each case-vignette

DBC-coding

The numerical DBC code exists of 4 to 5 items. These concern specialty, type of care, demand for care, diagnosis and treatment axis. For each case-vignette these 5 items will be specified. The demand for care is only used within a few specialties. In case of emergency care, normally two DBCs will be registered: one DBC for emergency care and one DBC for regular care. Hence, in case of emergency care always all DBCs for emergency and regular care will be asked for.

Case-vignette 1: Appendectomy

Specialty:	surgery (03)
Type of care:	emergency care (12) and / or regular care (11)
Demand for care:	N.A.
Diagnosis:	appendicitis (113)
Treatment axis:	surgical with clinical episode (203) or surgical (endo-technical) with clinical episode (303)

Corresponding DBC codes include:

03.11..113.203

03.11..113.303

03.12..113.*

Case-vignette 2: Normal delivery

Specialty:	gynaecology / obstetrics (07)
Type of care:	regular care (11)
Demand for care:	N.A.
Diagnosis:	partus assistance with aftercare and follow-up (V51)
Treatment axis:	partus spontaneous with clinical episode (133) or conservative with clinical episode (103)

Corresponding DBC codes include:

07.11..V51.103

07.11..V51.133

07.12..V51.*.

Case-vignette 3: Hip replacement

Specialty: orthopedics (05)

Type of care: regular care (11)

Demand for care: N.A.

Diagnosis: arthrosis pelvis / hip / femur (1701)

Treatment axis: surgical with clinical episode and articulation prosthesis (223)

Corresponding DBC codes include:

05.11..1701.223.

Case-vignette 4: Cataract

Specialty: ophthalmology (01)

Type of care: regular care (11)

Demand for care: N.A.

Diagnosis: cataract (554)

Treatment axis: intervention in daycare (32)

Corresponding DBC codes include:

01.11..554.32.

Case-vignette 5: Stroke

Specialty: neurology (30)

Type of care: emergency care (12) and / or regular care (11)

Demand for care: N.A.

Diagnosis: stroke - subarachnoidal bleeding (1101), stroke - intracerebral bleeding (1102), stroke – intracranial bleeding (1103), stroke not due to bleeding (1111)

Treatment axis: regular treatment with clinical episode (113), trombolysis with clinical episode (213)

Corresponding DBC codes include:

30.11..1101.113 and 30.11..1101.213 and 30.12..1101.*

30.11..1102.113 and 30.11..1102.213 and 30.12..1102.*

30.11..1103.113 and 30.11..1103.213 and 30.12..1103.*

30.11..1111.113 and 30.11..1111.213 and 30.12..1111.*

Case-vignette 6: Acute Myocardial Infarction (PTCA)

Specialty:	cardiology (20)
Type of care:	emergency care (12) and / or regular care (11)
Demand for care:	N.A.
Diagnosis:	Chest pain – MI with (204) or without (205) ST elevation
Treatment axis:	regular treatment with clinical episode (103), Class I PCI with clinical episode (213), Class II PCI with clinical episode (223), Class III PCI with clinical episode (233), Class IV PCI with clinical episode (243).

The distinction in different classes for PCI is not yet used in practice. Hence, the common treatment axis is regular treatment with clinical episode103 and class 1 PCI with clinical episode (213). The resulting DBC codes are:
20.11..204.103 and 20.11..204.213 and 20.12..204.*
20.11..205.103 and 20.11..205.213 and 20.12..205.*

Case-vignette 8: Colonoscopy

Diagnostic colonoscopy is not registered as a DBC but as a procedure code (034686). Hence resource use data are not available from the DBC registration for this intervention.

Appendix 2: Specifications standardised labour costs

Table A1: Labour costs of healthcare professionals and employees

	Salary scale	Monthly salary 2005	Surcharge employer expenses	Practice expenses	Total annual costs 2005	Workable hours per year	Costs per hour	Costs per minute	Sources:
Hospital									
Fellow	65, 6	€ 3,883.00	39%		€ 64,768.44	1988	€ 32.58	€ 0.54	[39]
OP assistant	50, 6	€ 2,639.00	39%		€ 44,018.52	1540	€ 28.58	€ 0.48	[39]
Nurse	45, 6	€ 2,296.00	39%		€ 38,297.28	1540	€ 24.87	€ 0.41	[39]
Dental practice									
Dental assistant	+, 5	€ 1,886.25	39%		€ 31,462.65	1540	€ 20.43	€ 0.34	[39]
GP practice									
GP assistant	+, 6	€ 1,941.07	39%		€ 32,377.05	1540	€ 21.02	€ 0.35	[39]
Independent practitioners									
Medical specialist							€ 147.50	€ 2.46	[39]
GP	75; 11	€ 4,814.49	35%	€ 677.00	€ 86,118.72	1575	€ 54.68	€ 0.91	[39]
Dentist	75; 11	€ 4,076.71	35%	€ 339.00	€ 70,110.72	1575	€ 44.51	€ 0.74	[39]
Physiotherapist	55 max	€ 1,496.32	45%	€ 1,175.00	€ 40,136.01	1540	€ 26.06	€ 0.43	[39]
Midwife	55 max	€ 1,878.96	45%	€ 2,626.00	€ 64,205.99	1540	€ 41.69	€ 0.69	[39]

Appendix 3: Tariff specification case-vignettes concerning list-A DBCs

Table A2: Tariff specification of case-vignettes concerning list A-DBCs

2006		DBC-code	relative frequency	Tariff hospital	Honorarium	Summed tariff
Appendectomy:	regular care	03.11..113.203	78%	3777	341	4118
		03.11..113.303	22%	3777	451	4228
	acute care	03.12..113.101	94%	118	26	143
		03.12..113.201	6%	118	26	143
Weighted mean	regular care			3777	365	4142
Weighted mean	acute care			118	26	143
Tariff appendectomy				3895	391	**4285**
Normal delivery		07.11.V51.132		475	236	**711**
Stroke:	regular care	30.11..1101.113	5%	6149	551	6700
		30.11.1102.113	13%	6149	551	6700
		30.11..1103.113	3%	6149	551	6700
		30.11..1111.113	77%	6149	551	6700
		30.11..1111.213	2%	6149	1003	7152
	acute care	30.12..1101.111	7%	230	144	374
		30.12..1102.111	13%	230	144	374
		30.12..1103.111	4%	230	144	374
		30.12..1111.111	75%	331	161	492
		30.12..1111.113	1%	6149	551	6700
Weighted mean	regular care			6149	558	6707
Weighted mean	acute care			386	163	549
Tariff stroke				6535	720	**7255**
AMI:	regular care	20.11..204.103	55%	4438	394	4832
(without PTCA)		20.11..205.103	45%	4438	394	4832
	acute care	20.12..204.101	55%	118	76	193
		20.12..205.101	45%	118	76	193
Weighted mean	regular care			4438	394	4832
Weighted mean	acute care			118	76	193
Tariff AMI without PTCA			10%	4556	470	5025
Tariff AMI with PTCA		20.11..204.243	90%	8377	755	9132
Tariff AMI						**8722**

Appendix 4: Specifications of resource use and costs per case-vignette

Table A3: Drugs: resource use and costs ~ case vignette 1 Appendectomy

		Surg 1	Surg 2	Surg 3	Surg 4	Surg 5	Surg 6	Surg 7	Surg 8	Surg 9	Surg 10	Proportion of patients receiving this service	Average per patient receiving this service	Average per patient	Standard deviation
Antibiotics															
	Daily dose in mg	*1666.7*	*1666.7*	500	*1666.6889*	*1666.7*	*1666.7*	*1666.7*	*1666.7*	2500	2000	1.00	1,666.69	1,666.69	1,040.83
	Number of days	1.0	6.0	1.0	*3.0*	6.0	*3.0*	3.0	1.0	5.0	1.0	1.00	3.00	3.00	2.33
	Total costs (in euro €)	**8.48**	**50.90**	**2.55**	***27.34***	**50.90**	**25.45**	**25.45**	**8.48**	**63.63**	**10.18**	1.00	27.34	27.34	21.22
Heparin															
	Daily dose in ml	*0.7*	*0.7*	*0.7*	*0.7*	*0.7*	*0.7*	*0.7*	*0.7*	*0.7*	*0.7*	1.00	0.70	0.70	na
	Number of days	*2.3*	3.0	*2.3*	2.0	2.0	*2.3*	*2.3*	*2.3*	*2.3*	*2.3*	1.00	2.33	2.33	0.58
	Total costs (in euro €)	***5.60***	**7.23**	***5.60***	**4.82**	**4.82**	**5.54**	***5.60***	***5.60***	***5.60***	***5.60***	1.00	5.60	5.60	0.66
Painkillers															
	Daily dose in mg	*8000.0*	*8000.0*	*8000.0*	*8000.0*	*8000.0*	*8000.0*	*8000.0*	*8000.0*	8000.0	*8000.0*	1.00	8,000.00	8,000.00	na
	Number of days	8.0	*3.3*	*3.3*	*3.3*	*3.3*	*3.3*	1.0	*3.3*	1.0	*3.3*	1.00	3.33	3.33	4.04
	Total costs (in euro €)	**2.56**	***1.06***	***1.06***	***1.06***	***1.06***	**1.06**	**0.32**	***1.06***	**0.32**	***1.06***	1.00	1.06	1.06	0.61
Anti-emetica															
	Daily dose in mg									30.0		0.10	30.00	3.00	na
	Number of days									4.0		0.10	4.00	0.40	na
	Total costs (in euro €)									**3.96**		0.10	3.96	0.40	na
Total costs												1.00	37.96	34.40	na

		Costs per tablet / injection
Antibiotics	**Metronidazol tabl 250 mg**	0.17
	Amoxycillin clavulanic acid inje 1000 / 100 mg	0.95
Heparin	**Enoxaparine inje 20 mg = 0.2 ml**	0.66
	Nadroparine inje 7600 IU = 0.8 ml	2.87
Painkillers	**Paracetamol tabl 500 mg**	0.02
Anti-emetica	**Cisapride tabl 10 mg**	0.33

Table A4: Nursing days, personnel and non-patient care: resource use ~ case vignette 1 Appendectomy

		Surg 1	Surg 2	Surg 3	Surg 4	Surg 5	Surg 6	Surg 7	Surg 8	Surg 9	Surg 10	Proportion of patients receiving this service	Average number of units per patient receiving this service	Average number of units per patient	Standard deviation
Nursing days	**Number of days clinic**	2,0	3,0	2,5	2,0	2,5	2,5	2,0	3,0	1,5	3,0	1,00	2,40	2,40	0,52
Pre OP	**OP-Team** (minutes)														
	Surgeon	60,0	20,0	30,0	30,0	30,0	30,0	60,0	30,0	30,0	60,0	1,00	38,00	38,00	15,49
	Nurse	60,0	30,0		30,0	30,0	30,0		30,0	60,0	60,0	0,80	41,25	33,00	15,53
OP	**OP-Team** (minutes)														
	Surgeon	30,0	30,0	30,0	30,0	30,0	27,0	37,5	45,0	60,0	45,0	1,00	36,45	36,45	10,54
	Anaesthesiologist	30,0	30,0	30,0	30,0		27,0	37,5	30,0	45,0	45,0	0,90	33,83	30,45	6,92
	Fellow	30,0	60,0	45,0	60,0	48,0	27,0	75,0	60,0	90,0	45,0	1,00	54,00	54,00	19,29
	OP assistant	90,0	60,0	75,0	60,0	48,0	54,0	75,0	60,0	90,0	90,0	1,00	70,20	70,20	15,95
	Nurse	30,0			30,0		27,0			30,0		0,40	29,25	11,70	1,50
Post OP	**OP-Team** (minutes)														
	Surgeon	60,0	25,0	30,0	30,0	45,0	30,0	30,0	30,0	60,0	30,0	1,00	37,00	37,00	13,17
	Nurse	60,0	84,0	0,0	70,0	140,0	255,0	15,0	150,0	200,0	138,0	0,80	111,20	88,96	80,48
Non-patient care	**Non-patient care**														
	Mark-up % overheads	*42%*	*42%*	45%	43%	41%	*42%*	*42%*	40%	*42%*	*42%*	1,00	42%	42%	0,01
	Mark-up % capital costs	*22%*	*22%*	19%	28%	21%	*22%*	*22%*	20%	*22%*	*22%*	1,00	22%	22%	0,02

Table A5: Nursing days, personnel and non-patient care: costs ~ case vignette 1 Appendectomy

All costs are expressed in Euro (€)		Surg 1	Surg 2	Surg 3	Surg 4	Surg 5	Surg 6	Surg 7	Surg 8	Surg 9	Surg 10	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Inpatient stay	**Nutrition and hotelcosts**														
	Costs per day	37,00	46,00	22,00	40,00	29,00	*37,22*	44,00	37,00	31,00	49,00	1,00	37,22	37,22	8,22
	Total costs	74,00	138,00	55,00	80,00	72,50	*90,22*	88,00	111,00	46,50	147,00	1,00	90,22	90,22	32,96
	Subtotal	**74,00**	**138,00**	**55,00**	**80,00**	**72,50**	***90,22***	**88,00**	**111,00**	**46,50**	**147,00**	**1,00**	**90,22**	**90,22**	**32,96**
	Nursing staff ~ normal ward														
	Costs per day	114,13	125,32	109,00	106,98	135,00	*118,09*	*118,09*	*118,09*	*118,09*	*118,09*	1,00	118,09	118,09	7,89
	Total costs	228,25	375,96	272,50	213,96	337,50	*285,63*	*285,63*	*285,63*	*285,63*	*285,63*	1,00	285,63	285,63	46,49
	Subtotal	**228,25**	**375,96**	**272,50**	**213,96**	**337,50**	***285,63***	***285,63***	***285,63***	***285,63***	***285,63***	**1,00**	**285,63**	**285,63**	**46,49**
Pre OP	**OP-Team**														
	Surgeon	147,50	49,17	73,75	73,75	73,75	73,75	147,50	73,75	73,75	147,50	1,00	93,42	93,42	38,08
	Nurse	24,60	12,30		12,30	12,30	12,30		12,30	24,60	24,60	0,80	16,91	13,53	6,37
	Subtotal	**172,10**	**61,47**	**73,75**	**86,05**	**86,05**	**86,05**	**147,50**	**86,05**	**98,35**	**172,10**	**1,00**	**110,33**	**106,95**	**41,00**
OP	**OP-Team**														
	Surgeon	73,75	73,75	73,75	73,75	73,75	66,38	92,19	110,63	147,50	110,63	1,00	89,61	89,61	25,90
	Anaesthesiologist	73,75	73,75	73,75	73,75		66,38	92,19	73,75	110,63	110,63	0,90	83,17	74,86	17,01
	Fellow	16,20	32,40	24,30	32,40	25,92	14,58	40,50	32,40	48,60	24,30	1,00	29,16	29,16	10,42
	OP assistant	43,20	28,80	36,00	28,80	23,04	25,92	36,00	28,80	43,20	43,20	1,00	33,70	33,70	7,66
	Nurse	12,30			12,30		11,07			12,30		0,40	11,99	4,80	0,62
	Subtotal	**219,20**	**208,70**	**207,80**	**221,00**	**122,71**	**184,32**	**260,88**	**245,58**	**362,23**	**288,75**	**1,00**	**247,63**	**232,12**	**63,97**
Post OP	**OP-Team**														
	Surgeon	147,50	61,46	73,75	73,75	110,63	73,75	73,75	73,75	147,50	73,75	1,00	90,96	90,96	32,37
	Nurse	24,60	34,44	0,00	28,70	57,40	104,55	6,15	61,50	82,00	56,58	0,80	45,59	36,47	33,00
	Subtotal	**172,10**	**95,90**	**73,75**	**102,45**	**168,03**	**178,30**	**79,90**	**135,25**	**229,50**	**130,33**	**1,00**	**136,55**	**127,43**	**50,16**
Non-patient care	**Non-patient care**														
	Overheads	*397,32*	*397,32*	420,54	410,74	440,91	*397,32*	*397,32*	317,10	*397,32*	*397,32*	1,00	397,32	397,32	31,72
	Capital costs	*206,73*	*206,73*	177,56	267,46	225,83	*206,73*	*206,73*	156,09	*206,73*	*206,73*	1,00	206,73	206,73	28,81
	Subtotal	***604,06***	***604,06***	**598,10**	**678,19**	**666,75**	***604,06***	***604,06***	**473,18**	***604,06***	***604,06***	**1,00**	**604,06**	**604,06**	**54,35**

Table A6: Drugs: resource use and costs ~ case vignette 2 Normal delivery

		Obs 1	Obs 2	Obs 3	Obs 4	Obs 5	Obs 6	Obs 7	MW 8	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	Proportion of patients receiving this service	Average per patient receiving this service	Average per patient	Standard deviation
Antibiotics																			
	Daily dose in mg	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	1.00	1.00	1.00	na
	Number of days	1.0	*1.0*	1.0	*1.0*	1.0	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	1.00	1.00	1.00	na
	Total costs (in euro €)	**0.62**	***0.62***	**0.62**	***0.62***	**0.62**	***0.62***	***0.62***	***0.62***	***0.62***	***0.62***	***0.62***	***0.62***	***0.62***	***0.62***	1.00	0.62	0.62	na
Painkillers																			
	Daily dose in mg	*4000.0*	*4000.0*	*4000.0*	*4000.0*	*4000.0*	*4000.0*	*4000.0*	*4000.0*	*4000.0*	*4000.0*	*4000.0*	*4000.0*	*4000.0*	4000.0	1.00	4,000.00	4,000.00	na
	Number of days	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	1.0	1.00	1.00	1.00	na
	Total costs (in euro €)	***0.16***	***0.16***	***0.16***	***0.16***	***0.16***	***0.16***	***0.16***	***0.16***	***0.16***	***0.16***	***0.16***	***0.16***	***0.16***	**0.16**	1.00	0.16	0.16	na
Total costs																1.00	0.78	0.78	na

		Costs per tablet / injection
Antibiotics	**Oxytocine inje 5 IU = 1 ml**	0.62
Painkillers	**Paracetamol tabl 500 mg**	0.02

Table A7: Nursing days, personnel and non-patient care: resource use ~ case vignette 2 Normal delivery

		Obs 1	Obs 2	Obs 3	Obs 4	Obs 5	Obs 6	Obs 7	MW 8	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	Proportion of patients receiving this service	Average number of units per patient receiving this service	Average number of units per patient	Standard deviation
Nursing days	**Number of days clinic**	0,5	1,0	1,0	1,0	1,0	1,0	0,5	0,5	0,5	1,0	1,0	1,0	1,0	0,5	1,00	0,82	0,82	0,25
Pre delivery	**Delivery Team** (minutes)																		
	Obstetrician		30,0	30,0	20,0	10,0	15,0									0,36	21,00	7,50	8,94
	Midwife			60,0	20,0			720,0	75,0		180,0	60,0	150,0	168,0	105,0	0,64	170,89	109,86	213,00
	Nurse		240,0	240,0	30,0	30,0		720,0		180,0						0,43	240,00	102,86	253,85
	Fellow	120,0				15,0	15,0									0,21	50,00	10,71	60,62
Delivery	**Delivery Team** (minutes)																		
	Obstetrician		30,0	30,0		15,0	45,0									0,29	30,00	8,57	12,25
	Midwife			90,0	60,0			60,0	4,0		240,0	180,0	270,0	120,0	600,0	0,64	180,44	116,00	180,13
	Nurse	180,0	120,0	120,0	240,0	600,0		60,0		300,0	30,0				30,0	0,64	186,67	120,00	180,49
	Fellow	60,0				300,0	45,0									0,21	135,00	28,93	143,09
Post delivery	**Delivery Team** (minutes)																		
	Obstetrician		6,0	10,0		5,0	15,0									0,29	9,00	2,57	4,55
	Midwife			15,0	30,0			180,0	135,0		180,0	120,0	120,0	120,0	120,0	0,64	113,33	72,86	57,17
	Nurse		120,0	60,0	120,0	120,0		180,0		180,0	30,0				120,0	0,57	116,25	66,43	51,81
	Fellow	10,0				60,0	15,0								10,0	0,29	23,75	6,79	24,28
Non-patient care	**Non-patient care**																		
	Mark-up % overheads	42%	*43%*	45%	*43%*	43%	40%	*43%*	*43%*	*43%*	*43%*	*43%*	*43%*	*43%*	*43%*	1,00	43%	43%	0,01
	Mark-up % capital costs	13%	*20%*	19%	*20%*	28%	20%	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	1,00	20%	20%	0,03

Table A8: Nursing days, personnel and non-patient care: costs ~ case vignette 2 Normal delivery

All costs are expressed in Euro (€)		Obs 1	Obs 2	Obs 3	Obs 4	Obs 5	Obs 6	Obs 7	MW 8	MW 9	MW 10	MW 11	MW 12	MW 13	MW 14	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Inpatient stay	**Nutrition and hotelcosts**																		
	Costs per day	47	46	22	41	40	37	32	*38*	*38*	*38*	*38*	*38*	*38*	*38*	1,00	37,86	37,86	5,89
	Total costs	24	46	22	41	40	37	16	*32*	*32*	*32*	*32*	*32*	*32*	*32*	1,00	32,21	32,21	7,81
	Subtotal	**24**	**46**	**22**	**41**	**40**	**37**	**16**	***32***	***32***	***32***	***32***	***32***	***32***	***32***	**1,00**	**32,21**	**32,21**	**7,81**
Pre delivery	**Delivery Team**																		
	Obstetrician		73,75	73,75	49,17	24,58	36,88									0,36	51,63	18,44	21,99
	Midwife			41,69	13,90			500,31	52,12		125,08	41,69	104,23	116,74	72,96	0,64	118,75	76,34	148,01
	Nurse		98,40	98,40	12,30	12,30		295,20		73,80						0,43	98,40	42,17	104,08
	Fellow	64,80				8,10	8,10									0,21	27,00	5,79	32,74
	Subtotal	**64,80**	**172,15**	**213,84**	**75,36**	**44,98**	**44,98**	**795,51**	**52,12**	**73,80**	**125,08**	**41,69**	**104,23**	**116,74**	**72,96**	**1,00**	**295,77**	**142,73**	**194,59**
Delivery	**Delivery Team**																		
	Obstetrician		73,75	73,75		36,88	110,63									0,29	73,75	21,07	30,11
	Midwife			62,54	41,69			41,69	2,78		166,77	125,08	187,61	83,38	416,92	0,64	125,39	80,60	125,17
	Nurse	73,80	49,20	49,20	98,40	246,00		24,60		123,00	12,30				12,30	0,64	76,53	49,20	74,00
	Fellow	32,40				162,00	24,30									0,21	72,90	15,62	77,27
	Subtotal	**106,20**	**122,95**	**185,49**	**140,09**	**444,88**	**134,93**	**66,29**	**2,78**	**123,00**	**179,07**	**125,08**	**187,61**	**83,38**	**429,22**	**1,00**	**348,57**	**166,50**	**124,67**
Post delivery	**Delivery Team**																		
	Obstetrician		14,75	24,58		12,29	36,88									0,29	22,13	6,32	11,18
	Midwife			10,42	20,85			125,08	93,81		125,08	83,38	83,38	83,38	83,38	0,64	78,75	50,63	39,73
	Nurse		49,20	24,60	49,20	49,20		73,80		73,80	12,30				49,20	0,57	47,66	27,24	21,24
	Fellow	5,40				32,40	8,10								5,40	0,29	12,83	3,66	13,11
	Subtotal	**5,40**	**63,95**	**59,61**	**70,05**	**93,89**	**44,98**	**198,88**	**93,81**	**73,80**	**137,38**	**83,38**	**83,38**	**83,38**	**137,98**	**1,00**	**161,36**	**87,85**	**46,36**
Non-patient care	**Non-patient care**																		
	Overheads	108,16	*146,48*	164,92	*146,48*	261,28	54,05	*146,48*	*146,48*	*146,48*	*146,48*	*146,48*	*146,48*	*146,48*	*146,48*	1,00	146,66	146,66	42,54
	Capital costs	33,48	*74,80*	69,63	*74,80*	170,14	27,03	*74,80*	*74,80*	*74,80*	*74,80*	*74,80*	*74,80*	*74,80*	*74,80*	1,00	74,88	74,88	31,75
	Subtotal	**141,64**	***221,28***	**234,55**	***221,28***	**431,42**	**81,08**	***221,28***	***221,28***	***221,28***	***221,28***	***221,28***	***221,28***	***221,28***	***221,28***	**1,00**	**221,54**	**221,54**	**73,55**

Table A9: Drugs: resource use and costs ~ case vignette 3 Hip replacement

		Orth 1	Orth 2	Orth 3	Orth 4	Orth 5	Orth 6	Orth 7	Proportion of patients receiving this service	Average per patient receiving this service	Average per patient	Standard deviation
Heparin												
	Daily dose in mg	*0.7*	*0.7*	*0.7*	0.4	*0.7*	1.0	*0.7*	1.00	0.70	0.70	0.30
	Number of days	*35*	21.0	*35.0*	42.0	*35.0*	42.0	*35.0*	1.00	35.00	35.00	9.90
	Total costs (in euro €)	***84.37***	**50.62**	**84.37**	**57.86**	***84.37***	**144.64**	**84.37**	1.00	84.37	84.37	30.21
Antibiotics												
	Daily dose in ml	*2000.0*	*2000.0*	*2000.0*	2000.0	*2000.0*	*2000.0*	*2000.0*	1.00	2,000.00	2,000.00	na
	Number of days	2.0	*1.5*	*1.5*	1.0	*1.5*	*1.5*	*1.5*	1.00	1.50	1.50	0.71
	Total costs (in euro €)	**20.36**	***15.27***	**15.27**	**10.18**	***15.27***	***15.27***	**15.27**	1.00	15.27	15.27	2.94
Painkillers												
	Daily dose in mg	*2000.0*	*2000.0*	*2000.0*	2000.0	*2000.0*	*2000.0*	*2000.0*	1.00	2,000.00	2,000.00	na
	Number of days	*11.0*	*11.0*	*11.0*	11.0	*11.0*	*11.0*	*11.0*	1.00	11.00	11.00	na
	Total costs (in euro €)	***0.88***	***0.88***	**0.88**	**0.88**	***0.88***	***0.88***	***0.88***	1.00	0.88	0.88	na
Aneasthetics												
	Daily dose in mg	*3000.0*	*3000.0*	*3000.0*	*3000.0*	*3000.0*	3000.0	*3000.0*	1.00	3,000.00	3,000.00	na
	Number of days	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	1.00	1.00	1.00	na
	Total costs (in euro €)	***3.60***	***3.60***	***3.60***	***3.60***	***3.60***	**3.60**	***3.60***	1.00	3.60	3.60	na
Total costs									1.00	104.12	104.12	na

		Costs per tablet / injection
Heparin	**Enoxaparine inje 20 mg = 0.2 ml**	0.66
	Nadroparine inje 7600 IU = 0.8 ml	2.87
Antibiotics	**Metronidazol tabl 250 mg**	0.17
	Amoxycillin clavulanic acid inje 1000 / 100 mg	0.95
Painkillers	**Paracetamol tabl 500 mg**	0.02
Aneasthetics	**Cefazoline inje 1000 mg**	1.20

Table A10: Nursing days, personnel and non-patient care: resource use ~ case vignette 3 Hip replacement

		Orth 1	Orth 2	Orth 3	Orth 4	Orth 5	Orth 6	Orth 7	Proportion of patients receiving this service	Average number of units per patient receiving this service	Average number of units per patient	Standard deviation
Nursing days	**Number of days clinic**	7,0	5,0	5,0	6,0	4,0	7,0	7,0	1,00	5,86	5,86	1,21
Pre OP	**OP-Team** (minutes)											
	Surgeon	120,0	60,0	30,0	90,0	60,0	15,0	90,0	1,00	66,43	66,43	36,60
	Nurse	60,0	120,0	30,0	90,0	60,0	30,0	120,0	1,00	72,86	72,86	38,17
OP	**OP-Team** (minutes)											
	Surgeon	120,0	90,0	90,0	150,0	120,0	90,0	90,0	1,00	107,14	107,14	23,60
	Anaesthesiologist			90,0				90,0	0,29	90,00	25,71	na
	Fellow	180,0	315,0	225,0	360,0	120,0	270,0	180,0	1,00	235,71	235,71	84,28
	OP assistant	60,0	105,0	90,0	240,0	60,0	90,0	90,0	1,00	105,00	105,00	61,85
	Nurse	90,0	105,0	90,0	120,0		90,0	90,0	0,86	97,50	83,57	12,55
Post OP	**OP-Team** (minutes)											
	Surgeon	180,0	60,0	60,0	120,0	60,0	30,0	90,0	1,00	85,71	85,71	50,28
	Nurse	380,0	330,0	37,5	690,0	395,0	154,5	341,2	1,00	332,60	332,60	205,25
	Physiotherapist	360,0	120,0	120,0	1200,0	360,0	90,0		0,86	375,00	321,43	422,46
Non-patient care	**Non-patient care**											
	Mark-up % overheads	42%	*52%*	82%	*52%*	*52%*	47%	37%	1,00	52%	52%	0,14
	Mark-up % capital costs	13%	*16%*	14%	*16%*	*16%*	19%	17%	1,00	16%	16%	0,02

Table A11: Nursing days, personnel and non-patient care: costs ~ case vignette 3 Hip replacement

All costs are expressed in Euro (€)		Orth 1	Orth 2	Orth 3	Orth 4	Orth 5	Orth 6	Orth 7	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Inpatient stay	**Nutrition and hotelcosts**											
	Costs per day	47,00	*36,00*	31,00	46,00	44,00	24,00	24,00	1,00	36,00	36,00	9,98
	Total costs	329,00	*212,00*	155,00	276,00	176,00	168,00	168,00	1,00	212,00	212,00	66,08
	Subtotal	**329,00**	***212,00***	**155,00**	**276,00**	**176,00**	**168,00**	**168,00**	**1,00**	**212,00**	**212,00**	**66,08**
	Nursing staff ~ normal ward											
	Costs per day	84,00	101,02	89,00	106,98	128,00	*101,80*	*101,80*	1,00	101,80	101,80	14,11
	Total costs	588,02	505,11	445,00	641,88	512,00	*538,40*	*538,40*	1,00	538,40	538,40	62,85
	Subtotal	**588,02**	**505,11**	**445,00**	**641,88**	**512,00**	***538,40***	***538,40***	**1,00**	**538,40**	**538,40**	**62,85**
Pre OP	**OP-Team** (minutes)											
	Surgeon	295,20	147,60	73,80	221,40	147,60	36,90	221,40	1,00	163,41	163,41	90,03
	Nurse	24,60	49,20	12,30	36,90	24,60	12,30	49,20	1,00	29,87	29,87	15,65
	Subtotal	**319,80**	**196,80**	**86,10**	**258,30**	**172,20**	**49,20**	**270,60**	**1,00**	**193,29**	**193,29**	**99,09**
OP	**OP-Team** (minutes)											
	Surgeon	295,20	221,40	221,40	369,00	295,20	221,40	221,40	1,00	263,57	263,57	58,07
	Anaesthesiologist							221,40	0,14	221,40	31,63	-
	Fellow	97,20	170,10	121,50	194,40	64,80	145,80	97,20	1,00	127,29	127,29	45,51
	OP assistant	28,80	50,40	43,20	115,20	28,80	43,20	43,20	1,00	50,40	50,40	29,69
	Nurse	36,90	43,05	36,90	49,20		36,90	36,90	0,86	39,98	34,26	5,15
	Subtotal	**458,10**	**484,95**	**423,00**	**727,80**	**388,80**	**447,30**	**620,10**	**1,00**	**702,63**	**507,15**	**121,80**
Post OP	**OP-Team** (minutes)											
	Surgeon	442,80	147,60	147,60	295,20	147,60	73,80	221,40	1,00	210,86	210,86	123,70
	Nurse	155,80	135,30	15,38	282,90	161,95	63,35	139,88	1,00	136,36	136,36	84,15
	Physiotherapist	212,40	70,80	70,80	708,00	212,40	53,10		0,86	221,25	189,64	249,25
	Subtotal	**811,00**	**353,70**	**233,78**	**1286,10**	**521,95**	**190,25**	**361,28**	**1,00**	**536,86**	**536,86**	**390,11**
Devices	**Hip prothesis**	**1100,00**	**1000,00**	***1825,00***	***1825,00***	***1825,00***	**4000,00**	**1200,00**	**1,00**	**1.825,00**	**1.825,00**	**1.026,93**
Non-patient care	**Non-patient care**											
	Overheads	1042,07	*1147,80*	598,68	*1147,80*	*1147,80*	2158,60	791,84	1,00	1.147,80	1.147,80	493,48
	Capital costs	398,99	*434,41*	102,21	*434,41*	*434,41*	872,63	363,82	1,00	434,41	434,41	226,80
	Subtotal	**1441,06**	***1582,21***	**700,89**	***1582,21***	***1582,21***	**3031,22**	**1155,66**	**1,00**	**1.582,21**	**1.582,21**	**716,27**

Table A12: Drugs: resource use and costs ~ case vignette 4 Cataract

		Oph 1	Oph 2	Oph 3	Oph 4	Oph 5	Oph 6	Oph 7	Proportion of patients receiving this service	Average per patient receiving this service	Average per patient	Standard deviation
Anti inflammation												
	Daily dose in drops	*6.0*	*6.0*	*6.0*	*6.0*	*6.0*	*6.0*	*6.0*	1.00	6.00	6.00	na
	Number of days	10.0	30.0	24.0	29.0	14.0	21.0	28.0	1.00	22.29	22.29	7.76
	Total costs (in euro €)	**5.53**	**11.06**	**11.06**	**11.06**	**5.53**	**11.06**	**11.06**	1.00	9.48	9.48	na
Pupil dilating agent												
	Daily dose in drops	*6*	*6*	*6*	*6.0*	*6*	*6.0*	*6.0*	1.00	6.00	6.00	na
	Number of days	*1*	*1*	*1*	1.0	*1*	*1.0*	*1.0*	1.00	1.00	1.00	na
	Total costs (in euro €)	***2.87***	***2.87***	***2.87***	**2.87**	***2.87***	**2.87**	**2.87**	1.00	2.87	2.87	na
Aneasthetics												
	Daily dose in mg	*1000*	*1000*	*1000*	*1000*	*1000*	*1000.0*	*1000.0*	1.00	1,000.00	1,000.00	na
	Number of days	*1*	*1*	*1*	*1*	*1*	*1.0*	*1.0*	1.00	1.00	1.00	na
	Total costs (in euro €)	***1.20***	***1.20***	***1.20***	***1.20***	***1.20***	**1.20**	**1.20**	1.00	1.20	1.20	na
Total costs									1.00	13.55	13.55	na

		Costs per bottle / injection
Anti inflammation	**Dexameth 0.1%-tobramycine 0.3% eyedr 5 ml**	5.53
Pupil dilating agent	**Cyclopentolaat eyedr 1% 0.5 ml minim**	2.87
Aneasthetics	**Cefazoline inje 1000 mg**	1.20

Table A13: Nursing days, personnel and non-patient care: resource use ~ case vignette 4 Cataract

		Oph 1	Oph 2	Oph 3	Oph 4	Oph 5	Oph 6	Oph 7	Proportion of patients receiving this service	Average number of units per patient receiving this service	Average number of units per patient	Standard deviation
Nursing days	**Number of days clinic**	0,5	0,5	0,5	0,5	0,5	0,5	0,5	1,00	0,50	0,50	na
Pre OP	**OP-Team** (minutes)											
	Surgeon	30,0	30,0	30,0	30,0	20,0	12,0	30,0	1,00	26,00	26,00	7,21
	Nurse	30,0		60,0	180,0		30,0	15,0	0,71	63,00	45,00	67,42
OP	**OP-Team** (minutes)											
	Surgeon	30,0	60,0	30,0	30,0	30,0	12,0	15,0	1,00	29,57	29,57	15,53
	Anaesthesiologist	15,0	45,0	30,0	15,0	15,0			0,71	24,00	17,14	13,42
	Fellow	52,0	75,0	67,0	79,0	54,0	57,0	15,0	1,00	57,00	57,00	21,24
	OP assistant	30,0	90,0	60,0	60,0	60,0	42,0	30,0	1,00	53,14	53,14	21,19
	Nurse	30,0		30,0	30,0				0,43	30,00	12,86	na
Post OP	**OP-Team** (minutes)											
	Surgeon	30,0	30,0	30,0	30,0	30,0	12,0	20,0	1,00	26,00	26,00	7,21
	Nurse	30,0	60,0	90,0	30,0		12,0		0,71	44,40	31,71	30,77
	Physiotherapist	60,0		30,0		10,0	48,0	10,0	0,71	31,60	22,57	22,42
Non-patient care	**Non-patient care**											
	Mark-up % overheads	*40%*	36%	40%	*40%*	47%	36%	*40%*	1,00	40%	40%	0,04
	Mark-up % capital costs	*17%*	15%	20%	*17%*	19%	15%	*17%*	1,00	17%	17%	0,02

Table A14: Nursing days personnel and non-patient care: costs ~ case vignette 4 Cataract

All costs are expressed in Euro (€)		Oph 1	Oph 2	Oph 3	Oph 4	Oph 5	Oph 6	Oph 7	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Inpatient stay	**Nutrition and hotelcosts**											
	Costs per day	37	30,00	37,00	49,00	24,00	36,00	*35,50*	1,00	35,50	35,50	7,63
	Total costs	18,50	15,00	18,50	24,50	12,00	18,00	*17,75*	1,00	17,75	17,75	3,82
	Subtotal	**18,50**	**15,00**	**18,50**	**24,50**	**12,00**	**18,00**	***17,75***	**1,00**	**17,75**	**17,75**	**3,82**
Pre OP	**OP-Team** (minutes)											
	Surgeon	73,80	73,80	73,80	73,80	49,20	29,52	73,80	1,00	63,96	63,96	17,74
	Nurse	12,30		24,60	73,80		12,30	6,15	0,71	25,83	18,45	27,64
	Subtotal	**86,10**	**73,80**	**98,40**	**147,60**	**49,20**	**41,82**	**79,95**	**1,00**	**89,79**	**82,41**	**35,00**
OP	**OP-Team** (minutes)											
	Surgeon	73,80	147,60	73,80	73,80	73,80	29,52	36,90	1,00	72,75	72,75	38,21
	Anaesthesiologist	36,90	110,70	73,80	36,90	36,90			0,71	59,04	42,17	33,00
	Fellow	28,08	40,50	36,18	42,66	29,16	30,78	8,10	1,00	30,78	30,78	11,47
	OP assistant	14,40	43,20	28,80	28,80	28,80	20,16	14,40	1,00	25,51	25,51	10,17
	Nurse	12,30		12,30	12,30				0,43	12,30	5,27	na
	Subtotal	**165,48**	**342,00**	**224,88**	**194,46**	**168,66**	**80,46**	**59,40**	**1,00**	**200,37**	**176,48**	**94,14**
Post OP	**OP-Team** (minutes)											
	Surgeon	73,80	73,80	73,80	73,80	73,80	29,52	49,20	1,00	63,96	63,96	17,74
	Nurse	12,30	24,60	36,90	12,30		4,92		0,71	18,20	13,00	12,62
	Physiotherapist	35,40		17,70		5,90	28,32	5,90	0,71	18,64	13,32	13,23
	Subtotal	**121,50**	**98,40**	**128,40**	**86,10**	**79,70**	**62,76**	**55,10**	**1,00**	**100,81**	**90,28**	**27,74**
Devices	**Intra-ocular lens**	**200,00**	**95,00**	**100,00**	**100,00**	**100,00**	**73,50**	**70,00**	**1,00**	**105,50**	**105,50**	**43,62**
Non-patient care	**Non-patient care**											
	Overheads	*84,20*	78,35	108,33	*84,20*	83,75	66,36	*84,20*	1,00	84,20	84,20	12,48
	Capital costs	*37,08*	32,65	54,16	*37,08*	33,86	27,65	*37,08*	1,00	37,08	37,08	8,28
	Subtotal	***121,28***	**111,00**	**162,49**	***121,28***	**117,61**	**94,00**	***121,28***	**1,00**	**121,28**	**121,28**	**20,66**

Table A15: Drugs: resource use and costs ~ case vignette 5 Stroke

		Neu 1	Neu 2	Neu 3	Neu 4	Neu 5	Neu 6	Neu 7	Proportion of patients receiving this service	Average per patient receiving this service	Average per patient	Standard deviation
Acetyl-salicyl acid												
	Daily dose in mg		300.0	300.0		300.0	*265.0*	160.0	0.71	265.00	188.15	70.00
	Number of days		*14.0*	14.0		14.0	*14.0*	14.0	0.71	14.00	9.94	na
	Total costs (in euro €)		**1.26**	**1.26**		**1.26**	**1.11**	**0.67**	0.71	1.11	0.79	0.25
Heparin												
	Daily dose in ml	*0.2*	*0.2*	0.2	*0.2*	*0.2*	*0.2*	*0.2*	1.00	0.20	0.20	na
	Number of days	1.0	*5.5*	*5.5*	10.0	*5.5*	*5.5*	*5.5*	1.00	5.50	5.50	6.36
	Total costs (in euro €)	**0.69**	**3.79**	**3.79**	**6.89**	**3.79**	**3.79**	**3.79**	1.00	3.79	3.79	1.79
Lipitor												
	Daily dose in mg		10.0	*10.0*		*10.0*			0.43	10.00	4.30	na
	Number of days		*60.0*	*60.0*		*60.0*			0.43	60.00	25.80	na
	Total costs (in euro €)		**5.40**	**5.40**		**5.40**			0.43	5.40	2.32	na
Antihypertension												
	Daily dose in mg	*2.5*	*2.5*	*2.5*					0.43	2.50	1.08	na
	Number of days	60.0	*60.0*	*60.0*					0.43	60.00	25.80	na
	Total costs (in euro €)	**18.51**	**18.51**	**18.51**					0.43	18.51	7.96	na
Total costs									1.00	28.81	14.86	na

		Costs per tablet / injection
Acetyl-salicyl acid	**Acetypsalicylacid caps 100 mg**	0.03
Heparin	**Enoxaparine inje 20 mg = 0.2 ml**	0.66
	Nadroparine inje 7600 IU = 0.8 ml	2.87
Lipitor	**Atorvastatine tabl 10 mg**	0.09
Antihypertension	**Ramipril tabl 1.25 mg**	0.25
	Labetalol inje 25 mg = 5 ml	1.17

Table A16: Nursing days, personnel and non-patient care: resource use ~ case vignette 5 Stroke

		Neu 1	Neu 2	Neu 3	Neu 4	Neu 5	Neu 6	Neu 7	Proportion of patients receiving this service	Average number of units per patient receiving this service	Average number of units per patient	Standard deviation
Nursing days	**Number of days clinic**	7,0	8,0	17,5	28,0	11,0	7,0	13,0	1,00	13,07	13,07	7,60
	Number of days stroke unit	2,0	2,0	3,5	2,0	3,0	5,0	2,0	1,00	2,79	2,79	1,15
	Total number of days	9,0	10,0	21,0	30,0	14,0	12,0	15,0	1,00	15,86	15,86	7,38
Hospital care	**Conservative / drugs** (%)	95,0	95,0	80,0	95,0	90,0	20,0	20,0	0,71	70,71	50,01	35,05
	Trombolysis (%)	5,0	5,0	20,0	1,0	10,0	80,0	80,0	0,29	28,71	8,25	35,54
	Conservative / drugs (minutes)											
	Neurologist	60,0	*232,5*	240,0	900,0	90,0	45,0	60,0	1,00	232,50	232,50	305,67
	Revalidation specialist	30,0	*67,5*	60,0	180,0	60,0	15,0	60,0	1,00	67,50	67,50	53,21
	Other specialists	10,0	*65,0*	120,0	180,0	30,0	20,0	30,0	1,00	65,00	65,00	62,92
	Fellow	80,0	*272,0*	300,0	900,0		60,0	20,0	0,86	272,00	233,14	328,78
	Nurse	*20,0*	*20,0*	*20,0*	*20,0*	*20,0*	*20,0*	20,0	1,00	20,00	20,00	na
	Transfer nurse	30,0	*35,0*	*35,0*	*35,0*	60,0	20,0	30,0	1,00	35,00	35,00	12,25
	Physiotherapist	60,0	*208,0*	360,0	*208,0*	420,0	20,0	180,0	1,00	208,00	208,00	144,96
	Ergotherapist	30,0	*95,0*	240,0	*95,0*	60,0	25,0	120,0	1,00	95,00	95,00	73,03
	Speech therapist	15,0	*97,0*	210,0	*97,0*	120,0	20,0	120,0	1,00	97,00	97,00	66,43
	Nutrition specialist	10,0	*33,3*	*33,3*	*33,3*	30,0	60,0		0,86	33,33	28,57	15,92
	Trombolysis (minutes)											
	Neurologist	60,0	*138,8*	300,0	*138,8*	*138,8*	120,0	75,0	1,00	138,75	138,75	78,12
	Revalidation specialist	30,0	*40,0*	60,0	*40,0*	*40,0*	10,0	60,0	1,00	40,00	40,00	17,32
	Other specialists	10,0	*45,0*	120,0	*45,0*	*45,0*	20,0	30,0	1,00	45,00	45,00	35,82
	Fellow	80,0	*115,0*	300,0	*115,0*	*115,0*	60,0	20,0	1,00	115,00	115,00	88,98
	Nurse	*20,0*	*20,0*	*20,0*	*20,0*	*20,0*	*20,0*	20,0	1,00	20,00	20,00	na
	Transfer nurse	30,0	*26,7*	*26,7*	*26,7*	*26,7*	20,0	30,0	1,00	26,67	26,67	3,33
	Physiotherapist	60,0	*157,5*	360,0	*157,5*	*157,5*	30,0	180,0	1,00	157,50	157,50	105,89
	Ergotherapist	30,0	*103,8*	240,0	*103,8*	*103,8*	25,0	120,0	1,00	103,75	103,75	71,26
	Speech therapist	15,0	*91,3*	210,0	*91,3*	*91,3*	20,0	120,0	1,00	91,25	91,25	65,60
	Nutrition specialist	10,0	*10,0*	*10,0*	*10,0*	*10,0*	10,0		0,86	10,00	8,57	na
Non-patient care	**Non-patient care**											
	Mark-up % overheads	42%	*41%*	*41%*	41%	*41%*	40%	*41%*	1,00	41%	41%	0,01
	Mark-up % capital costs	13%	*18%*	*18%*	21%	*18%*	20%	*18%*	1,00	18%	18%	0,03

Table A17a: Nursing days, personnel and non-patient care: costs ~ case vignette 5 Stroke

All costs are expressed in Euro (€)		Neu 1	Neu 2	Neu 3	Neu 4	Neu 5	Neu 6	Neu 7	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Inpatient stay	**Nutrition and hotelcosts**											
	Costs per day	47,00	*42,00*	46,00	29,00	44,00	37,00	49,00	1,00	42,00	42,00	6,93
	Total costs	423,00	*675,67*	966,00	870,00	616,00	444,00	735,00	1,00	675,67	675,67	202,75
	Subtotal	**423,00**	***675,67***	**966,00**	**870,00**	**616,00**	**444,00**	**735,00**	**1,00**	**675,67**	**675,67**	**202,75**
	Nursing staff ~ normal ward											
	Clinic											
	Costs per day	102,96	126,33	145,00	136,88	154,00	*133,04*	*133,04*	1,00	133,04	133,04	16,06
	Total costs	720,75	1010,68	2537,50	3832,58	1694,00	*1959,10*	*1959,10*	1,00	1.959,10	1.959,10	1.028,57
	Stroke unit											
	Costs per day	150,00	175,00	200,00	150,00	175,00	200,00	175,00	1,00	175,00	175,00	na
	Total costs	300,00	350,00	700,00	300,00	525,00	1000,00	350,00	1,00	503,57	503,57	263,17
	Subtotal	**1020,75**	**1360,68**	**3237,50**	**4132,58**	**2219,00**	**1000,00**	**350,00**	**1,00**	**2.462,67**	**2.462,67**	**1.363,30**
Hospital care	**Conservative / drugs**											
	Neurologist	147,60	*571,95*	590,40	2214,00	221,40	110,70	147,60	1,00	571,95	571,95	751,94
	Revalidation specialist	73,80	*166,05*	147,60	442,80	147,60	36,90	147,60	1,00	166,05	166,05	130,90
	Other specialists	24,60	*159,90*	295,20	442,80	73,80	49,20	73,80	1,00	159,90	159,90	154,77
	Fellow	43,20	*146,88*	162,00	486,00		32,40	10,80	0,86	146,88	125,90	198,50
	Nurse	*8,20*	*8,20*	*8,20*	*8,20*	*8,20*	*8,20*	8,20	1,00	8,20	8,20	na
	Transfer nurse	12,30	*14,35*	*14,35*	*14,35*	24,60	8,20	12,30	1,00	14,35	14,35	5,02
	Physiotherapist	35,40	*122,72*	212,40	*122,72*	247,80	11,80	106,20	1,00	122,72	122,72	85,53
	Ergotherapist	17,10	*54,15*	136,80	*54,15*	34,20	14,25	68,40	1,00	54,15	54,15	41,63
	Speech therapist	8,85	*57,23*	123,90	*57,23*	70,80	11,80	70,80	1,00	57,23	57,23	39,20
	Nutrition specialist	4,80	*16,00*	*16,00*	*16,00*	14,40	28,80		0,86	16,00	13,71	7,64
	Subtotal	**375,85**	***1317,43***	**1706,85**	**3858,25**	**842,80**	**312,25**	**645,70**	**1,00**	**1.317,43**	**1.294,16**	**1.236,73**

Table A17b: Nursing days, personnel and non-patient care: costs ~ case vignette 5 Stroke

All costs are expressed in Euro (€)		Neu 1	Neu 2	Neu 3	Neu 4	Neu 5	Neu 6	Neu 7	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Hospital care	**Trombolysis**											
	Neurologist	147,60	*341,33*	738,00	*341,33*	*341,33*	295,20	184,50	1,00	341,33	341,33	192,18
	Revalidation specialist	73,80	*98,40*	147,60	*98,40*	*98,40*	24,60	147,60	1,00	98,40	98,40	42,61
	Other specialists	24,60	*110,70*	295,20	*110,70*	*110,70*	49,20	73,80	1,00	110,70	110,70	88,13
	Fellow	43,20	*62,10*	162,00	*62,10*	*62,10*	32,40	10,80	1,00	62,10	62,10	48,05
	Nurse	*8,20*	*8,20*	*8,20*	*8,20*	*8,20*	*8,20*	8,20	1,00	8,20	8,20	na
	Transfer nurse	12,30	*10,93*	*10,93*	*10,93*	*10,93*	8,20	12,30	1,00	10,93	10,93	1,37
	Physiotherapist	35,40	*92,93*	212,40	*92,93*	*92,93*	17,70	106,20	1,00	92,93	92,93	62,47
	Ergotherapist	17,10	*59,14*	136,80	*59,14*	*59,14*	14,25	68,40	1,00	59,14	59,14	40,62
	Speech therapist	8,85	*53,84*	123,90	*53,84*	*53,84*	11,80	70,80	1,00	53,84	53,84	38,70
	Nutrition specialist	4,80	*4,80*	*4,80*	*4,80*	*4,80*	4,80		0,86	4,80	4,11	na
	Subtotal	**375,85**	***842,36***	**1839,83**	***842,36***	***842,36***	**466,35**	**682,60**	**1,00**	**842,36**	**841,67**	**479,49**
Non-patient care	**Non-patient care**											
	Overheads	771,39	*1691,49*	*1691,49*	3576,19	*1691,49*	726,90	*1691,49*	1,00	1.691,49	1.691,49	942,43
	Capital costs	254,58	*609,20*	*609,20*	1209,56	*609,20*	363,45	*609,20*	1,00	609,20	609,20	301,82
	Subtotal	**1025,97**	***2300,69***	***2300,69***	**4785,75**	***2300,69***	**1090,35**	***2300,69***	**1,00**	**2.300,69**	**2.300,69**	**1.242,67**

Table A18: Drugs: resource use and costs ~ case vignette 6 AMI

		Cardio 1	Cardio 2	Cardio 3	Cardio 4	Cardio 5	Cardio 6	Proportion of patients receiving this service	Average per patient receiving this service	Average per patient	Standard deviation
Anti-coagulantia											
	Daily dose in mg	*75.0*	*75.0*	*75.0*	75.0	*75.0*	75.0	1.00	75.00	75.00	na
	Number of days	*365.0*	forever	forever	365.0	forever	365.0	1.00	365.00	365.00	na
	Total costs (in euro €)	**331.69**	**331.69**	**331.69**	**331.69**	**331.69**	**331.69**	1.00	331.69	331.69	na
Lipitor											
	Daily dose in ml	*10.0*	*10.0*	*10.0*	*10.0*	*10.0*		0.83	10.00	8.30	na
	Number of days	*365.0*	forever	forever	forever	forever		0.83	365.00	302.95	na
	Total costs (in euro €)	**32.85**	**32.85**	**32.85**	**32.85**	**32.85**		0.83	32.85	27.27	na
B/Blocking agent											
	Daily dose in mg		*100.0*	*100.0*	100.0	*100.0*	100.0	0.83	100.00	83.00	na
	Number of days		365.0	*365.0*	*365.0*	365.0	*365.0*	0.83	365.00	302.95	na
	Total costs (in euro €)		**73.00**	**73.00**	**73.00**	**73.00**	**73.00**	0.83	73.00	60.59	na
Acetyl-salicyl acid											
	Daily dose in mg				80.0		160.0	0.33	120.00	39.60	56.57
	Number of days				forever		365.0	0.33	365.00	120.45	na
	Total costs (in euro €)				**8.76**		**17.52**	0.33	13.14	4.34	6.19
Total costs								1.00	450.68	423.89	na

		Costs per tablet
Anti-coagulantia	**Carbasalaatcalcium sachet 100 mg**	0.01
	Clopidogrel tabl 75 mg	1.81
Lipitor	**Atorvastatine tabl 10 mg**	0.09
B/Blocking agent	**Metoprolol zoc tabl retard 50 mg**	0.10
Acetyl-salicyl acid	**Acetyl-salicyl acid caps 100 mg**	0.03

Table A19a: Nursing days, personnel and non-patient care: resource use ~ case vignette 6 AMI

		Cardio 1	Cardio 2	Cardio 3	Cardio 4	Cardio 5	Cardio 6	Proportion of patients receiving this service	Average number of units per patient receiving this service	Average number of units per patient	Standard deviation
Nursing days	**Number of days clinic**	3,0	3,0	5,0	4,0	4,5	3,0	1,00	3,75	3,75	0,88
	Number of days ICU	2,0	2,0	1,0	2,0	2,5	2,0	1,00	1,92	1,92	0,49
	Total number of days	5,0	5,0	6,0	6,0	7,0	5,0	1,00	5,67	5,67	0,82
Hospital care	**Conservative / drugs** (%)	0,0	0,0	3,0	0,0	10,0	0,0	0,02	2,17	0,05	4,02
	Trombolysis (%)	1,0	0,0	1,0	10,0	30,0	1,0	0,07	7,17	0,51	11,79
	PTCA (%)	99,0	100,0	95,0	90,0	60,0	99,0	0,91	90,50	81,90	15,40
ICU	**Conservative / drugs** (minutes)										
	Cardiologist	*46,7*	*46,7*	20,0	*46,7*	60,0	60,0	1,00	46,67	46,67	14,61
	Fellow	*20,0*	*20,0*	20,0	*20,0*	*20,0*	*20,0*	1,00	20,00	20,00	na
	Physiotherapist	*540,0*	*540,0*	*540,0*	*540,0*	540,0	*540,0*	1,00	540,00	540,00	na
	Trombolysis (minutes)										
	Cardiologist	*40,0*	*40,0*	30,0	45,0	40,0	45,0	1,00	40,00	40,00	5,48
	Fellow	*60,0*	*60,0*	30,0	90,0	*60,0*	*60,0*	1,00	60,00	60,00	18,97
	Physiotherapist	*292,5*	*292,5*	*292,5*	45,0	540,0	*292,5*	1,00	292,50	292,50	156,53
	PTCA (minutes)										
	Cardiologist	*37,0*	60,0	20,0	45,0	30,0	30,0	1,00	37,00	37,00	14,00
	Fellow	*56,7*	60,0	20,0	90,0	*56,7*	*56,7*	1,00	56,67	56,67	22,21
	Nurse	*240,0*	240,0	*240,0*	*240,0*	*240,0*	*240,0*	1,00	240,00	240,00	na
	Physiotherapist	*262,5*	*262,5*	*262,5*	45,0	480,0	*262,5*	1,00	262,50	262,50	137,56

Table A19b: Nursing days, personnel and non-patient care: resource use ~ case vignette 6 AMI

		Cardio 1	Cardio 2	Cardio 3	Cardio 4	Cardio 5	Cardio 6	Proportion of patients receiving this service	Average number of units per patient receiving this service	Average number of units per patient	Standard deviation
Post ICU	**Conservative / drugs** (minutes)										
	Cardiologist	*52,5*	*52,5*	50,0	*52,5*	90,0	17,5	1,00	52,50	52,50	22,97
	Fellow	*75,0*	*75,0*	75,0	*75,0*	*75,0*	*75,0*	1,00	75,00	75,00	na
	Physiotherapist	*90,0*	*90,0*	60,0	*90,0*	120,0	*90,0*	1,00	90,00	90,00	18,97
	Trombolysis (minutes)										
	Cardiologist	*50,6*	*50,6*	50,0	45,0	90,0	17,5	1,00	50,63	50,63	23,15
	Fellow	*67,5*	*67,5*	75,0	60,0	*67,5*	*67,5*	1,00	67,50	67,50	4,74
	Physiotherapist	*75,0*	*75,0*	60,0	45,0	120,0	*75,0*	1,00	75,00	75,00	25,10
	PTCA (minutes)										
	Cardiologist	*58,0*	120,0	50,0	45,0	60,0	15,0	1,00	58,00	58,00	34,44
	Fellow	*85,0*	120,0	75,0	60,0	*85,0*	*85,0*	1,00	85,00	85,00	19,75
	Nurse	*240,0*	240,0	*240,0*	*240,0*	*240,0*	*240,0*	1,00	240,00	240,00	na
	Physiotherapist	*86,3*	120,0	60,0	45,0	120,0	*86,3*	1,00	86,25	86,25	30,56
Non-patient care	**Non-patient care**										
	Mark-up % overheads	*36%*	*36%*	*36%*	*36%*	*36%*	36%	1,00	36%	36%	na
	Mark-up % capital costs	*15%*	*15%*	*15%*	*15%*	*15%*	15%	1,00	15%	15%	na

Table A20a: Nursing days, personnel and non-patient care: costs ~ case vignette 6 AMI

All costs are expressed in Euro (€)		Cardio 1	Cardio 2	Cardio 3	Cardio 4	Cardio 5	Cardio 6	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Inpatient stay	**Nutrition and hotelcosts**										
	Costs per day	*42,40*	37,00	46,00	44,00	49,00	36,00	1,00	42,40	42,40	5,08
	Total costs	*249,60*	185,00	276,00	264,00	343,00	180,00	1,00	249,60	249,60	61,07
	Subtotal	***252,50***	**185,00**	**276,00**	**264,00**	**343,00**	**180,00**	**1,00**	**250,08**	**249,60**	**61,08**
	Nursing staff ~ normal ward										
	Clinic										
	Costs per day	79,71	140,81	133,00	141,82	148,00	*128,67*	1,00	128,67	128,67	24,94
	Total costs	239,14	422,43	665,00	567,30	666,00	*511,97*	1,00	511,97	511,97	162,88
	ICU										
	Costs per day	644,00	544,00	490,00	791,00	1001,00	818,00	1,00	714,67	714,67	na
	Total costs	1288,00	1088,00	490,00	1582,00	2502,50	1636,00	1,00	1.431,08	1.431,08	668,81
	Subtotal	**1527,14**	**1510,43**	**1155,00**	**2149,30**	**3168,50**	**1636,00**	**1,00**	**1.943,06**	**1.943,06**	**717,78**
ICU	**Conservative / drugs**										
	Cardiologist	*114,80*	*114,80*	49,20	*114,80*	147,60	147,60	1,00	114,80	114,80	35,93
	Fellow	*10,80*	*10,80*	10,80	*10,80*	*10,80*	*10,80*	1,00	10,80	10,80	na
	Physiotherapist	*318,60*	*318,60*	*318,6*	*318,60*	318,60	*318,60*	1,00	318,60	318,60	na
	Subtotal	***444,20***	***444,20***	**378,60**	***444,20***	**477,00**	**477,00**	**1,00**	**444,20**	**444,20**	**35,93**
	Trombolysis										
	Cardiologist	*98,40*	*98,40*	73,80	110,70	98,40	110,70	1,00	98,40	98,40	13,47
	Fellow	*32,40*	*32,40*	16,20	48,60	*32,40*	*32,40*	1,00	32,40	32,40	10,25
	Physiotherapist	*172,58*	*172,58*	*172,58*	26,55	318,60	*172,58*	1,00	172,58	172,58	92,35
	Subtotal	***303,38***	***303,38***	**262,58**	**185,85**	**449,40**	**315,68**	**1,00**	**303,38**	**303,38**	**85,97**
	PTCA										
	Cardiologist	*91,02*	147,60	49,20	110,70	73,80	73,80	1,00	91,02	91,02	34,44
	Fellow	*30,60*	32,40	10,80	48,60	*30,60*	*30,60*	1,00	30,60	30,60	11,99
	Nurse	*98,40*	98,40	*98,40*	*98,40*	*98,40*	*98,40*	1,00	98,40	98,40	na
	Physiotherapist	*154,88*	*154,88*	*154,88*	26,55	283,20	*154,88*	1,00	154,88	154,88	81,16
	Subtotal	***374,90***	**433,28**	**313,28**	**284,25**	**486,00**	**357,68**	**1,00**	**374,90**	**374,90**	**74,92**

Table A20b: Nursing days, personnel and non-patient care: costs ~ case vignette 6 AMI

All costs are expressed in Euro (€)		Cardio 1	Cardio 2	Cardio 3	Cardio 4	Cardio 5	Cardio 6	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Post ICU	**Conservative / drugs**										
	Cardiologist	*129,15*	*129,15*	123,00	*129,15*	221,40	43,05	1,00	129,15	129,15	56,50
	Fellow	*40,5*	*40,5*	40,50	*40,5*	*40,5*	*40,5*	1,00	40,50	40,50	na
	Physiotherapist	*53,1*	*53,1*	35,40	*53,1*	70,80	*53,1*	1,00	53,10	53,10	11,19
	Subtotal	***222,75***	***222,75***	**198,90**	***222,75***	**332,70**	**136,65**	**1,00**	**222,75**	**222,75**	**63,36**
	Trombolysis										
	Cardiologist	*124,54*	*124,54*	123,00	110,70	221,40	43,05	1,00	124,54	124,54	56,95
	Fellow	*36,45*	*36,45*	40,50	32,40	*36,45*	*36,45*	1,00	36,45	36,45	2,56
	Physiotherapist	*44,25*	*44,25*	35,40	26,55	70,80	*44,25*	1,00	44,25	44,25	14,81
	Subtotal	***205,24***	***205,24***	**198,90**	**169,65**	**328,65**	**123,75**	**1,00**	**205,24**	**205,24**	**68,08**
	PTCA										
	Cardiologist	*142,68*	295,20	123,00	110,70	147,60	36,90	1,00	142,68	142,68	84,72
	Fellow	*45,90*	64,80	40,50	32,40	*45,90*	*45,90*	1,00	45,90	45,90	10,66
	Nurse	*98,40*	98,40	*98,40*	*98,40*	*98,40*	*98,40*	1,00	98,40	98,40	na
	Physiotherapist	*50,89*	70,80	35,40	26,55	70,80	*50,89*	1,00	50,89	50,89	18,03
	Subtotal	***337,87***	**529,20**	**297,30**	**268,05**	**362,70**	**232,09**	**1,00**	**337,87**	**337,87**	**104,82**
Devices	**Stent**	**2000,00**	***1533,33***	**500,00**	***1533,33***	**2100,00**	***1533,33***	**1,00**	**1.533,33**	**1.533,33**	**566,86**
Non-patient care	**Non-patient care**										
	Overheads	*278,49*	*278,49*	*278,49*	*278,49*	*278,49*	278,49	1,00	278,49	278,49	na
	Capital costs	*116,04*	*116,04*	*116,04*	*116,04*	*116,04*	116,04	1,00	116,04	116,04	na
	Subtotal	***394,53***	***394,53***	***394,53***	***394,53***	***394,53***	**394,53**	**1,00**	**394,53**	**394,53**	**na**

Table A21: Drugs: resource use and costs ~ case vignette 7 Cough

	GP 1	GP 2	GP 3	GP 4	GP 5	GP 6	GP 7	Proportion of patients receiving this service
Painkillers	0,20	0,50	0,00	0,70	0,20	1,00	0,70	0,47
Antibiotics	0,30	0,00	0,10	0,50	0,05	0,00	0,30	0,18
Bronchodilating agent	0,20	0,00	0,00	0,30	0,00	0,00	0,00	0,07
Cough medicine	0,20	0,00	0,00	0,00	0,05	0,00	0,00	0,04

Total costs

		Daily dose in mg	Number of days	Number of tablets / injections used	Costs per tablet / injection	Total costs (in euro €)	Proportion of patients receiving this service	Average per patient receiving this service	Average per patient
Painkillers	**Paracetamol tabl 500 mg**	625,0	2,0	1,3	0,02	0,05	0,47	0,05	0,02
Antibiotics	**Amoxicilline inje 250 mg**	500,0	6,0	2,0	0,56	6,72	0,18	6,72	1,20
Bronchodilating agent	**Salbutamol aero 100 microgr 200 do**	300,0	2,0	3,0	3,38	20,28	0,07	20,28	1,45
Cough medicine	**Promethazine HCL syrop 1 mg / ml 300 ml**	3,0 ml	3,0	0,0	1,43	0,04	0,04	0,07	0,00
	Noscapine syrup 1 mg / ml 300 ml	3,0 ml	3,0	0,0	3,52	0,11			

Total costs 2,67

Table A22: Personnel and non-patient care: resource use ~ case vignette 7 Cough

		GP 1	GP 2	GP 3	GP 4	GP 5	GP 6	GP 7	Proportion of patients receiving this service	Average number of units per patient receiving this service	Average number of units per patient	Standard deviation
Examination	General practitioner	12.3	10.0	10.0	10.0	10.0	10.0	10.0	1.00	10.33	10.33	0.87
	Assistant	5.6		15.0	2.0		1.5		0.57	6.03	3.44	6.26
Post examination	**Second visit** (%)	50.0	10.0	5.0	30.0	5.0	15.0	10.0	0.18	17.86	3.19	16.55
	ENT-specialist (%)	10.0	0.0	5.0	0.0	0.0	0.0	0.0	0.02	2.14	0.05	3.93
	Pediatrician (%)	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.01	0.71	0.01	1.89
Non-patient care	**Non-patient care**											
	Mark-up % overheads	*36%*	45%	32%	32%	*36%*	32%	38%	1.00	36%	36%	0.05
	Mark-up % capital costs	-	-	-	-	-	-	-	-	-	-	na

Table A23: Personnel and non-patient care: costs ~ case vignette 7 Cough

All costs are expressed in Euro (€)		GP 1	GP 2	GP 3	GP 4	GP 5	GP 6	GP 7	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Examination	**First visit**											
	General practitioner	11.21	9.11	9.11	9.11	9.11	9.11	9.11	1.00	9.41	9.41	0.79
	Assistant	1.96		5.25	0.70		0.53		0.57	2.11	1.21	2.19
	Subtotal	**13.17**	**9.11**	**14.36**	**9.81**	**9.11**	**9.64**	**9.11**	**1.00**	**11.52**	**10.62**	**2.20**
Post examination	**Second visit**	**6.58**	**0.91**	**0.72**	**2.94**	**0.46**	**1.45**	**0.91**	**0.18**	**2.00**	**0.36**	**2.18**
Non-patient care	**Non-patient care**											
	Overheads	*6.07*	7.51	5.36	5.36	*6.07*	5.36	6.43	1.00	6.02	6.02	0.78
	Capital costs	-	-	-	-	-	-	-	-	-	-	na
	Subtotal	***6.07***	**7.51**	**5.36**	**5.36**	***6.07***	**5.36**	**6.43**	**1.00**	**6.02**	**6.02**	**0.78**
Fee charged to health insurer	Per visit	9.00	9.00	9.00	9.00	9.00	9.00	9.00	1.00	9.00	9.00	na
	Per therapy	10.62	10.62	10.62	10.62	10.62	10.62	10.62	1.00	10.62	10.62	na

Table A24: Drugs: resource use and costs ~ case vignette 8 Colonoscopy

		GE 1	GE 2	GE 3	GE 4	GE 5	GE 6	GE 7	GE 8	GE 9	Proportion of patients receiving this service	Average per patient receiving this service	Average per patient	Standard deviation
Fentanyl														
	Daily dose in mg	*0.08*	0.10	0.08	0.05	*0.08*	0.08	*0.08*	*0.08*	0.08	1.00	0.08	0.08	0.01
	Number of days	*1*	1	1	1	*1*	1	*1*	*1*	1	1.00	1.00	1.00	na
	Total costs (in euro €)	***0.17***	**0.23**	**0.17**	**0.12**	***0.17***	**0.17**	***0.17***	***0.17***	**0.17**	1.00	0.17	0.17	0.03
Dormicum														
	Daily dose in mg	*7.5*	10	*7.5*	5	*7.5*	7.5	*7.5*	7.5	7.5	1.00	7.50	7.50	1.25
	Number of days	*1*	1	*1*	1	*1*	1	*1*	1	1	1.00	1.00	1.00	na
	Total costs (in euro €)	***0.30***	**0.39**	***0.30***	**0.20**	***0.30***	**0.30**	***0.30***	**0.30**	**0.30**	1.00	0.30	0.30	0.05
Pethidine														
	Daily dose in mg					50					0.11	50.00	5.56	na
	Number of days					1					0.11	1.00	0.11	na
	Total costs (in euro €)					**0.73**					0.11	0.73	0.08	na
Total costs											1.00	1.20	0.55	na

		Costs per tablet / injection
Fentanyl	**Fentanyl inje 0.1 mg**	0.23
Dormicum	**Midazolam inje 15 mg**	0.59
Pethidine	**Pethidine inje 50 mg**	0.73

Table A25: Nursing days, personnel and non-patient care: resource use ~ case vignette 8 Colonoscopy

		GE 1	GE 2	GE 3	GE 4	GE 5	GE 6	GE 7	GE 8	GE 9	Proportion of patients receiving this service	Average number of units per patient receiving this service	Average number of units per patient	Standard deviation
Nursing days	**Number of days clinic**	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	1,00	0,50	0,50	na
Pre examination	**Examination-Team** (minutes)													
	Gastro-enterologist	20,0	5,0	5,0	30,0		30,0	10,0		1,0	0,78	14,43	11,22	12,20
	Nurse		10,0	10,0		5,0	20,0	20,0		5,0	0,67	11,67	7,78	6,83
Examination	**Examination-Team** (minutes)													
	Gastro-enterologist	30,0	25,0	20,0	30,0	30,0	20,0	17,5	25,0	20,0	1,00	24,17	24,17	5,00
	Nurse	40,0	25,0	20,0		30,0	60,0	30,0	25,0	20,0	0,89	31,25	27,78	13,30
Post examination	**Examination-Team** (minutes)													
	Gastro-enterologist	10,0	5,0	5,0	10,0		10,0	10,0		5,0	0,78	7,86	6,11	2,67
	Nurse		5,0	5,0		5,0	10,0	20,0			0,56	9,00	5,00	6,52
Non-patient care	**Non-patient care**													
	Mark-up % overheads	*43%*	49%	45%	43%	*43%*	47%	36%	37%	*43%*	1,00	43%	43%	0,04
	Mark-up % capital costs	*19%*	19%	19%	28%	*19%*	19%	15%	17%	*19%*	1,00	19%	19%	0,03

Table A26: Nursing days, personnel and non-patient care: costs ~ case vignette 8 Colonoscopy

All costs are expressed in Euro (€)		GE 1	GE 2	GE 3	GE 4	GE 5	GE 6	GE 7	GE 8	GE 9	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Inpatient stay	**Nutrition and hotelcosts**													
	Costs per day	*35,13*	54,00	22,00	40,00	49,00	24,00	36,00	24,00	32,00	1,00	35,13	35,13	11,20
	Total costs	*17,56*	27,00	11,00	20,00	24,50	12,00	18,00	12,00	16,00	1,00	17,56	17,56	5,60
	Subtotal	***17,56***	**27,00**	**11,00**	**20,00**	**24,50**	**12,00**	**18,00**	**12,00**	**16,00**	**1,00**	**17,56**	**17,56**	**5,60**
Pre examination	**Examination-Team** (minutes)													
	Gastro-enterologist	49,20	12,30	12,30	73,80		73,80	24,60		2,46	0,78	35,49	27,69	30,02
	Nurse		4,10	4,10		2,05	8,20	8,20		2,05	0,67	4,78	3,20	2,80
	Subtotal	**49,20**	**16,40**	**16,40**	**73,80**	**2,05**	**82,00**	**32,80**		**4,51**	**0,89**	**40,28**	**30,89**	**30,52**
Examination	**Examination-Team** (minutes)													
	Gastro-enterologist	73,80	61,50	49,20	73,80	73,80	49,20	43,05	61,50	49,20	1,00	59,45	59,45	12,30
	Nurse	16,40	10,25	8,20		12,30	24,60	12,30	10,25	8,20	0,89	12,81	11,40	5,45
	Subtotal	**90,20**	**71,75**	**57,40**	**73,80**	**86,10**	**73,80**	**55,35**	**71,75**	**57,40**	**1,00**	**72,26**	**70,85**	**13,07**
Post examination	**Examination-Team** (minutes)													
	Gastro-enterologist	24,60	12,30	12,30	24,60		24,60	24,60		12,30	0,78	19,33	15,08	6,57
	Nurse		2,05	2,05		2,05	4,10	8,20			0,56	3,69	2,07	2,67
	Subtotal	**24,60**	**14,35**	**14,35**	**24,60**	**2,05**	**28,70**	**32,80**		**12,30**	**0,89**	**23,02**	**17,14**	**10,55**
Non-patient care	**Non-patient care**													
	Overheads	*8,66*	9,18	7,50	1,00	*8,66*	18,44	11,17	4,65	*8,66*	1,00	8,66	8,66	4,72
	Capital costs	*3,60*	3,56	3,17	0,65	*3,60*	7,45	4,65	2,14	*3,60*	1,00	3,60	3,60	1,84
	Subtotal	***12,26***	**12,73**	**10,67**	**1,65**	***12,26***	**25,89**	**15,82**	**6,79**	***12,26***	**1,00**	**12,26**	**12,26**	**7,18**

Table A27: Materials, personnel and non-patient care: resource use ~ case vignette 9 Tooth filling

		Dentist 1	Dentist 2	Dentist 3	Dentist 4	Dentist 5	Proportion of patients receiving this service	Average number of units per patient receiving this service	Average number of units per patient	Standard deviation
Materials	**Materials** (%)									
	Composite	100.0	100.0	100.0	100.0	50.0	0.90	90.00	81.00	22.36
	Amalgam	0.0	0.0	0.0	0.0	50.0	0.10	10.00	1.00	22.36
Pre therapy	**First visit**									
	Dentist	10.0	12.2	8.2	5.0	12.0	1.00	9.48	9.48	2.99
	Assistant	10.0	10.0	8.2	5.0	3.8	0.92	7.40	6.81	2.87
Therapy	Dentist	30.0	18.3	20.0	10.0	14.0	1.00	18.47	18.47	7.53
	Assistant	30.0	14.4	20.0	10.0	14.0	1.00	17.69	17.69	7.75
Post examination	**Second visit** (%)	0.0	20.0	30.0	0.0	0.0	0.10	10.00	1.00	14.14

Table A28: Materials, personnel and non-patient care: costs ~ case vignette 9 Tooth filling

All costs are expressed in Euro (€)		Dentist 1	Dentist 2	Dentist 3	Dentist 4	Dentist 5	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Materials	**Materials**									
	Composite	4.00	1.01	1.63	2.50	2.25	0.90	2.28	2.05	1.12
	Amalgam					0.82	0.10	0.82	0.08	na
	Anaesthetic	1.00	0.35	0.40	0.30	0.52	0.78	0.51	0.40	0.28
	Subtotal	**5.00**	**1.36**	**2.03**	**2.80**	**3.59**	**1.00**	**3.61**	**2.53**	**1.41**
Pre therapy	**First visit**									
	Dentist	7.42	9.05	6.08	3.71	8.90	1.00	7.03	7.03	2.22
	Assistant	3.49	3.49	2.86	1.75	1.33	0.92	2.59	2.38	1.00
	Subtotal	**10.91**	**12.54**	**8.95**	**5.46**	**10.23**	**1.00**	**9.62**	**9.41**	**2.66**
Therapy	Dentist	22.26	13.60	14.84	7.42	10.39	1.00	13.70	13.70	5.59
	Assistant	10.48	5.05	6.99	3.49	4.89	1.00	6.18	6.18	2.71
	Subtotal	**32.74**	**18.65**	**21.82**	**10.91**	**15.28**	**1.00**	**19.88**	**19.88**	**8.25**
Post therapy	**Second visit**	**43.65**	**31.19**	**30.77**	**16.37**	**25.51**	**0.10**	**29.50**	**2.95**	**9.91**
Non-patient care	**Non-patient care**									
	Overheads	16.67	11.35	4.20	3.25	3.22	1.00	7.74	7.74	6.04
	Capital costs	-	-	-	-	-	-	-	-	na
	Subtotal	**16.67**	**11.35**	**4.20**	**3.25**	**3.22**	**1.00**	**7.74**	**7.74**	**6.04**
Fee charged to health insurer	Per therapy	68.80	78.76	49.70	53.30	53.10	1.00	60.73	60.73	12.50

Table A29: Personnel and non-patient care: resource use ~ case vignette 10 Ambulatory physiotherapy

		Physio 1	Physio 2	Physio 3	Physio 4	Physio 5	Physio 6	Physio 7	Physio 8	Proportion of patients receiving this service	Average number of units per patient receiving this service	Average number of units per patient	Standard deviation
Therapy	**First visit** (minutes)												
	Physiotherapist	45.0	30.0	30.0	30.0	60.0	50.0	40.0	60.0	1.00	43.13	43.13	12.80
	Subsequent visits (minutes)												
	Physiotherapist, per visit	40.0	60.0	30.0	45.0	45.0	45.0	30.0	60.0	1.00	44.38	44.38	11.48
	Number of subsequent visits	20.4	46.2	14.0	24.5	26.5	*26.4*	26.5	26.5	1.00	26.37	26.37	9.88
	Physiotherapist, total of visits	816.0	2772.0	420.0	1102.5	1192.5	*1241.1*	795.0	1590.0	1.00	1,241.14	1,241.14	711.22
Non-patient care	**Non-patient care**												
	Mark-up % overheads	6%	*17%*	*17%*	7%	*17%*	11%	*17%*	45%	1.00	17%	17%	0.12
	Mark-up % capital costs	-	-	-	-	-	-	-	-	-	-	-	na

Table A30: Personnel and non-patient care: costs ~ case vignette 10 Ambulatory physiotherapy

		Physio 1	Physio 2	Physio 3	Physio 4	Physio 5	Physio 6	Physio 7	Physio 8	Proportion of patients receiving this service	Average costs per patient receiving this service	Average costs per patient	Standard deviation
Therapy	**First visit**												
	Physiotherapist	19.55	13.03	13.03	13.03	26.06	21.72	17.37	26.06	1.00	18.73	18.73	5.56
	Subtotal	**19.55**	**13.03**	**13.03**	**13.03**	**26.06**	**21.72**	**17.37**	**26.06**	**1.00**	**18.73**	**18.73**	**5.56**
	Subsequent visits												
	Physiotherapist, per visit	17.37	26.06	13.03	19.55	19.55	19.55	13.03	26.06	1.00	19.28	19.28	4.98
	Physiotherapist, total of visits	354.45	1204.07	182.44	478.89	517.99	539.12	345.32	690.65	1.00	539.12	539.12	308.93
	Subtotal	**354.45**	**1204.07**	**182.44**	**478.89**	**517.99**	***539.12***	**345.32**	**690.65**	**1.00**	**539.12**	**539.12**	**308.93**
Non-patient care	**Non-patient care**												
	Overheads	22.44	*129.64*	*129.64*	34.43	*129.64*	2.39	*129.64*	322.52	1.00	112.54	112.54	101.15
	Capital costs	-	-	-	-	-	-	-	-	-	-	-	na
	Subtotal	**22.44**	***129.64***	***129.64***	**34.43**	***129.64***	**2.39**	***129.64***	**322.52**	**1.00**	**112.54**	**112.54**	**101.15**
Fee charged to health insurer	Per visit	27.50	26.00	*26.75*	*26.75*	*26.75*	*26.75*	*26.75*	*26.75*	1.00	26.75	26.75	0.40
	Per therapy	588.50	1227.20	*907.85*	*907.85*	*907.85*	*907.85*	*907.85*	*907.85*	1.00	907.85	907.85	170.70