The costs of seven case-vignettes in the Danish health sector

- Appendectomy
- Normal delivery
- Hip replacement
- Cataract (operation)
- Stroke
- AMI
- Colonoscopy

Part II: Results from a survey

Data Collection Report for Denmark, Work Package 9 of the Health Basket project (SP21-CT-2004-501588)

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Content

List of abbreviations

ACS	Acute Coronary Syndrome
AMI	Acute Myocardial Infarction
ASA	American Society of Anaesthesiology (grouping of patients according to risk (1-5) in anaesthesia)
DAGS	Danish ambulatory groups
DD	Daily Doses
DkDRG	Danish version of Diagnosis Related Groups
DRG	Diagnosis Related Groups
ECG	Electro cardiography
GP	General Practitioner
KAG	Coronary Arterygraphy
LOS	Length of stay
NCD	National Cost Database
NCSP	Nordic Classification of Surgical Procedures
NIP	National Indicator Project
NOV	Number of visits
PCI	Percutane Coronary Intervention
SD	Standard deviation
IU	Injection Units

Preface

This report is preceeded by another report, "Part I"[1], which outlines the results of a data collection process aiming at costing ten case-vignettes in the Danish health sector (denoted Part I). Part I is based on a description of patient pathways and ways of organising the services as they took place in 2004 in the Danish health sector and on top of that on the provision of corresponding cost figures from 2004. This report, "Part II", provides an update of these figures to 2005 and compares them with results of a survey of resource use from a sample of Danish hospitals to assess the costs of seven of the hospital based vignettes from a "bottom-up" perspective.

The report has been elaborated in autumn 2006 by the DSI Danish Institute for Health Services Research as part of Work Package 9 of the EU funded research project, "HealthBASKET, Health Benefits and Services Costs in Europe " (EU-contract No. SP 21-2004-501588 under the sixth Framework Programme).

Authors of the report are Anni Ankjær-Jensen (responsible for the project management) and Jesper Thyge Johansen (responsible for the questionnaire part of the project concerning vignette 1 (appendectomy), 2 (normal delivery), 3 (hip replacement), 4 (cataract), 5 (stroke), 6 (AMI) and 8 (colonoscopy) and for coordination of this report.

We thank the (many) participating health care sites for their efforts in providing data for the survey.

[1] Bilde L, Ankjær-Jensen A, Kilsmark K. Costing 10 case-vignettes in the Danish Health Sector, Part I, DSI Danish Institute for Health Services Research

1 Summary and discussion

The purpose of this report is to outline the results of a questionnaire based survey in which Danish hospital departments were asked to provide estimates of their resource use in relation to seven hospital-based case-vignettes. The questionnaires were constructed on the basis of the description of patient pathways provided in the first report, "part I". Furthermore, the report provides a price and wage adjustment of the 2004 national figures from "part I" to 2005, and compares these figures with the results from the survey.

Table 1.1 below provides a summary of the results at local as well as national level concerning vignettes 1-6 and 8. The table indicates the number of hospitals and patient records included in the cost estimates. Further the table indicates mean length of stay, the mean total cost per vignette, and a comparison with the national (DRG) tariff.

Table 1.1 Results summary Denmark in € 2005, results and cost figures based on local sample, the national cost database and, national tariffs 2004, Vignette 1-6 and vignette 8.*

Results summary Denmark in € 2005, results and cost figures based on sample and national cost database, national tariff 2005

	Local sample				National average				Tariff
Vignette	N Hospitals	n patient records	Mean LOS/NOV	Mean costs €	N Hospitals	n patient records	Mean LOS/NOV	Mean costs €	National Tariff €
1 Appendicitis	2	23	2	2.617	29	312	2	2.455	2.233
2. Normal Delivery	4	2.821	2	1.633	18	8905	2	1.786	1.944
3. Hip replacement	2	89	7	5.067	28	869	8	8.847	7.841
4. Cataract	4	420	1	597	9	723	2	974	1.440
5. Stroke	1	109	5	3.362	38	867	11	5.562	5.889
6 AMI with surgery	1	159	3	14.575	2	160	6	14.533	
6 AMI without surgery	2	69	5	2.403	34	528	3	3.226	
8 Colonoscopy	3	0	1	722	24	426	1	705	

*National cost and price figures 2004 from the first report "Part I", adjusted to 2005 prices and wages.

The table represents two different approaches to cost calculation. One approach is the calculation of national averages based on the National Cost Database (NCD), undertaken as part of and described in "part I" report, price and wage adjusted to 2005. The other approach is a calculation based on information of direct resource use from a small sample of hospitals to elicit mean total costs for the hospitals included in the sample, supplemented by data from the NCD on the particular hospitals in the sample.

The advantage of using the national average approach is that it covers all Danish hospitals and therefore represents the "true" Danish cost of the vignettes. The disadvantage is the lack of detail, as the data only allows a breakdown of the total costs into a number of cost centres. The advantage of using the small sample of hospitals (supplemented with data from the NCD on the particular hospitals in the sample) is that it facilitates a more detailed description of the direct costs, but since the calculated costs only represent a small number of hospitals (in some vignettes one or two) the costs are still subject to much uncertainty. However, as the NBC includes all costs - direct costs as well as indirect costs (i.e. administration, heating, maintenance, indirect staff time), an advantage in relation to both approaches is that all hospital costs are accounted for.

It appears from table 1.1 that there is only a small difference between the two cost estimates for some vignettes (1, 2, 6, and 8). Hence the sample seems to be rather representative for the Danish hospitals. For other vignettes (3, 4 and 5) there are major differences in the cost esti-

mates. The main reason for the differences between the two estimates is undoubtedly the small sample on which the local cost estimate is based. The sample representing vignettes 3, 4 and 5 therefore does not seem to be very representative for the hospitals in Denmark.

2 Introduction

2.1 Background and objective of report

This report is part of one out of many outputs from a European research collaboration aiming at developing methods to compare health care services and costs across countries, the Health Basket project[2]. It provides a price and wage adjustment to 2005 of the results of part I, which estimated the costs of ten "case-vignettes" in the Danish setting for 2004. Furthermore, this report outlines the results of a survey carried out among a number of Danish hospital departments to estimate the resource use and costs of seven hospitals based case-vignettes and compare these estimates with the adjusted national cost figures.

2.2 Methods and data sources

Introduction

The methods, data sources and processes relating to the translation of the data collection guidelines into the Danish setting, the inclusion of patients and extraction of national data etc. are described in the first report, "part I".

All cost figures from the first report which were from 2004 have been price and wage adjusted to 2005.

Methods for calculating costs for the hospitals included in the survey

Calculation of direct costs

The initial strategy of conducting interviews with key clinics/departments to supplement the national average cost of the NCD is described in the first report, Part I. In order to increase level of detail in the cost information, the present report, presents the results of a method where samples of local figures are supplemented with local data from the NCD. Further the cost estimate based on the sample is compared to the NCD national average figures. Hence the original data from the interviews are here supplemented with data from questionnaires, where we have sought to broaden the base of the sample.

We sent out 48 questionnaires to relevant clinics/departments geographically situated in the region of Zealand. Due to an unfortunate combination of a short deadline and holidays we only received 14 questionnaires to supplement the original 7 interviews. Two of the received questionnaires were unusable due to lack of data quality or because the questionnaire only dealt with parts of the hospitalization.

We asked the clinics/departments to estimate the resources used in terms of time (staff), number and type of diagnostic procedures, drug use etc. Since local costs of services supplied by departments within the hospital are often absent in Danish Hospital settings and due to a short deadline of the projects we used unit costs from a single supplier. The chosen reference hospi-

[2] Health Basket: Health Benefits and Service Costs in Europe, EU contract No. SP21-CT-2004-501588.

tal has several years of experience in calculating costs for different purposes in the Danish Health sector, and they do it within a single framework: the method of activity based costing.

Wages includes all wage elements including costs of pension. The effective hourly wage is calculated by dividing the annual wage with the sum of working hours (subtracting holidays and average figures for absence due to illness, maternity leave, etc.).

Costs of Radiology services (X-rays, CT-scans, etc.) are calculated using cost data from the reference hospital and relative service weights supplied by the National Board of Health.
Costs of laboratory tests are based on the unit costs calculated at the reference hospital.
Drug costs are based on the price list of the hospital pharmacy of the Copenhagen Hospital Corporation.

All unit costs are based on 2004-figures adjusted to 2005-prices and wages. The adjusted cost figures are presented in € using the 2005 yearly calculated average exchange rate of 100 € = 745.1927 DKK[3]

The local estimates of number of resource units used in the different vignettes are then multiplied (where applicable) with the unit costs from the reference hospital in order to get the total cost of the particular resource.

Calculating total cost based on data from NCD
A description of The National Cost Database (NCD) is found the first report "part I". The national cost database include all costs except capital costs and depreciation. As described in part I, national mean (total) cost for the patients included in the vignettes were calculated based on data from the NCD. In this part of the project calculations on national level have been supplemented with calculation of mean total cost for the hospital included in the survey.

Indirect costs (overhead)
Overhead costs for the hospitals included in the survey are, in principle, the difference between mean total cost of the patients included in the vignette supplied from NCD, and the direct cost calculated on the basis of the information gathered through the questionnaire. In an attempt to split overhead into overhead at department level and overhead at hospital level, we used data from the reference hospital reflecting clinic/department direct costs compared to the total costs allocated to the clinic/department.

The figures of the reference hospital have, when available, been used to calculate overhead for similar clinics/departments.

Overview of the method used for calculations.
The method used can be summarised in the following way:

A. The interviews and questionnaires provide local estimates of units and number of units of resources used.
B. The local estimates are multiplied with unit costs calculated at the reference hospital to calculate total direct cost.
C. Local total cost figures (mean total cost) for the relevant vignette are supplied from the NCD.

3 Data from the National Bank of Denmark, Danmarks Nationalbank, www.nationalbanken.dk

D. The average local cost figure from the NCD is then multiplied with the overhead-percentage from a comparable clinical setting at the reference hospital to calculate the overhead cost at hospital level.
E. The clinic/department overhead is then calculated by subtracting overhead (D) and local direct cost figures from the average total cost (C-D-(A+B)).

The method is thus a combination of a bottom-up and a top-down approach, which partly ensures relatively detailed information in the clinic/department setting, partly places local estimates in a balanced local framework, where total local cost figures have been balanced with the total account of the hospital.

Unless otherwise stated calculations of average costs, LOS, etc. are weighted averages - the number of cases constituting the weight factor.

3 Results

The following sections presents the results from the calculation of costs of the vignette 1,2,3,4,5,6,8 based on the hospitals included in the sample. For each vignette the mean cost based on the sample are compared to national average cost.

3.1 Appendectomy (vignette 1)

Patient inclusion criteria: “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.”

Cost estimate based on sample

The data of the vignette consists of data from one interview and one questionnaire. Seven questionnaires were sent to a selection of Gastroenterological departments – two was returned. Data from the sample is presented below.

Hospital A

In 2004, the number of appendectomies carried out at the hospital was around 300, of which 17 met the inclusion criteria for the vignette.

The elements of the treatment episode are described in the table 3.1 below.

Table 3.1 Cost data for patients admitted with appendicitis at the gastroenterology department at Hospital A

Phase	Type of resource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Preparation for operation	Staff	Physician: 90 min.	100%	1,50	45,57	68,36
		Nurse: 120 min.	100%	2,00	26,93	53,86
		Physician (anesthetist) : 22 min.	100%	0,37	45,57	16,71
Operation	Staff	Nurse (anesthetist) 90 min.	100%	1,50	26,93	40,39
		Physician (anesthetist) : 30 min.	100%	0,50	45,57	22,79
		Physician (surgeon): 2 X 60 min.	100%	2,00	45,57	91,14
		Nurse 2 X 90 min.	100%	3,00	26,93	80,79
	Drugs	Innohep 3.500 IU	100%	1,00	3,33	3,33
		Anesthetics	100%	1,00	134,19	134,19
	Other resources	Consumables	100%	1,00	117,00	117,00
		Microbiological test for infection	10%	1,00	na.	
		Pathological test	na.	na.	na.	
Wake-up room	Staff	Porter 15 min.	100%	0,25	26,20	6,55
		Nurse 55 min.	100%	0,92	26,93	24,69
Post operative	Staff	Nurse 216 min.	100%	3,60	26,93	96,95
	Drugs	Paracetamol (1g. X 4)	100%	4,00	na.	
		Ibuprofen (600 mg. X 3)	100%	3,00	0,08	0,23
		Metronidazol	100%	1,00	0,15	0,15
		Gentamycin	100%	1,00	na.	
		Anhypen (if. Infection)	na.	na.	na.	na.
Overhead department level						944,88
Overhead and services from other departments						811,69
Total cost						2.513,69

Patients treated meeting the inclusion criteria 17

Average LOS 1,4 days

Source: Interviews

Hospital B

Table 3.2 Cost data for patients admitted with appendicitis at the surgical department at Hospital B

Phase	Type of resource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Preparation for operation	Staff	Physician: 30 min.	100%	0,50	45,57	22,79
		Nurse: 45 min.	100%	0,75	26,93	20,20
		Physician (anesthetist): 10 min.	100%	0,17	45,57	7,60
	Diagnostic resources	Blood tests	100%	1,00	na.	
		BAS test (blood test)	80%	1,00	21,50	17,20
		Ultra sound abdomen	20%	1,00	60,43	12,09
		X-ray Thorax	10%	1,00	54,54	5,45
		Magnetic Resonance abdomen	10%	1,00	na.	
	Drugs	Analgesics	30%	1,00	na.	
		Antibiotics	70%	1,00	na.	
Operation	Staff	Nurse (anesthetist) 110 min.	100%	1,83	26,93	49,37
		Physician (anesthetist) : 60 min.	100%	1,00	45,57	45,57
		Physician (surgeon): 2 X 65 min.	100%	2,17	45,57	98,74
		Nurse 2 X 100 min.	100%	3,33	26,93	89,76
	Drugs	Metronidazol, 1,5 g.	40%	1,00	1,04	0,41
		Gentamycin 240 mg.	25%	1,00	na.	
		Zinacef 1,5 g.	25%	1,00	10,52	2,63
	Other resources	Microbiological test for infection	10%		na.	
Wake-up room	Staff	Porter 10 min.	100%	0,17	26,20	4,37
		Nurse 45 min.	100%	0,75	26,93	20,20
Post operative	Staff	Nurse 40 min./day	100%	1,33	26,93	35,91
		Physician 15 min./day	100%	0,50	45,57	22,79
		Porter 10 min./day	100%	0,33	26,20	8,73
	Drugs	Paracetamol (1g. X 4)	100%		na.	
		NSAID 8 mg. X 3	95%	na.	na.	
		Metronidazol (500 mg. X 3)	25%	3,00	0,69	0,52
		Morphine 10 mg. X 4	90%	4,00	0,11	0,39
		Gentamycin (240 mg. X 1)	25%	na.	na.	
		Zinacef 1,5 g. X 3	25%	3,00	9,82	7,37
		Antibiotics	25%	1,00	na.	
Overhead department level						1356,05
Overhead and services from other departments						1.087,43
Total cost						2.908,18

Patients treated meeting the inclusion criteria 6

Average LOS after operation 2,0 days

Source: Questionnaire

Table 3.3 Average cost from sample. Appendectomy

Average costs vignette 1 appendectomy

Phase	Type of ressource used	Units	Unit cost	Total cost
Preparation for operation	Staff	Physician:	45,57	56,47
		Nurse:	26,93	45,08
		Physician (anaesthetist):	45,57	14,33
	Diagnostic ressources			9,06
	Drugs		na.	
Operation	Staff	Nurse (anaesthetist)	26,93	42,74
		Physician (anaesthetist)	45,57	28,73
		Physician (surgeon)	45,57	93,12
		Nurse	26,93	83,13
	Drugs			102,44
	Other ressources			86,48
Wake-up room	Staff	Porter	26,20	5,98
		Nurse	26,93	23,51
Post operative	Staff	Nurse	26,93	81,02
		Physician	45,57	5,94
		Porter	26,20	2,28
	Drugs			2,44
Overhead department level				945,05
Overhead and services from other departments				988,79
Total cost				2.616,60

Patients treated meeting the inclusion criteria	23
Average LOS after operation	1,6 days

National average cost based on NCD

Table 3.4 Mean cost per admission for appendectomy €, mean total cost and cost centre distributions. Standard deviation and 25-75 percentiles of total cost. Average length of stay.

	Cost centre					Total costs			
	Op-an (n=307)	Laboratory (n=238)	Radiology (n=227)	Pathology (n=206)	Not specified	Mean (n=312)	Percentile 25 - 75	SD	Average LOS
Total costs (direct+indirect)	1,150	89	17	89	1,109	2,455	1,837-2,727	990	2
% of total	46.9 %	3.6 %	0.7 %	3.6 %	45.2 %	100 %			
Indirect costs (30%)						736			
Direct costs						1,719			

Source: Bilde L, Ankjær-Jensen A, Kilsmark K. Costing of 10 case-vignettes in the Danish Health Sector, Part I, DSI Danish Institute for Health Services Research.
LOS= length of stay
Note: number in brackets shows (?) the number of observations on which the estimated cost is based

As it appears from table x the estimated cost of the vignette based on the sample amounts to 2.616 €, which is very close to the national average of 2,397 €. This similarity indicates that the included department is representative for the Danish hospital sector. Also the estimated cost is very close to the national tariff.

3.2 Normal Delivery (vignette 2)

Patient inclusion criteria: “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).”

Cost estimate based on sample

The sample data of the vignette consists of data from one interview and three questionnaires. Seven questionnaires were sent to a selection of gynaecological-obstetric departments. Four questionnaires were returned but one was omitted due to poor data. Data from the sample of four departments are presented below.

Hospital A

Table 4.1 Cost data for patients admitted for normal delivery at Hospital A

Phase	Type of resource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Pre-delivery (admission and planning)	Staff	Midwife 20 min.	100%	0,33	28,11	9,37
		Nurse: 10 min.	75%	0,17	26,93	3,37
	Diagnostic procedures	Cardiotocography 10 min.	90%	1,00	na.	
	Drugs	Klyx 250 ml.	95%	1,00	na.	
Delivery (including partum and post partum activity in delivery room)	Staff	Midwife 390 min.	100%	6,50	28,11	182,70
		Nurse (anesthetist) 40 min.	30%	0,67	26,93	5,39
		Physician (anesthetist) : 20 min.	30%	0,33	45,57	4,56
		Physician: 10 min.	50%	0,17	45,57	3,80
		Nurse 30 min.	100%	0,50	26,93	13,46
	Diagnostic procedures	Cardiotocography	na.	na.	na.	
		Blood tests	na.	na.	na.	
	Drugs	Morphine	5%	1,00	na.	
		Bupovacain + sufenta (Epidural)	26%	1,00	na.	
		Carbocain 10mg./ml. 10 ml.	25%	1,00	2,12	0,53
		Carbocain 10mg./ml. 20 ml. (Pudendus)	10%	1,00	4,24	0,42
		Syntocinon	100%	1,00	0,48	0,48
		Konakion 10mg./ml. (child)	100%	1,00	1,32	1,32
Post-delivery	Staff	Midwife 75 min./day	100%	1,86	26,20	48,79
		Nurse 75 min./day	100%	1,86	26,93	50,14
		Physician 10 min./child/day	100%	0,25	45,57	11,31
		Physiotherapist 30 min./day	50%	0,74	29,74	11,07
		Porter 10 min.	50%	0,17	26,20	2,18
	Drugs	Pamol	75%	4,00	0,08	0,24
		Anti-D	30%	1,00	na.	
Overhead department level						752,24
Overhead and services from other departments						518,19
Total cost						1.619,57

Number of patients treated meeting the inclusion criteria 1145

Average LOS 2,0 days

Source: Questionnaire

Hospital B

Table 4.2 Cost data for patients admitted for normal delivery at Hospital B

Phase	Type of resource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Pre-delivery (admission and planning)	Staff	Midwife 100 min.	100%	1,00	28,11	28,11
		Nurse: 10 min.	100%	0,17	26,93	4,49
		Assistant 10 min.	100%	0,10	23,30	2,33
	Diagnostic procedures	Cardiotocography 30 min.	70%	1,00	na.	
Delivery (including partum and post partum activity in delivery room)	Staff	Midwife 420 min.	100%	7,00	28,11	196,76
		Nurse (anesthetist) 30 min.	30%	0,50	26,93	4,04
		Physician (anesthetist) 30 min.	30%	0,50	45,57	6,84
		Physician: 30 min.	70%	0,50	45,57	15,95
		Nurse 60 min.	100%	1,00	26,93	26,93
	Diagnostic procedures	Cardiotocography	70%	1,00	na.	
	Drugs	Epidural	20%	1,00	na.	
		Lidocain	na.	na.	na.	
		Bupivacain	na.	na.	na.	
		Syntocinon	45%	1,00	0,48	0,22
Post-delivery	Staff	Midwife 200 min.	na.	3,33	26,20	87,35
		Nurse 120 min. X 2	95%	5,33	26,93	136,44
	Drugs	Pamol	75%	4,00	0,08	0,24
		Anti-D	30%	1,00	na.	
Overhead department level						585,30
Overhead and services from other departments						533,50
Total cost						1.628,48

Number of patients treated meeting the inclusion criteria 643

Average LOS 2,2 days

Source: Questionnaire

Hospital C

Table 4.3 Cost data for patients admitted for normal delivery at Hospital C

Phase	Type of resource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Pre-delivery (admission and planning)	Staff	Midwife 30 min.	100%	0,50	28,11	14,05
	Diagnostic procedures	Cardiotocography 20 min.	100%	1,00	na.	
Delivery (including partum and post partum activity in delivery room)	Staff	Midwife 480 min.	100%	8,00	28,11	224,86
		Physician (anesthetist) : 30 min.	19%	0,50	45,57	4,33
		Nurse 120 min.	100%	2,00	26,93	53,86
Post-delivery	Staff	Obstetrician	na.	0,50	45,57	22,79
		Physiotherapist	100%	1,08	29,74	32,22
Overhead department level						645,75
Overhead and services from other departments						446,16
Total cost						1.444,02

Number of patients treated meeting the inclusion criteria 595

Average LOS 1,9 days

Source: Interview

Hospital D

Table 4.4 Cost data for patients admitted for normal delivery at Hospital D

Phase	Type of resource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Pre-delivery (admission and planning)	Staff	Midwife 45 min.	100%	0,75	28,11	21,08
	Diagnostic procedures	Cardiotocography 20 min.	100%	1,00	na.	
	Drugs	Pondocillin	2%	3,00	0,93	0,06
		Pamol	10%	2,00	0,19	0,04
		Klysma	na.	na.	na.	
Delivery (including partum and post partum activity in delivery room)	Staff	Midwife 540 min.	100%	9,00	28,11	252,97
		Physician (anesthetist) : 45 min.	30%	0,75	45,57	10,25
		Nurse 60 min.	100%	1,00	26,93	26,93
	Diagnostic procedures	Cardiotocography 60 min.	50%	na.	na.	
		Blood tests	na.	na.	na.	
	Drugs	Sufentanil 5 ug./ml.	30%	1,00	1,10	0,33
		Bubivacain 0,125% 4 ml.	30%	na.	na.	
		Lidocain nordadrenalin 10 mg./ml.	70%	1,00	na.	
		Syntocinon inteapartum 10 IU	43%	1,00	1,61	0,69
		Syntocinon post partum 10 IU	100%	1,00	1,61	1,61
		Konakion 0,2mg./ml. (child)	100%	4,00	1,32	5,27
Post-delivery	Staff	Midwife 360 min.	100%	6,00	26,20	157,22
		Nurse 120 min.	100%	2,00	26,93	53,86
		Physician 10 min./child/day	5%	0,28	45,57	0,64
	Drugs	Pamol 500 mg./ml.	70%	2,00	0,04	0,06
Overhead department level						764,17
Overhead and services from other departments						634,96
Total cost						1.930,14

Number of patients treated meeting the inclusion criteria 438

Average LOS 2,2 days

Source: Questionnaire

Table 4.5 Average cost from sample. Normal delivery

Average costs from sample vignette 2

Phase	Type of ressource used	Units	Total cost
Pre-delivery (admission and planning)	Staff	Midwife	16,45
		Nurse:	2,39
		Assistant	0,53
	Drugs		0,01
Delivery (including partum and post partum activity in delivery room)	Staff	Midwife	205,71
		Nurse (anaesthetist)	3,11
		Physician (anaesthetist)	5,91
		Physician	5,18
		Nurse	27,14
	Drugs		2,39
Post-delivery	Staff	Midwife	64,12
		Nurse	59,81
		Physician	9,50
		Physiotherapis	11,29
		Porter	0,89
	Drugs		0,16
Overhead department level			693,58
Overhead and services from other departments			524,62
Total cost			1632,79

Number of patients treated meeting the inclusion criteria	2821,00
Average LOS	2,05 days

National average cost based on NCD

Table 4.6 Normal Delivery. Mean cost per admission in €, mean total and break-down by cost centre. SD and 25 /75% fractiles

	Cost Centre (DKK)							Total costs (€)		
	A-O.* (n=7677)	Radiol. (n=8041)	Pathol-ogy (n=6008)	Clin. Fys. (n=2105)	Clin-micro (n=1579)	Clin-biol. (n=7834)	Not specified	Mean (n=8905)	Percentile 25%-75%	SD
Total cost**	620	0.3	0.7	3.5	2.8	17.5	1,141	1,786	889 -2,499	1,087
% of total	(34.7 %)	(0 %)	(0%)	(0.2 %)	(0.2%)	(1%)	(63.9)	(100 %)		
Indirect cost (30%)							536			
Direct Cost							605			

Source: Bilde L, Ankjær-Jensen A, Kilsmark K. Costing of 10 case-vignettes in the Danish Health Sector, Part I, DSI Danish Institute for Health Services Research.
* Anaesthesia and operation
** direct + indirect costs

From table 4.6 it appears that the mean cost calculated from our sample is very close to the mean national cost, indicating that the 4 hospitals included in the sample are representative for the whole country.

3.3 Hip Replacement (vignette 3)

Patient inclusion criteria: “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)”.

Cost estimate based on sample

The sample data of the vignette consists of data from one interview and one questionnaire. Eight questionnaires were sent to a selection of orthopaedic departments. One questionnaire was returned. Data from the two departments are presented below.

Hospital A

Table 5.1 Cost data for patients admitted for a hip replacement at Hospital A

Outpatient visit

Phase	Type of resource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Outpatient visit	Staff	Physician (anesthetist) : 10 min.	100%	0,17	45,57	7,60
		Physician (surgeon): 45 min.*	100%	0,75	45,57	34,18
		Nurse: 45 min.*	100%	0,75	26,93	20,20
		Physiotherapist 5 min. **	95%	0,08	29,74	2,35
		Nurse (anesthetist) 5 min.**	95%	0,08	26,93	2,13
		Physician (surgeon): 5 min.**	95%	0,08	45,57	3,61
		Nurse: 5 min.**	95%	0,08	26,93	2,13
		Ergo therapist	95%	0,17	29,01	4,59
	Diagnostic procedures	X-ray	100%	1,00	46,98	46,98
		Blood tests	100%	1,00	24,26	24,26
Overhead department level						
Overhead and services from other departments						
Total cost						254,52

In-patient stay

Phase	Type of resource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Preparation for operation	Staff	Physician: 2 min.	100%	0,03	45,57	1,52
		Nurse: 20 min.	100%	0,33	26,93	8,98
Operation	Staff	Nurse (anesthetist) 90 min.	100%	1,50	26,93	40,39
		Physician (anesthetist) : 25 min.	100%	0,42	45,57	18,99
		Physician (surgeon): 60 min.	100%	1,00	45,57	45,57
		Nurse 2 X 120 min.	100%	4,00	26,93	107,72
	Drugs	Lidokain 20 ml.	100%	1,00	0,21	0,21
		Adrenalin	100%	1,00	2,14	2,14
		Marcain spinal plain 4 ml.	100%	1,00	6,93	6,93
		Propofol 10 mg./ml. 100 ml.	100%	1,00	41,63	41,63
		NaCl isotonic	100%	1,00	2,35	2,35
		Toradol 30mg./ml. 1 ml.	100%	1,00	2,54	2,54
		Spinal needle	100%	1,00	na.	na.
		Zinacef	100%	1,00	10,52	10,52
		Cyklokapron	98%	1,00	1,13	1,10
	Other resources	Instruments & utensils	100%	1,00	12,08	12,08
		Implants	100%	1,00		
		Saw-blade, batteries, etc.	100%	1,00	103,53	103,53
	Staff	Porter 10 min.	100%	0,17	26,20	4,37
		Nurse 180 min./day	100%	11,40	26,93	306,99
		Physician 5 min./day	100%	0,32	45,57	14,43
		Physiotherapist 60 min./day	100%	3,80	29,74	113,01
		Ergo therapist 5 min./day	100%	0,32	29,01	9,19
	Diagnostic procedures	X-ray	100%	1,00	46,98	46,98
		Blood tests	100%	1,00	na.	na.
Overhead department level						4400,57
Overhead and services from other departments						2.403,37
Total cost						7.705,12

Number of patients treated meeting the inclusion criteria 25

Average LOS 3,8 days

Implant used: bimetric stem, ringloc cup, polyethylen liner

* Administrative work with the patient, pre-examination
** Seminar: joint information to groups of patients

Source: Questionnaire and telephone interviews

Hospital B

The cost data from the department are presented below.

Table 5.2 Cost data for patients admitted for hip replacement Hospital B

Outpatient visit

Phase	Type of resource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Outpatient visit	Staff	Physician (anesthetist)	na.	na.	na.	
		Physician (surgeon): 20 min.*	100%	0,33	45,57	15,19
	Diagnostic procedures	X-ray	100%	1,00	46,98	46,98
		Blood tests	100%	1,00	24,26	24,26
Overhead department level						-37,34
Overhead and services from other departments						22,06
Total cost						71,14

In-patient stay

Phase	Type of resource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Preparation for operation	Staff	Physician	na.	na.	45,57	
		Nurse	na.	na.	26,93	
	Diagnostic procedures	BAS-test (blood-test)	100%	1,00	21,50	21,50
	Drugs	Paracetamol	100%	1,00	na.	
		Triasolam 0,125 mg.	100%	1,00	0,13	0,13
Operation	Staff	Nurse (anesthetist) 90 min.	na.	na.	26,93	
		Physician (anesthetist) : 168 min.	100%	2,80	45,57	127,60
		Physician (surgeon): 202 min.	100%	3,37	45,57	153,42
		Nurse	na.	na.	26,93	
	Drugs	Anticoagulative (eg. Fragmin)	100%	1,00	1,34	1,34
		Antibiotics	na.	na.	na.	
		Marcain spinal plain 4 ml.	100%	1,00	6,93	6,93
		Cyklokapron	100%	1,00	1,13	1,13
	Other resources	Implants	100%	1,00		
Post-operative	Staff	Nurse 1.410 min.	100%	23,50	26,93	632,84
		Physician	na.	na.	na.	
		Physiotherapist 180 min.	100%	3,00	29,74	89,22
	Diagnostic procedures	X-ray	100%	3,00	46,98	140,93
	Drugs	Oxynorm (morphine) 20 mg.	100%	1,00	0,13	0,13
		Fragmin 5000 IU	100%	1,00	0,67	0,67
		Paracetamol	100%	1,00	na.	na.
Overhead department level						1841,68
Overhead and services from other departments						847,97
Total cost						3.865,50

Number of patients treated meeting the inclusion criteria	64
Average LOS	8,0 days

Source: Interview

Table 5.3 Average cost of admission for hip replacement

Average sample costs vignette 3

Outpatient visit

Phase	Type of ressource used	Units	Total cost
Outpatient visit	Staff	Physician (anaesthetist)	2,13
		Physician (surgeon):	20,52
		Nurse:	5,67
		Physiotherapist	0,66
		Nurse (anaesthetist)	0,60
		Physician (surgeon)	1,01
		Nurse	0,60
		Ergotherapist	1,29
	Diagnostic procedures	X-ray	46,98
		Blood tests	24,26
Overhead department level			-26,85
Overhead and services from other departments			15,86
Total cost			122,65

In-patient stay

Phase	Type of ressource used	Units	Total cost
Preparation for operation	Staff	Physician	0,43
		Nurse	2,52
	Diagnostic procedures	BAS-test (blood-test)	15,46
	Drugs		0,10
Operation	Staff	Nurse (anaesthetist)	11,35
		Physician (anaesthetist)	97,09
		Physician (surgeon)	123,13
		Nurse	30,26
	Drugs		25,70
	Other ressources	Instruments & utensils	3,39
		Implants	0,00
		Saw-blade, batteries, etc.	29,08
	Staff	Porter	1,23
		Nurse	541,31
		Physician	4,05
		Physiotherapist	95,90
		Ergotherapist	2,58
	Diagnostic procedures	X-ray	114,54
	Drugs		0,57
Overhead department level			2560,47
Overhead and services from other departments			1284,88
Total cost			4944,04

Number of patients treated meeting the inclusion criteria	89
Average LOS	6,8 days

Average national cost based on NCD

Table 5.5 Out patient pre-examination (s) for patients admitted for Hip replacement Mean cost per admission €, mean total and break-down by cost centre. SD and 25 /75% fractiles

Pre-examination (s)											
	Cost Centre (€)								Total costs (€)		
	A-O.* (n=1174)	Radiol. (n=965)	Pathol-ogy (n=145)	Clin. Fys. (n=2105)	Micro-biol. (n=1579)	Clin-biol. (n=7834)	Physio-occup. (n=214)	Not speci-fied	Mean (n=1174)	Percentile 25%-75%	SD
Total cost** (% total)		54 (24%)	0	9 (4%)	2 (1%)	18 (8%)	6 (3%)	139 (60%)	230 (100%)	138-309	105
Admission for surgery											
	Cost Centre (€)								Total costs (€)		
	A.-O (n= 869)	Radiol. (n=730)	Pathol-ogy (n=172)	Clinical fys. (n= 199)	Micro-biol. (n=167)	Clin-biol. (n=670)	Physio-occup. (n= 214)	Not specified	Mean (n=869)	Percentile 25%-75%	SD
Total cost** (% total)	4,031 (47 %)	133 (2 %)	5 (0%)	594 (7 %)	4 (0%)	88 (1%)	429 (5%)	3,331 (39 %)	8,617 (100%)	6,922-10,031	3,048
Pre-ex + Surgery total cost									8,847		
Indirect cost (30%)									2,654		
Direct Cost									6,193		

* Anaesthesia and operation
** direct + indirect costs

Figures in brackets are the number of observations the means are based on.

The cost estimate based on the local sample is 5,067 while the average cost at national level is 8,847. This difference may be explained by the small number of hospitals in the sample, and by the fact that the two hospitals are not representative of the general orthopaedic clinics performing hip replacement in Denmark. Especially length of stay at Hospital A is much shorter than national average, probably because the hospital is employing "accelerated patient episodes".

3.4 Cataract operation (vignette 4)

Patient inclusion criteria: “Male, 70-75 years old, has consulted a hospital clinic/ ophthalmologist's office because of blurred vision. After clinical assessment a diagnosis of *Cataracta Senilis* is made and the patient is put on the operating list. The case vignette concerns the actual operation in the hospital/ ophthalmologist's office (depending on country, please state) including any pre-operative assessment (possibly in separate visits). Please specify the type of implant/ ocular lens used (especially if costs differ)”.

Cost estimate based on sample

The sample data of the vignette consists of data from one interview and three questionnaires. Four questionnaires were sent to a selection of eye departments. Three questionnaires were returned. Data from the sample of four departments are presented below.

Hospital A

The cost data from the department are presented below.

Table 6.1 Cost data for patients admitted for cataract surgery at Hospital A

Outpatient visit

Phase	Type of resource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Outpatient visit	Staff	Physician (surgeon): 20 min	100%	0,33	45,57	15,19
		Nurse: 45 min	100%	0,75	26,93	20,20
Overhead						69,88
Total cost						105,27

Operation

Phase	Type of resource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Operation	Staff	Physician (surgeon): 15 min.	100%	0,25	45,57	11,39
		Nurse 40 min.	100%	0,67	26,93	17,95
	Drugs	Metaoxedrin 10%	100%	1,00	na.	na.
		Mydriacyl 1 %	100%	1,00	na.	na.
		Zinacef	100%	1,00	na.	na.
		Oxybuprocain	100%	1,00	na.	na.
	Other resources	Implant SA60 Alcon	100%	1,00	na.	na.
Overhead						75,40
Total cost						104,74

Patients treated meeting the inclusion criteria		78
Average LOS	1,0	days
Share of patients in general anesthesia	5,0%	

Source: Questionnaire

Hospital B

Table 6.2 Cost Data for patients admitted for cataract surgery at Hospital B

Outpatient visit

Phase	Type of resource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Outpatient visit	Staff	Physician (surgeon): 30 min	100%	0,50	45,57	22,79
		Nurse: 30 min	100%	0,50	26,93	13,46
	Drugs	Metaoxedrin 10%	100%	1,00	na.	na.
		Tropicamid 0,5%	100%	1,00	na.	na.
		Oxybuprocain	100%	1,00	na.	na.
Overhead						78,48
Total cost						114,73

Operation

Phase	Type of resource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Operation	Staff	Physician (surgeon): 30 min.	100%	0,50	45,57	22,79
		Nurse 2 X 30 min.	100%	1,00	26,93	26,93
	Drugs	Metaoxedrin 10%	100%	1,00	na.	na.
		ciloxan	100%	1,00	na.	na.
		PVD-iod	100%	1,00	na.	na.
		Oxybuprocain	100%	1,00	na.	na.
		Iopidine	100%	1,00	na.	na.
		Xylokain-gel 2%	100%	1,00	na.	na.
		Cefuroxim	100%	1,00	na.	na.
		Elektrolyt 250 ml.	100%	1,00	1,62	1,62
	Other resources	Implant SA60 Alcon	50%	1,00	na.	na.
		Implant MA60 Alcon	50%	1,00	na.	na.
		Costum pack from Alcon	100%	1,00	35,24	35,24
		Knives	100%	2,00	na.	na.
		Pair of gloves	100%	2,00	na.	na.
		Alcon Monarch II injector	100%	1,00	na.	na.
		0,85 ml. Healon	100%	1,00	na.	na.
		Eye bandage	100%	1,00	na.	na.
		Cassette/tubesystem	100%	1,00	na.	na.
Overhead						539,16
Total cost						625,74

Patients treated meeting the inclusion criteria		138
Average LOS	1,0	days
Share of patients in general anesthesia	25,0%	

Source: Questionnaire

Hospital C

Table 6.3 Cost data for patients admitted for cataract operation at Hospital C

Outpatient visit

Phase	Type of resource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Outpatient visit	Staff	Physician (surgeon): 30 min	100%	0,50	45,57	22,79
		Nurse: 30 min	100%	0,50	26,93	13,46
	Drugs	Metaoxedrin 10%	100%	1,00	na.	na.
		Tropicamid 0,5%	100%	1,00	na.	na.
		Oxybuprocain	100%	1,00	na.	na.
Overhead						122,59
Total cost						158,84

Operation

Phase	Type of resource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Operation	Staff	Physician (surgeon): 37 min.	100%	0,62	45,57	28,10
		Nurse 3 X 37 min.	100%	1,85	26,93	49,82
	Drugs	Metaoxedrin 10%	100%	1,00	na.	na.
		cyclogyl 1%	100%	1,00	na.	na.
		Cocaine 4%	100%	1,00	na.	na.
		Oxybuprocain	100%	1,00	na.	na.
		Iopidine	100%	1,00	na.	na.
		Xylokain-gel 2%	100%	1,00	na.	na.
		PVD Iodine	100%	1,00	na.	na.
	Other resources	Implant 3 piece acrylic lens	100%	1,00	na.	na.
		"Butterfly" to hold the lens	100%	1,00	na.	na.
		Knife (non reusable)	100%	1,00	na.	na.
		"Viskoelastica"	100%	2,00	na.	na.
		Pair of gloves	100%	2,00	na.	na.
		Surgery kit	100%	1,00	na.	na.
Overhead						501,76
Total cost						579,68

Patients treated meeting the inclusion criteria	100
Average LOS	1,0 days
Share of patients in general anesthesia	0,0%

Source: Interview

Table 6.4 Average cost of patients admitted for cataract surgery.

Average costs from sample vignette 4

Outpatient visit

Phase	Type of ressource used	Units	Total cost
Outpatient visit	Staff	Physician	21,38
		Nurse	14,71
Overhead			128,25
Total cost			164,34

Operation

Phase	Type of ressource used	Units	Total cost
Operation	Staff	Physician	20,06
		Nurse	28,49
Overhead			383,99
Total cost			432,54

Patients treated meeting the inclusion criteria		420
Average LOS	1,0	days
Share of patients ind general anaesthetics	9,1%	

National average cost based on NCD

Table 6.5 Average cost per cataract operation. Average total and distribution on cost centres. Standard deviation, percentiles 25/75%. Average number of visits. (€)

	Cost centre			Total cost			Average NOV
	Surgery/ Anaesthesia	Laboratory	Not explained	Mean	Percentile 25- 75 %	SD	
Preoperative visit	0	1 (n=689)	184	185 (n=821)	101 - 174	61	1
% total		0,5 %	99,5 %	100 %			
Surgery	376 (n=722)	1 (n=31)	219	596 (n = 864)	617 - 756	245	1
% total	63,1 %	0,1 %	36,8 %	100 %			
Total cost of cataract operation (direct + indirect)	376	2	403	781			2
% total	48,1 %	0,3 %	51,6 %	100 %			
Indirect (30%)				234			
Direct				547			

Source: Bilde L, Ankjær-Jensen A, Kilsmark K. Costing of 10 case-vignettes in the Danish Health Sector, Part I, DSI Danish Institute for Health Services Research

NOV: Number of visits:

Number in brackets: number of observations on which the cost estimate is based

Based on the sample the average cost for a cataract surgery seems to be around 40 % lower than average cost based on the national average. This difference may be due to the clinics in the sample not being representative for Danish eye clinics in general. Especially one of the eye clinics (Hospital A) seems to have relatively low costs. This difference in cost may be due to difference in treatment practice, or difference in patients included in the calculation of national average and in the sample. The sample is only a description of cost for patients treated as outpatients. However, a few patients do need an admission and therefore have a higher cost. The cost at national level will be an average of both types of treatments.

3.5 Stroke (vignette 5)

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

Cost estimate based on sample

The sample data of the vignette consists of data from one interview. Seven questionnaires were sent to a selection of Neurological departments. One questionnaire was returned but the questionnaire was not included in the sample due to lack of key data. Data from the department of Hospital A is presented below.

Hospital A

The cost data from the department are presented below.

Table 7.1 Cost for treating patients admitted for stroke at Hospital A

Phase	Type of resource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Stroke Unit	Staff	Physician 90 min.	100%	1,50	45,57	68,36
		Nurse 30 min.	100%	0,50	26,93	13,46
	Diagnostic procedures	CT-scan	100%	1,00	41,22	41,22
		MR-scan	10%	1,00	293,26	29,33
		Ultrasound	100%	1,00	72,51	72,51
		X-ray of Thorax	100%	1,00	54,54	54,54
		Blood tests	100%	2,00	199,01	398,01
Main Therapy	Drugs	ASA	100%	1,00	na.	
		ASA Dipyridamol.*	na.	na.	na.	
		Maravan (blood dilutive)**	na.	na.	na.	
		Cimvastin 40 mg.***	na.	na.	na.	
Hospital Care	Staff	Physician 60 min./day	100%	4,55	45,57	207,37
		Nurse 330 min./day	100%	25,03	26,93	673,98
		Physiotherapy 60 min./day	100%	4,55	29,74	135,33
		Occupational therapy 60 min./day	100%	4,55	29,01	132,03
		Speech therapist	100%	4,55	28,90	131,51
Overhead department level						682,56
Overhead and services from other departments						721,59
Total cost						3.361,79

Patients treated meeting the inclusion criteria 109

Average LOS 4,6 days

* if no cerebral hemorrhage
** if arterial fibrillation
*** if high cholesterol

Source: Interview and e-mails

National average cost based on NCD

Table 7.2 Average cost per admission of patients with stroke in €; average total and distribution on different cost centres. Standard Deviation and percentiles (25/75) of total cost.

	Cost Centre (€)						Total cost (€)		
	Lab. (n=580)	Radiol. (n=782)	Pathology (n=447)	Clin. Fys. (n=228)	Physio-/ Occup. Therapy (n=503)	Not Speci-fied	Mean (n=867)	Percentile 25%-75%	SD
Total cost (dir.+indirect)	151	190	12	68	622	4,519	5,562	1,886- 6,151	6,829
% of total	2.7 %	3.4 %	0.2 %	1.2 %	11.2 %	81.2 %	100 %		
Indirect cost (30%)							1,669		
Direct Cost							3,893		

Source: Bilde L, Ankjær-Jensen A, Kilsmark K. Costing of 10 case-vignettes in the Danish Health Sector, Part I, DSI Danish Institute for Health Services Research
*Clinical Physiology also includes diagnostic cost centres: Clinical Physiology-Nuclear Medicine, Clinical Neurophysiology.
Note: number in brackets gives the number of observations on which the estimated cost is based.

It appears from table 7.2 that the mean cost per patient at the hospital included in the sample is below national sample. This difference is probably due to the fact that length of stay in the department is 4,6 days compared to a national average of 11 day. The short length of stay in the clinic may be explained by patients being transferred to a rehabilitation unit (see part I).

3.6 AMI (vignette 6)

Patient inclusion criteria: “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.”

As described I part I, the treatment of patients admitted with Acute Coronar Syndrome, is divided into three different pathways, depending on whether the patient are diagnosed as

- AMI with ST-segment elevation (STEMI)
- AMI without ST-segment elevation (non-Stemi)
- Unstable angina

Patients with STEMI should be having a surgery (PCI) as fast as possible.

Surgery is centralised to 5 heart centres, and patients admitted to local hospital with the symptoms of STEMI are transferred the nearest heart centre as fast as possible. Therefore the average cost of a patient admitted to a local hospital with ACS consists of the costs the patients with non-STEMI who are treated locally, and the patients with STEMI who are staying only a short time at the hospital and then transferred to a heart centre.

Cost estimate based on sample

The sample data of the vignette consists of data from one interview and two questionnaires. Eight questionnaires were sent to a selection of cardiologic departments. Two questionnaires were returned. Data from the sample are presented below.

Hospital A

In all 16 patients met the inclusion criteria for the vignette at hospital A. It was estimated by the department, that 20 % of patients admitted with ACS was transferred to at heart centre. Table 8.1 below shows the average cost to the 16 patients.

Table 8.1 cost data for patients admitted for AMI at hospital A

AMI Department A

Phase	Type of ressource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Emergency	Staff	Physician 53 min.	100%	0,88	45,57	40,25
		Nurse 59 min.	100%	0,98	26,93	26,48
	Diagnostic procedures	X-ray thorax	80%	1,00	54,54	43,63
		Electrocardiography	19%	1,00	na.	na.
		Blood tests	81%	1,00	318,63	258,89
	Drugs	Klexane 1mg./kg X 2	81%	1,00	26,0389	21,16
		Idotyl 250 mg.	81%	1,00	0,07	0,05
		Clopidogred 75 mg.	100%	4,80	na.	na.
		Selozok 50 mg.	81%	1,00	na.	na.
		aspisol 300 mg.	19%	1	na.	na.
		Heperin 10000 IE	19%	1	3,91	0,73
		Seleken 5 mg.	19%	1	3,20	0,60
		Morphine 3 mg.	100%	1,00	0,79912	0,80
		Nitroglycerin 0,5 mg.	100%	2,00	0,09	0,18
Treatment	Staff	Physician 127 min.	100%	2,12	45,57	96,46
		Nurse: 337 min.	100%	5,62	26,93	151,25
		Physiotherapist 90 min.	80%	1,50	29,74	44,61
	Diagnostic procedures	X-ray thorax	76%	1,00	54,54	41,45
	Drugs	Klexane 1mg./kg X 2	81%	1,00	26,0389	21,16
		Selozok 50 mg.	81%	2,00	na.	na.
		Simvastatin 40 mg.	81%	1,00	0,19	0,15
		Magnyl 75mg.	81%	1,00	0,11	0,09
		Ramipril 5 mg.	41%	1,00	0,02	0,01
		Nitroglycerin 0,5 mg.	81%	2,00	0,09	0,15
Overhead department level						805,02
Overhead and services from other departments						719,68
Total cost						2.272,79

Hospital B

In total 23 patients met the inclusion criteria for the vignette. The department has estimated that 95% of patients admitted with ACS are transferred to heart centre. The average cost of the 23 patients is presented in table 8.2 below.

Table 8. 2 Cost data for patients admitted for AMI at Hospital B

Phase	Type of ressource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Emergency	Staff	Physician	na.	na.	na.	na.
		Nurse	na.	na.	na.	na.
	Diagnostic procedures	X-ray thorax	5%	1,00	54,54	2,73
		Electrocardiography	95%	1	na.	na.
		Blood tests	100%	1,00	60,23	60,23
	Drugs	Klexane 1mg./kg X 2	5%	1,00	26,04	1,30
		Simvastatin 40 mg.	5%	1,00	0,27	0,01
		Selozok 100 mg.	5%	1,00	0,41	0,02
		Plavix 75 mg.	5%	1,00	2,58	0,13
		Magnyl 75mg.	5%	1,00	0,11	0,01
		Magnyl 300 mg.	96%	1	0,21	0,20
		Heperin 10000 IE	96%	1	3,91	3,74
		Selozok 2,5 mg.	96%	8	na.	na.
Treatment	Staff	Physician 61,5 min./day	100%	1,03	45,57	46,71
		Nurse: 60 min./day	5%	6,00	26,93	8,08
		Physiotherapist 15 min./day	5%	1,50	29,74	2,23
	Diagnostic procedures	X-ray thorax	5%	1,00	54,54	2,73
		Blood tests	5%	1,00	21,50	1,07
	Drugs	Klexane 1mg./kg X 2	5%	1,00	26,04	1,30
		Simvastatin 40 mg.	5%	1,00	0,27	0,01
		Selozok 100 mg.	5%	1,00	0,41	0,02
		Plavix 75 mg.	5%	1,00	2,58	0,13
		Magnyl 75mg.	5%	1,00	0,11	0,01
Overhead department level						1.587,50
Overhead and services from other departments						1.016,52
Total cost						2.734,68

Hospital C

Hospital C is a heart centre, treating both patients admitted with ACS directly to the hospital (both STEMI and non STEMI), and patients transferred from other hospitals (STEMI). In all 214 patients met the inclusion criteria at hospital C. Of those 55 had been treated without surgery, while 159 had surgery. The tables below presents the average cost of patients with surgery (STEMI) and the average cost of patients without surgery (non-STEMI) at hospital C.

Table 8.3 cost data for patients admitted for AMI at Hospital C

non-STEMI

Phase	Type of ressource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Emergency	Staff	Physician	na.	na.	45,57	
		Nurse	na.	na.	26,93	
	Other	Lab.tests	na.	na.	na.	
	Drugs				na.	
					na.	
		Clopidogred 75 mg.	100%	8	na.	na.
Main Therapy	Staff	Physician: 30 min.	100%	0,50	45,57	22,79
		Nurse: 2 X 30 min.	100%	1,00	26,93	26,93
	Diagnostic procedures	X-ray thorax	100%	1,00	54,54	54,54
		Blood tests	100%	na.	na.	
	Drugs	LMH (first 3 days of stay)	100%	na.	na.	
		Nitroglycerine (in case of pain)	na.	1,00	1,34	1,34
		Copidogrel (Plavix) 75 mg.	100%	1,00	2,58	2,58
		Betabloccer 25 mg.	100%	2,00	na.	
		Simvastin 40 mg.	100%	1,00	na.	
		ASA 75 mg.	100%	1,00	na.	
Overhead department level						1.465,86
Overhead and services from other departments						852,15
Total cost						2.426,18

Number of patients meeting the inclusion criteria 55

STEMI

Phase	Type of ressource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Main therapy (PCI)	Staff	Physician 90 min.	100%	1,50	45,57	68,36
		Nurse 3 X 90 min.	100%	4,50	26,93	121,18
	Other	Implants (average cost)	100%	1,00	1345,00	1.345,00
Bed department	Staff	Physician	na.	na.	45,57	
		Nurse	na.	na.	26,93	
	Diagnostic procedures	X-ray thorax	95%	1,00	54,54	51,81
		Lab. Tests	100%	1,00	na.	
	Drugs	Copidogrel (Plavix) 75 mg.	100%	1,00	2,58	2,58
		Betabloccer 25 mg.	100%	2,00	na.	
		Simvastin 40 mg.	100%	1,00	na.	
		ASA 75 mg.	100%	1,00	na.	
Overhead department level						7.591,20
Overhead and services from other departments						5.395,07
Total cost						14.575,20

Patients treated meeting the inclusion criteria 159

Average LOS 3,2 days

The average cost of the patients included in the vignette cannot be calculated, as the percentage of patients in the different groups (non STEMI, STEMI) is not known. As it appears some hospitals only treat non STEMI, while others (the heart centre) treat both types (their own patients plus patients transferred from local hospitals). Therefore none of the hospitals included in the sample have a representative distribution of patients between the two groups. Below therefore to average cost figures are presented, patients with surgery (STEMI) and patients without surgery (Non-STEMI).

Table 8.4 Average cost for patients admitted for AMI at the local sample

Non-STEMI

Average weighted costs AMI patient

Phase	Type of ressource used	Units	Total cost
Emergency/operation	Staff	Physician	7,91
		Nurse	4,51
	Diagnostic procedures	X-ray thorax	8,09
		Blood tests	58,12
	Other costs	Implants	0,00
	Drugs		5,28
Bed department	Staff	Physician	41,18
		Nurse	43,48
		Physiotherapist	6,62
	Diagnostic procedures	X-ray thorax	39,63
		Blood tests	0,26
	Drugs		6,27
Overhead department level			1.382,86
Overhead and services from other departments			871,34
Total cost			2.475,56

Patients treated meeting the inclusion criteria 94

STEMI

Average weighted costs AMI patient

Phase	Type of ressource used	Units	Total cost
Emergency/operation	Staff	Physician	68,36
		Nurse	121,18
	Diagnostic procedures	X-ray thorax	0,00
		Blood tests	0,00
	Other costs	Implants	1.345,00
	Drugs		0,00
Bed department	Staff	Physician	0,00
		Nurse	0,00
		Physiotherapist	0,00
	Diagnostic procedures	X-ray thorax	51,81
		Blood tests	0,00
	Drugs		2,58
Overhead department level			7.591,20
Overhead and services from other departments			5.395,07
Total cost			14.575,20

Patients treated meeting the inclusion criteria 159

National average cost based on NCD

Based on NCD the following national average cost are calculated:

Patients without surgery

Table 8.5 Average cost per admission of patient with ACS, no surgery. Average total and distribution on different cost centres (€). Standard deviation and percentiles (25/75) of total cost.

	Cost centre (€)							Total cost (€)		
	Lab (n= 368)	Radio. (n= 484)	Patho Logy (n=85)	Clin. Fys* (n=97)	Micro-biology (n=94)	Physio-/Occupa Therapy (n=171)	Not speci-fied	Mean (n= 528)	Percentile 25 – 75	SD
Total (dir.+indir.) % total	160 5.0%	79 2.0%	4 0.1%	25 0.8%	9 0.3%	55 1.7%	2,907 90.1%	3,241 100%	1,441-4,144	3,054
Indirect cost (30%)								968		
Direct cost								2,273		

Source: Bilde L, Ankjær-Jensen A, Kilsmark K. Costing of 10 case-vignettes in the Danish Health Sector, Part I, DSI Danish Institute for Health Services Research
*Clinical Physiology also includes Clinical Physiology-Nuclear Medicine

It appears from table 8.5 that the average total cost at of an admission of a patient with ACS, with no surgery at national level is 3,241 €, which is about 30 % higher than average cost based on the sample(table 8.4).

Patients with surgery

Table 8.6 Average cost per admission of patients with ACS, with surgery. Mean total and distribution on different cost centres. Standard deviation and percentiles (25/75) of total cost.

	Cost centre (€)							Total cost (€)		
	Surgery/ Anaesth. (n=160)	Lab. (n=159)	Radio. (n=160)	Patholo. (n=159)	Clin. Fys. (n=159)	Physio-/ Occup. Therapy (n=341)	Not Speci-fied	Mean (n=160)	Percen-tile 25-75	SD
Total cost (direct+ Indirect) % of total	7,443 51,2%	24 0,2%	80 0,5%	1 0,0%	3 0,0%	47 0,3%	6,934 47,7%	14,533 100%	12,606-15,003	4,094
Indirect (30%)								4,360		
Direct cost								10,172		

Source: Bilde L, Ankjær-Jensen A, Kilsmark K. Costing of 10 case-vignettes in the Danish Health Sector, Part I, DSI Danish Institute for Health Services Research
Note: number in brackets indicate the number of admissions on which the cost is estimated.

According to table 8.6 the average cost per admission of patients with ACS, with surgery is 14,533 €, which is very close to the cost estimate based on the sample (14.575 €).

3.7 Colonoscopy (vignette 8)

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

Cost estimate based on sample

The sample data of the vignette consists of data from one interview and two questionnaires. Seven questionnaires were sent to a selection of gastroenterological departments. Two questionnaires were returned. Data from the sample are presented below.

Hospital A

Table 10.1 Cost estimate for colonoscopy for patients admitted to Hospital A

Phase	Type of resource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Preparation for examination	Staff	Physician 3 min.	100%	0,05	45,57	2,28
		Nurse 10 min.	100%	0,17	26,93	4,49
	Drugs	Venflon	100%	1,00	na.	
Examination	Staff	Nurse 30 min.	100%	0,50	26,93	13,46
		Physician 30 min.	100%	0,50	45,57	22,79
	Drugs	Midazolam iv.	100%	1,00	0,06	0,06
After examination	Staff	Physician 3 min.	100%	0,05	26,93	1,35
		Nurse 10 min.	100%	0,17	45,57	7,60
Overhead department level						261,19
Overhead and services from other departments						149,75
Total cost						462,95

Patients treated meeting the inclusion criteria 20

Source: Questionnaire

Hospital B

Table 10.2 Cost data for patients admitted for colonoscopy at Hospital B

Phase	Type of resource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Preparation for examination	Staff	Nurse 3 min.	100%	0,05	26,93	1,35
	Drugs	Benzodiazepin (Dormicum)	100%	1,00	0,06	0,06
		Fentanyl (haldid)	100%	1,00	0,14	0,14
Examination	Staff	Nurse 2 X 45 min.	100%	1,50	26,93	40,39
		Physician 45 min.	100%	0,75	45,57	34,18
	Drugs	see below				
	Other resources	Consumables, drugs	100%	1,00	101,00	101,00
After examination	Staff	Nurse 15 min.	100%	0,25	45,57	11,39
Overhead department level						300,16
Overhead and services from other departments						233,63
Total cost						722,30

Patients treated meeting the inclusion criteria 27

Source: Interview

Hospital C

Table 10.3 Cost data for patients admitted for colonoscopy at Hospital C

Phase	Type of resource used	Units	Percentage of patients	No. of units used/patient	Unit cost	Total cost
Preparation for examination	Staff	Physician 5 min.	100%	0,08	45,57	3,80
		Nurse 15 min.	100%	0,25	26,93	6,73
Examination	Staff	Nurse 2 X 37 min.	100%	1,23	26,93	33,21
		Physician 30 min.	100%	0,50	45,57	22,79
		Porter 10 min.	100%	0,17	26,20	4,37
	Drugs	Dormicum 3 mg.	95%	1,00	0,77	0,73
		Haldid 100 micrograms	95%	1,00	0,82	0,78
	Other resources					
After examination	Staff	Physician 10 min.	10%	0,17	45,57	0,76
		Nurse 15 min.	100%	0,25	26,93	6,73
		CT-Colonoscopy Physician 10 min	12%	0,17	45,57	0,91
		CT-Colonoscopy Nurse 10 min.	12%	0,17	26,93	0,54
		Physician 10 min.*	10%	0,17	45,57	0,76
Overhead department level						318,71
Overhead and services from other departments						190,58
Total cost						589,20

Patients treated meeting the inclusion criteria 19

Source: Questionnaire

* Supplementary examination

Table 10.4 Average cost for patients admitted for colonoscopy based on local sample

Average Cost vignette 8

Phase	Type of ressource used	Units	Total cost
Preparation for examination	Staff	Physician	1,78
		Nurse	3,85
	Drugs		0,08
Examination	Staff	Nurse	30,22
		Physician	57,61
		Porters	1,26
	Other ressources incl. Drugs		41,77
After examination	Staff	Physician	1,11
		Nurse	9,06
Overhead department level			201,94
Overhead and services from other departments			140,96
Total cost			605,39

Patients treated meeting the inclusion criteria	66

National average cost based on NCD

Table 10.5 Average cost per colonoscopy, average total and distribution on different cost centres. Standard deviation, percentiles (25/75) of total cost. Average length of stay.

	Cost centre					Total cost			Avg. LOS
	Surgery/ Anaesthesia (n=386).	Lab. (n=209)	Radiology (n=57)	Pathology (n=224)	Not specified	Mean (n=426)	Percentile 25-75	SD	
Total cost (direct+indirect)	511	5	4	20	164	705	486-870	260	1
% of total	72,6%	0,7%	0,6%	2,9%	23,2%	100%			
Indirect (30%)						211			
Direct						494			

Source: Bilde L, Ankjær-Jensen A, Kilsmark K. Costing of 10 case-vignettes in the Danish Health Sector, Part I, DSI Danish Institute for Health Services Research

It appears from table that the average cost of the vignette based on the sample is very much similar to the national average.