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

- Appendectomy
- Normal delivery
- Hip replacement
- Cataract (operation)
- Stroke
- AMI
- Cough
- Colonoscopy
- Tooth filling
- Physiotherapy (knee)

Part I: National Cost Database figures and local estimates from 2004

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

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Indhold

Preface

This report is the first of two (part I and part II) outlining the results of a data collection process aiming at costing ten case patient cases (vignettes) in the Danish health sector.

Data are from 2004 and the report has been elaborated in summer 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 Jannie Kilsmark, Anni Ankjær-Jensen and Lone Bilde.

Jannie Kilsmark has performed the computer (SAS) programming in relation to the collection of data from the National cost database at the National Board of Health. Furthermore, she has performed the interviews and drafted the descriptions relating to vignette 9 (tooth filling) and 10 (physiotherapy).

Anni Ankjær-Jensen has performed the interviews and the description of case-vignettes 1 (appendectomy), 4 (Cataract), 5 (stroke), 6 (AMI) and 8 (colonoscopy).

Lone Bilde has drafted the report structure, chapter 2 (results summary and discussion), chapter 3 (introduction and methods) and performed the interviews and the description relating to vignette 2 (normal delivery), 3 (hip replacement), and 7 (cough). Furthermore, she been responsible for the project management including report editing, drafting of project plans and identification of appropriate sites to be recruited as reference cases.

All authors have contributed to the discussion, the decision on data collection methods, and to the analysis and presentation of results.

We thank the (many) participating health care sites and their employees for spending their time and sharing their expertise with us and the National Board of Health for providing access to the National Cost Database and letting us use the data for the project.

Omissions and errors are our own.

1 Summary, Results and Discussion

1.1 Introduction

This report, "part I", outlines the methods and results from a costing analysis of 10 "case-vignettes" or pre-defined patient pathways in the Danish health sector.

This exercise aimed at eliciting the mean cost per patient meeting a set of inclusion criteria in 2004 defined for the project, and secondarily at describing the patient pathway ("vignette") as it took place in the Danish setting.

The costing of the hospital based vignettes was based on a count of data in 2004 from the National Cost Database for meeting the inclusion criteria, accompanied by a detailed description of the "typical" pathway at a Danish representative hospital. The results of this report have subsequently been supplemented by results from a survey based on 2005 estimates of resource use from a local sample of hospital departments. The "local cost data" are presented and compared with price and wage adjusted national figures from this report in part II.[1].

To cost the vignettes taking place in the primary sector or at the hospital physiotherapy department, we asked the providers to assess their resource use. This corresponds to the "bottom-up" method recommended in the guidelines developed for the project.

1.2 Cost assessment based on National Cost data

Results

Table 1.1 below provides a summary of the results from the analysis of data from the National Cost Database for vignettes 1-6 and 8.

The table 1.1. on the next page, indicates the number of hospitals and patient records included in the cost estimates, mean length of stay, the mean direct and total cost per vignette, the standard deviation, the first and third fractiles, and a comparison with the national (DRG) tariff.

In vignette 3 and 4, the costing consists of the two or more admissions which may have taken place within a relatively large time interval. The cost of AMI in vignette 6 is provided with and without surgery.

[1] Ankjaer-Jensen A, Johansen JT. Costing ten case-vignettes in the Danish Health Sector. Part II: results from a survey based on 2005 figures, DSI Danish Institute for Health Care Services, November 2006

Table 1.1 Results summary Denmark in € 2004, results and cost figures based on the national cost database, national tariff 2004

Vignette	N Hos-pitals	n patient records[a]	Mean LOS /NOV	Mean direct cost € [b]	Total cost € Mean	SD	25%- 75% Fractiles	National tariff €
1. Appendicitis	29	312	2	1,678	2,397	967	1,794-2,663	2,278
2. Normal delivery	18	8,905	2	1,220	1,744	1,062	868-2440	1,499 /2,298
3. Hip replacement	28	869	8	6,048	8,640	*	*	7.657
4. Cataract	9	723	2	666	951	*	*	907 /1,904
5. Stroke	38	867	11	3,802	5,432	6,669	1,842-6,007	5,751
6. AMI with surgery 6. AMI w/o surgery	2 34	160 528	6 3	9,934 2,205	14,192 3,150	3,998 2,982	12,311-14651 1,407-4,047	[c] 4.630/ 3,156
8. Colonoscopy	24	426	1	482	688	254	475-850	349/586

Source: based on data from the National Cost Database, 100 € = 7.43 DKK
* the figures consists of a pre-operative visit and the admission for surgery, see p. 32 and 36 for statistical figures.
a after trimming
b 30% indirect costs deducted from total cost figure
c 8,848-35,800 € depending on the type of surgery

Table 1.2 provides a breakdown into cost centers or categories based on the distribution of the total cost per patient record. The "not specified" category corresponds to the bedday cost.

Table 1.2 Break-down of total mean cost into cost centers (€)

Vignette	Cost center**								Total Cost €
	Sur-gery/ Anaes-thesia	Labora-tory	Radio-logy	Pathol-ogy	Clin. Fys.	Micro-biology	Physio-/ Occupa. Therapy	Not ex-plained*	
1. Appendicitis	1,124	87	17	87	0	0	0	1,083	2,397
2. Delivery	605	17.1	0	1	4	2	0	1,114	1,744
3. Hip replacement	3,937	104	183	5	589	6	425	3,389	8,640
4. Cataract	535	2	0	0	0	0	0	414	951
5. Stroke	0	147	186	12	67	0	607	4,413	5,432
6. AMI:									
with surgery	7,269	24	78	1	3	0	46	6,771	14,192
without surgery	0	157	64	4	24	9	54	2,836	3,150
8. Colonoscopy	499	5	4	20	0	0	0	160	688

Source: based on the NCD, 100 € = 743 DKK

* Cost allocated through bed days or visits
** For the definition of cost centres see next chapter

Discussion

Costs versus prices

Every year, Danish hospitals report patient-specific costs to a central database at the National Board of Health, the "National Cost Database" from which we collected our data. Costs are allocated to the individual patient through a step-down costing procedure carried out by each hospital. On the basis of the hospital costs, the National Board of Health then calculates the tariffs for the national case-mix system consisting of the DkDRG tariffs for inpatients and the DAGS tariffs for outpatients.

It is the intention that the national tariffs should reflect the costs of treating patients in the different DRG groups and tariffs should therefore be similar and comparable to the costs calculated for this analysis. As can be seen, as costs and prices in table 1.1 cohere in most cases, our results do indeed reflect what could be expected.

In three cases, there are however, slight differences between costs and prices, eg. for hip replacement, deliveries, and colonoscopy. These differences may relate to the following:

Firstly, costs are calculated in one year and the prices derived on the basis of the costs two years before. In our case, the 2004 DRG price are based on costs from 2002. Although costs are price and wage adjusted to the actual year of price setting, this price setting method cannot account for organisational and technological changes and changes in the (clinical) definitions of the DRG groups from one year to another. This is something which may have been the case between 2004 and previous years2. Secondly, our inclusion criteria with pre-defined age groups, and exclusion of the university hospitals may provide differences between cost and prices, as the vignette only covers a subset of the group of patients going into the case-mix group.

Breakdown of costs

The breakdown of costs at a hospital department in the database reflects the hospital's feeder system through which the costs of the final cost centers are attributed to each individual patient.

Our assumption is that the subset of hospitals in the dataset with a break-down of costs, due to the presence of the specific feeder systems, is representative of the hospitals in the database who do not have these feeder systems. This may however, not always be the case.

Also, hospitals define their cost centers independently according to the organisation of the individual hospital and therefore cost centers may not be comparable across hospitals, eg. which costs are allocated to the operation, anesthesia and recovery departments and which to the clinical fysiological department. Although the data are therefore subject to uncertainty and reservations have to be made to the method, we still believe that the figures indicate the broad lines for a categorisation of costs, and that it is a relatively valid method.

Main difficulties – more than one patient contact

One difficulty with regard to costing these vignettes was to adapt the data collection to the actual vignettes. Eg. the units of record in the national cost database correspond to an admis-

[2] This is a general weakness of cost assessment methods using retrospective data compared to a prospective data collection method, not only of the case-mix system. However, to achieve large sample sizes, using retrospecitive register data is probably the only realistic method.

sion in a inpatient department or a visit in an outpatient department So if the vignette implies eg. a separate outpatient visit (e.g. pre-examination) taking place some time before the in-patient admission or the out-patient visit for the surgery, two searches in the database for the same patient had to be carried out.

Comorbidity
Also, some of the vignettes required a patient which was "healthy" when admitted or "without comorbidity".

In our datasets app. one third of the patients are registered with bi-diagnoses. Some of the bi-diagnoses relate to the past, some to the current admission (complications) and some of them are not at all comorbid diagnoses. To be able to literally match this criteria, it would have been necessary to have an exact definition of how these bi-diagnoses are registered at the specific hospitals, to perform a translation by clinical experts into diagnosis codes for bi-diagnoses which would have a causal relationship with the main diagnosis and would imply complications, and - finally – to analyse the data (regression) to determine the relationship between comorbid bi-diagnoses and costs in the actual data set.

Although very interesting, it is a research project in itself and not within the scope of this project. In the real-life setting, many of the patients are of a high age and do indeed have other diagnoses, of which diabetes mellulitus is a frequent one. Also, in the real-life setting patients die during admission (AMI and stroke patients), resulting in a shorter length of stay than the patients who stay alive during the entire admission. It can be assumed that the higher the degree of co-morbidity and complications, the higher the risk of dying. The mortality aspect cannot be reflected in our results as the death registry is not updated for 2004 yet. It is however, another argument for using the data as they are, thus reflecting the real life setting for patients with the particular main diagnosis.

In all cases, the trimming of the data will exclude the worst cases of complications and/or comorbidity resulting in extremely high costs.

Trimming
We chose to use a trimming method similar but not completely identical to the one used by the National Board of Health. The latter sets the outliers at the values for 1% and 99% of the total costs, whereas we excluded observations below 1% and above 99% of the total accumulated costs.

Although there may be both advantages and disadvantages of this method depending on the distribution of data, the discussion of trimming method is very comprehensive and a research object itself . Our choice of trimming method relates to the wish to obtain a certain comparability with the National Board of Health figures.

Validity and reliability of results
There is a certain variability in the observed data which may result from the (expected) differences between patients in the length of stay and comorbidity, and from the different ways of organising the services at each department resulting from (among other things) a large freedom in the provision of hospital services in Denmark.

Furthermore, there may be some uncertainty attached to the costs in the database: there is great variation as to how the hospitals define their cost centers and cost their intermediate

outputs (i.e. allocate their intermediate cost centers to final cost centers) and therefore, the cost calculated in the national database may not always reflect the actual cost. Furthermore, some of the vignettes imply admissions to different hospitals and departments, and therefore the mean cost per vignette might be subject to different allocation methods

Finally, uncertainty of the data may relate to differences in coding practices (eg. which main diagnoses and which and how many bidiagnosis should be recorded).

However, our analysis is based on a total count of all patients in Denmark outside the university hospitals meeting the vignette inclusion criteria, resulting in as large a sample size as was possible. The activity data eg. length of stay, are assumed to be very valid, and although some uncertainty is attached to the cost data on the grounds listed above, the method chosen enables us to provide an overall and representative description of the vignette patient population in Denmark. This would not have been possible to the same extent had we used "softer" data, such as provider assessment.

1.3 Cost assessment for cough at the GP practice (7), municipal tooth filling (9) and out-patient physiotherapy (10)

Results

In the table below we provide a summary of results for the vignette 7 taking place at a general practitioners office, the tooth filling by a municipal dentist (9) and post-operative knee physiotherapy (10) taking place in hospital setting with individual results of the partipating providers and the price where it is available.

Table 1.3 Results summary Denmark, 2004 direct and total costs for vig. 7, 9-10, price (€)

Vig-nette	N *	Site A Costs Dir	Total	Site B Costs Dir.	Total	Site C Costs Dir.	Total	Site D Costs Dir.	Total	Mean Costs Dir	Total	price (€) **
7. Cough	*6 (4)*	*€ 23*	*€ 30*	*€ 16*	*€ 21*	*€19*	*€ 33*	*€12*	*€ 21*	*€18*	*€ 26*	*€23-44*
9. Tooth Filling	*5 (4)*	*€ 39*	*€53*	*€30*	*€37*	*€ 40*	*€ 48*	*€ 41*	*€ 49*	*€38*	*€47*	*-*
10. Physio-therapy	*3*	*€322*	*€524*	*€46*	*€65*	*€ 96*	*€ 119*	*-*	*-*	*€155*	*€236*	*-*

1 €= 7.43 DKK (2004)

* No. of providers: we recruited 6 GPs but 2 cancelled their appointment, and 5 dentists but one never delivered the data.

** depends on the extent to which fees for service and capitation are included

Discussion

The method used to cost these vignettes was to the greatest extent possible the one suggested in the guidelines for WP9. The providers were asked to provide a description of the vignettes and estimates regarding resource use and individual cost information to the extent possible.

However, in most cases, due to lack of data we had to use a pragmatic approach, eg. use averaged data from the central organisations, use provider estimates regarding the overhead proportions and face-to-face time with patients. Thus, the costing is to a great extent based on very broad assumptions and on provider estimates which may in some cases be highly over- or underestimated thus not reflecting the real situation. This is a weakness of the method chosen and we make reservations as to the cost figures provided.

Furthermore, for vignette 7, the GP time was costed using the difference between income and cost, the profit. He is the owner of the practice and his salary does not occur from his annual account. This figure is assumed to reflect the GPs "alternative cost" eg. what he would have been paid from a similar job at another practice. As income is derived from fees or prices, there is a relationship in this case between the "cost" calculated and the price of the service and this is a weakness of the costing.

As to vignette 9, "tooth filling", the dentists claimed that the demand for tooth fillings in 12 year olds is very low due to the preventive dental activities for pre-school and school children in Denmark. Therefore, it may be claimed that the vignette does not reflect the actual practice in the municipal dentistry whose main job is preventive or tooth corrective. There is no price attached to this vignette, as the dentists are paid through the annual budget of the municipality.

As to vignette 10, post-operative physiotherapy, this is an example of "rehabilitation following a hospital stay" which is an explicit benefit for the patient according to the law but which should be provided and further specified by the counties. This freedom of provision results in as many ways of providing the services as there are counties or even hospitals in Denmark. In some cases, it may be provided by the hospital, in some by a privately practising physiotherapist and in some cases with a minimum of care.

We decided to describe the situation when it takes place as an out-patient hospital service and chose three providers, one with high intensity of care, one with the medium and one with a low intensity of care. Recruiting more departments would not have brought us any further to national representativity than these three. To obtain this we should included all potential providers in the country. As can be noted the cost of services is very different in the three situations.

2 Introduction

2.1 Background and objective of report

This report is 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[3]. Results from this report have been supplemented by local cost estimates based on a survey, in "part II".

The objective of the report is to describe the patient pathway and estimate the costs of the following ten "case-vignettes" in the Danish setting for 2004. Seven of the vignettes (marked with +) are related to the European Community Health Indicators (ECHI) set, developed in another EU research project.

2.2 Methods and data sources

2.2.1 Introduction

As a first step, a "generic" description of each case-vignette was developed with input from all partners in the Health Basket project and described in the "guidelines for WP9" (R.Busse et al 2005). The challenge for the Danish team was then to adapt these guidelines to the Danish setting i.e. find methods for data collection which would meet the guideline requirements regarding sample size and costing methodology, and to "translate" the "generic" description into a description of how the vignettes took place in Denmark in 2004.

For the vignettes (1-6 and 8) the main source of data was the National Cost Database.
From this database we extracted data on the resource use of every single patient meeting the inclusion criteria in 2004 at the allowed hospitals (eg. exclusive of university hospitals).

The patients' personal identification codes made it possible to link information regarding different admissions if the vignettes implied more than one admission. (eg. pre-operative outpatient visit + in-patient admission). In the outdata, personal identification codes were removed and the dataset was trimmed to adjust for outliers. (see below).

The national cost database is managed by the National Board of Health and includes detailed cost data from most Danish hospitals. The hospitals calculate their patient specific costs using a step-down cost allocation method where all costs are allocated to intermediate and final cost centers, and subsequently from intermediate to final cost centers using relevant allocation keys. Through feeder systems, the costs of final cost centers are allocated to the individual patient. The hospitals report these data to the National Board of Health which then provides a trimming, and calculates the DRG tariffs reflecting the average patient costs.

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

The Danish case-mix system consists of the DkDRG system for inpatients and the DAGS for patient treated as out-patients. The case-mix system and the costing procedure have previously been described in other publications relating to the Health Basket project[4]

Furthermore, for each of the vignettes 1-6 and 8, we recruited a representative field site, i.e. a department with a reasonable share of the patients meeting the inclusion criteria. We excluded the university hospitals as potential sites.

Through interviews and subsequent communication with the Heads of Unit, and the Head Nurse(s), supplemented by written material (guidelines, annual reports, abc-analyses), we made a description of the organisation and the patient pathway in relation to each vignette, as it took place in 2004 at the specific field site and with a view to the general organisation of the particular vignette in Denmark.

As the activity and cost data come from the national registry and are country representative, the interviews with reference sites have been focused on describing the patient pathway and the activities during treatment thus providing a more qualitative documentation of the activities behind the "hard" registry data. The use of resources for the reference sites is therefore only described on an occasional basis.

For the vignettes 7, 9 and 10 we used the "bottom-up" method recommended in the guidelines for WP9: recruited a number of representative providers and asked them to describe the patient pathway and provide resource use estimates for the last ten patients of the specific kind. As to vignette 7, "cough", the general practioners proved to be particularly reluctant to participate, due to - as they pointed out - lack of time and renumeration, and closure for holidays. We contacted more than 60 GPs both by letter and telephone and ended up with six, of whom two cancelled the appointment, thus resulting in a final four.

In order to keep their effort low, these GPs were then only required to answer a minimum of questions, and we collected the main cost data from other sources, eg. the GP association ("PLO"), and applied a number of general assumptions about their annual working time, their clinic staff salary cost, material cost etc. The GPs have been referred to in the description by the name of the city in which their practice is located.

As to vignette 9, "tooth filling", we did recruit five municipal dentists, but ended up with only four case-descriptions as we never received the answers from the fifth. One dentist preferred to be anonymous, and therefore all descriptions of vignette 9 are anonymous.

As to vignette 10, "physiotherapy", due to great differences in the provision of the servicee, we chose to look at in-hospital rehabilitation after operation only and recruited three hospital physiotherapy departments each representing a different level of intensity of care: one with a very intensive level of rehabiliation, one with a "medium" level (adapted to each patient) and

[4] Bilde L, Ankjær-Jensen A. Approaches for price setting and cost assessment in the Danish Health sector. DSI København 2005, published at www.dsi.dk and www.ehma.org - and
Ankjær-Jensen A, Rosling P. Bilde L. Cost weights in the Danish case-mix system.Variable prospective financing in the Danish hospital sector and the development of a Danish case-mix system. In press. Health Management Science 2006

one with a minimum level. Again, the results refer to site A, B and C and not to the specific hospital.

2.2.2 Methods for calculating costs based on data from the National Cost Database

Definition of in- and exclusion criteria and data extraction from the NCD

Three clinicians helped us translate the "generic" vignette descriptions into the appropriate diagnosis and procedure codes (ICD 10, Nordic Classification of Surgical Procedures etc.) used in the Danish setting. These codes were applied to extract the data from the National Cost Database at the National Board of Health. For some of the vignettes (eg. 3 – hip replacement) we had to extract two datasets, first the operation, and then an outpatient visit prior to the date of admission for surgery for the same patients with the same inclusion criteria[5] to match the "generic" description of the vignettes.

Some of the vignettes required a "healthy" patient or a patient "without comorbidity". For vignette 2, "normal delivery" we initially excluded a number of patient records where the bidiagnoses indicated a high risk or a complicated pregnancy, eg. the woman is a drug abuser, or has been treated for gestational diabetes or the woman she had a complicated vaginal delivery (eg. maternal haemoarage, delivery with vacuum suction etc).

For the other vignettes with the "without comorbidity" attribute, we kept the datasets with bidiagnoses as they were on the grounds discussed in chapter 1.

Although trimming would not at all adjust completely for co-morbidity resulting in higher costs per patient, it would still exclude some of the worst cases.

We trimmed the data by excluding observations corresponding to values observed at 1 and 99% of the accumulated total cost. The numbers excluded for each vignette have been provided.

The following variables were used in the analysis of data from the NCD: Patient sex and age, diagnosis (primary, bi- , supplementary), procedure codes etc., hospital and department number, admission and discharge date, length of stay, total costs per admission, cost per cost category or cost center (operation, anaesthesia, clinical micro-biological, radiology, ergo-, physiotherapy, bedday costs etc).

Calculation of costs and break-down of average costs

The data variables resulting from the data extraction were the following per patient record: primary and bi-diagnoses, procedure codes, hospital and hospital department number, admission and discharge data, LOS, total cost, and cost per cost center (see below).

After trimming the data as described above, we calculated the mean length of stay and the mean total cost per patient, its standard deviation, and the 25 and 75% percentile to describe the variation.

The type of cost information at patient level provided by the individual hospital depends on the organisation and the existence of feeder systems. Some hospitals have a large number of

[5] Using the personal identification code as a link, however, the personal code does not appear from the outdata.

feeder systems, and some hospitals only provide costs at the patient level as a cost per bedday. On the basis of the final cost centres defined at the hospitals represented in the dataset, it is possible to break down the total cost into the following cost categories:
Operation, anesthesia, intensive care and recovery ("Op-an")
Laboratory services (clinical biochemical or immunological)
Radiology
Pathology
Clinical physiological (physiolocial, physiological-nuclear medicine or neuro-physiological)
Micro-biology (Clinical microbiological)
Physiotherapy and occupational therapy ("Phys-occ.")
A not specified category (costs allocated to beddays, i.e. nursing time, physician time (not including surgery time) and medication)

As not all hospitals provide this breakdown into cost centers, the calculation is based on the number of hospitals which do have this breakdown (the specific feeder systems), assuming that this subset of hospitals be representative of the rest. The number used to calculate each mean have been provided at the results of each vignette.

Cost figures are presented in Danish Kroner and € using the June 2004 exchange rate of 100 € = 743 DKK[6]. Finally, we provided a comparison with the DRG tariff and a discussion of the differences in the figures.

Indirect costs

Indirect costs at department as well as at hospital level are already included in the National Cost database figures.

To enable the comparison of the Danish costs with those of the other countries, we therefore calculated an estimated indirect cost corresponding to the average proportion of indirect costs of the total annual hospital costs from three of the participating hospitals. This calculation resulted in indirect costs of 29, 30, 31 % respectively, of the total cost. On average, this is 30% which is the figure assumed to be applicable to all total costs calculated. The cost components included in the indirect costs proportion calculated were eg. administration, cleaning, laundry, feeding of patients, maintenance of buildings and green areas.

No reduction of indirect departments costs have been made in the presentation of results.

Capital costs and depreciations are not included in the Danish DRG prices and therefore not included in the estimates from the cost database.

2.2.3 Methods for calculating costs for primary care vignettes and out-patient physiotherapy at a hospital.

For the vignette 7, 9 or 10, we used the "bottom-up" method recommended in the guidelines for WP9 and asked the providers to estimate their resource use. In some cases, the resource use was valued using cost and accounting information from the central organisations (eg. the Association of Municipalities, the GP organization), as it was not possible to collect this information directly from the providers.

[6] www.valutakurser.dk

We marked up the direct estimated cost by a an overhead which was either quoted by the providers themselves (i.e. based on their own accounts) or used a calculated figure based on economic reports from the central provider organisations.

For these vignettes, we first present the cost model assumptions and then the estimates from each of the providers with a calculation of the means and the price of the service.
Finally, we provide a comparison with the fees associated with the services, to the extent possible.

3 Appendectomy (vignette 1)

3.1 Introduction

The following chapter describes the results from the data collection for vignette 1: appendectomy.

3.2 Patient inclusion criteria

According to the guidelines the vignette includes the following cases:
"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."

3.3 Description of the patient pathway

The patient pathway described reflects the practice at the Unit of Gastroenterology at the Hvidovre Hospital. According to the hospital website[7] the unit is one of the largest gastroenterology units in Denmark. The unit consists of a surgical and a medical section and has 91 beds.

The unit employs 55 physicians, 125 nurses and 42 nurse assistants. In 2004, the number of appendectomies carried out at the department was around 300, of which 17 met the inclusion criteria for the vignette.

The description is based on an interview with the head of department supplemented by written comments received from the unit head nurse, and the chief physician of the hospital anaesthesia department. Finally, a paper written by a physician and a nurse from the Unit of Gastroenterology at Hvidovre Hospital[8] has provided information for the description.

According to the local guidelines, patients admitted with suspected appendicitis are first placed at the Emergency Reception Department, belonging to the Gastroenterology Unit. The patients are observed, and if appendicitis is verified, they are transferred to the Surgical Department. After the surgery the patients are transferred to a ward in the Unit of Gastroenterology.

In order to minimize the length of stay, the Hvidovre Hospital generally practises "accelerated" patient episodes, implying early mobilisation and early pain management. This practice also includes patients with appendicitis. On average, the length of stay for patients without complications is one day, and for patients with complication (i.e. infection) the length of stay is 3 days. Ten days after surgery, the sutures are removed by the patient's GP.

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

[7] www. Hvidovrehospital.dk
[8] Ugeskrift for Læger 8. marts 2004

Table 3.1 Pathway for patients admitted with appendecitis at the Unit of Gastroenterology at the Hvidovre Hospital

Phase	Elements	Resources
Pre-operative	*Nursing activity:* Pulse, Blood pressure, Temperature. Physician activity: Examination of the patient, patient history. *Diagnostic procedures:* Urine test (glucose) Only blood tests if indicated* If indicated: CRP, Blood Count, Electrolyte, Ca, Na, Creatinine. *Anaesthetist:* Preoperative assessment Transport of patient to surgery department	
Surgery	*Medication:* Innohep *Anaesthesia:* 1 nurse 1 anaesthetist Anaesthetics (1,000 DKK per hour) *Surgery* (Knife time 60 min) : 2 Nurses 2 Surgeons Consumables Pathological test Microbiological test for infection (only 10% of the cases)	 3,500 i.e 90 min. 30 min. 135 € 180 min. 120 min. 117 €.
Wake-up room	*Nursing activity:* Transport to wake up room Stay in wake-up room (75 min)	 15 min 25 min**
Post operative	Transport to bed department 1 nurse 1 porter <u>No complications</u> *Medication:* Paracetamol (1g x 4) Ibubofen (600 mg. x 3) Metrondazol (500 mg x 1) Gentamycin (160 mg x 1) Length of stay: <u>Complications(i.e. infection):</u> *Medication:* Paracetamol (1g x 4) Ibubofen (600 mg. x 3) Metrondazol (1,5 mg x 3) Gentamycin (240 mg x 3) Anhypen (3g. x 3) Length of stay:	 15 min 15 min 24 hours 3 days

* it is a department policy to minimize the use of laboratory tests

**One nurse takes care of 3 patients

3.4 Cost estimate based on the National Cost Database

Patient records (admissions) are extracted from the National Cost Database using the following inclusion criteria:

Table 3.2. Inclusion criteria for vignette 1: "appendectomy"

Age and sex:	Male 14 – 25 years	
Diagnosis (ICD 10):	K359 Surgery (NCSP):	JEA00

Results

In total, 320 patient records in the cost database met the inclusion criteria, of those 8 were removed as a result of the trimming process. The remaining 312 patients represented 29 different hospitals.

Table 3.3 Mean cost per admission for appendectomy €, mean total cost and cost center 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)	1,124	87	17	87	1,083	2,397	1,794-2,663	967	2
% of total	46,9 %	3,6 %	0,7 %	3,6 %	45,2 %	100 %			
Indirect costs (30%)						719			
Direct costs						1,678			

Source: National Cost Database
LOS= length of stay
Note: number in brackets shows (?) the number of observations on which the estimated cost is based

According to table 3.3, the average total cost for patients meeting the inclusion criteria for the vignette was 2,397 €. The total direct cost is estimated to 1,678 €. The costs of surgery and anaesthesia were the largest cost component, constituting 47 % the cost.

Comparison of cost with the national tariff

In the Danish DRG-system (DkDRG) patients included in the vignette are grouped in DRG 614. The national tariff for DRG 614 in 2004 was 2,278 €. Thus, the estimated cost (2,397 €) is very close to the national tariff.

4 Normal Delivery (vignette 2)

4.1 Introduction

The right for a woman in labour to deliver at a hospital is an explicit and specific benefit in the Danish health basket[9] and about 99% of all deliveries in Denmark take place at a hospital. Only in about 1% of the cases of uncomplicated pregnancies, the women use their right to deliver at home assisted by a midwife.

Maternity care in Denmark is a midwife-lead service both regarding antenatal and delivery care. In the case of an uncomplicated pregnancy and delivery, the midwife is always the lead health professional. The general trend in Denmark over the last 10 years[10] with relevance to the organisation and costs of the services has been to reduce the intensity of care and monitoring for low-risk, uncomplicated pregnancies and deliveries, and increase the intensity of care and monitoring for high-risk pregnancies and deliveries. For low risk pregnancies, the amount and level of guidance for the family on how to deal with the pregnancy and the baby has been intensified to promote family self-help ability.

4.2 Patient inclusion criteria

The wording from the guidelines for WP9 said:
"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)."

4.3 Description of case vignette

The site chosen for the description of the vignette is the Gynaecological-Obstetric department at Hillerød Sygehus in the County of Frederiksborg. In 2004, the department assisted 1,361 vaginal deliveries for 25-34 year old women, with normal baby presentation and one foetus. In the county, a total of app. 3,500 deliveries were carried out, and in the country the equivalent figure was 59,000 deliveries (including caesarens and multiple births)[11] .

In the County of Frederiksborg there has been a centralisation of the obstetric activity with the closure of the maternity wards in Elsinore and the transfer of the activity to Hillerød. Thus, in 2003, the 20 beds in Elsinore and 30 at Hillerød were merged into 36 beds at Hillerød, consisting of 2 maternity wards with 16 beds each and a midwife-led department[12] with 4 beds.
This is the context of the vignette in 2004 where the registry cost data are from.

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[9] Bilde L. Ankjær-Jensen A. Danneskiold-Samsoe B. The "health benefit basket" in Denmark – a description of entitlements, actors and decision-making processes in the curative health sector. Eur Jour Health Econ. 2005, suppl 6:11-17Bilde L. Ankjær-Jensen A. Danneskiold-Samsoe B. The "health benefit basket" in Denmark – a description of entitlements, actors and decision-making processes in Danish health sector. DSI København 2005. published at www.dsi.dk and www.ehma.org.

[10] As first indicated in the guidelines from the National Board of Health in 1998

[11] http://www.sst.dk/publ/tidsskrifter/nyetal/pdf/2006/14_06.pdf - Fødsler og fødende kvinders vægtforhold 2003-1.kvartal 2006 Sundhedsstyrelsen 2006

[12] Where the midwife is the lead health provider and there are no physicians. The beds are only aimed at parous women with uncomplicated pregnancies /deliveries.

The description of the case vignette is based on an interview with the head of unit and on a telephone conversation with a nurse on the registration of patients.
The department currently employs 33 physicians, 33 nurses at the gynaecological department and 31 nurses at the obstetrical department (constituting the gyn-obs department)[13] .

Table 4.1 Vignette 2: Normal Delivery, Denmark

Phase	Elements	Units	No. of units used/ patient
Pre-delivery (admission and planning)	1) Diagnostic Procedures		
	Cardiotocography	No.	1
	Care before delivery		
	2) Midwife input	Patient days	0.02
	3) Morphine injection (paedidine) (19% of patients) 4) Epidural (see anaesthesist below) (19% of patients)	DD DD	0.19 0.19
Delivery (including partum and post partum activity in delivery room)	Delivery Team (altogether or separately)	Min.	
	6) Midwife	Min.	480
	7) Anaesthetist	Min.	6
	8) Nursing aid	Min	120
	9) Procedures performed by midwife Providing laughing gas (100% of patients) Insertion of sterile water papules (4%) acupuncture (10%) bath tub (10%) sewage (40%) Examine baby – Apgar score (100%) Injection of vitamin K in baby (100%) Delivery room running costs (e.g. sterilisation)***		
Post-delivery (normal ward for mother and child)	10) Obstetrician	Patient days	0.02
	11) Nursing	Patient days	n.a.
	12) Other (e.g. Physiotherapy)	Patient days	0.045
	13) Diagnostic procedures of mother and child (e.g. imaging, laboratory: blood count, bilirubine)	No.	
	Therapeutic procedures (e.g. punctures, drainages, special wound dressing)	No.	n.a
Overhead (including administration, catering, etc.)	Total, or: - On ward level - On departmental level - On hospital level	Patient days	See below

Source: interview with Head of Unit, Dr. Med. Kim Toftager Larsen, Hillerød Sygehus, and Nurse Lotte Thym, May-June 2004, n.a.: not available

Table comments

1) Is the only diagnostic procedure performed after admission. Other procedures are part of the standard ante-natal benefit package offered pregnant women, the latest examination being week 36
2) Est. 30 minutes
3) The figure provided was “less than 20%”= 19% of the patients = 19% of a daily dosis (DD)
4) “Less than 20%” = 19% of the patients = 19% of a DD + 19% of anaesthesist time
5) Estimated average LOS in the pre-delivery room is 3 hours. The patient is supervised by a midwife who performs other tasks at the same time.
6) A midwife is the only health professional present during normal deliveries, when the baby is born a nursing aid assists. She assists 5-6 hours (intrapartum) and 2 hours (post partum) in the delivery room
7) Anaesthesists are only present in case of an epidural (est. 19% of patients) app 30 min. (19% of 30 min.)
8) A nursing aid assists app. 2 hours post partum
9) Some of the procedures listed involves a cost of material eg. Vitamin K injection. It has not been possible to elicit this cost. The resource use relating to other procedures are included in the time component of the mid-wife. Other procedures such as vacuum extraction and episotomia are considered as complications and therefore not included in the vignette.
10) Examines the baby (app. 30 min). Today this procedure is carried out by a GP after discharge

[13] Information from the hospital

11) Primary provider after delivery. Provides advice on breastfeeding, diet, caring for the baby etc. The nurse capacity is 0.9 person year per bed (total 32.4 nurse person years in department)
12) Physiotherapy: 1 hour family guidance and a gym class group based 30 minutes per woman (groups of 6 women = 5 minutes per woman = total 65 min physiotherapy time per woman)
13) Not carried out on a routine basis.

In the table above, the "generic" vignette from the WP9 guidelines has been adapted to the Danish setting; that is, as it takes place at the Obstetric department at Hillerød hospital. However, it is reasonable to assume that the description is representative of how deliveries are carried out in Denmark. Cost components have been provided according to the template to the extent it was possible and time estimates etc. have been transformed into proportion of bed days where requested.

4.4 Data from the National Cost Database

The vignette "generic" description was translated into the following inclusion criteria used in the data extraction from the National cost database:

Table 4.2 Vignette 2: Normal delivery, inclusion criteria, Denmark

Age and sex	25-34 years old woman
ICD 10 diagnosis codes	
Primary diagnosis:	O80.0 - Partus spontaneus unifoetatio, praesentatio capitis O80.8 – Partus spontaneous unifoetatio O80.9 – Partus spontaneous unifoetatio without specification
Bi-diagnosis:	Z370 – Baby alive at birth from group O only O70 and O80 codes from group Z were allowed
Supplementary diagnosis:	U 37 - 37 weeks of gestation U 38 – 38 weeks of gestation U 39 – 39 weeks of gestation U 40 – 40 weeks of gestation U 41 – 41 weeks of gestation From group O only O70 a nd O80 Group U and Z were allowed

It was not possible the distinguish in the register data between different baby outcomes, other than "alive at birth", eg. levels in Apgar score. Therefore, although cases where the baby has been temporarily transferred to the paediatric department for examination or has received phototherapy in the delivery room may indeed extend the length of stay for the mother (confirmed by the unit personnel) it was been possible to extract these cases from the patient sample. Only in the more severe cases where the baby is admitted for in-patient treatment to a paediatric of neonatal department, will the mother be discharged from the delivery room and the baby outcome will not influence on the length of stay and thus the cost charged to the mother's admission.

From the sample of 9,283 deliveries at 18 hospitals (24 departments), we excluded 379 observations by trimming. Thus the results below are based on a total of 8905 admissions. The average length of stay (n=8905) in 2004 was 2 days.

Table 4.3 Normal Delivery. Mean cost per admission in €, mean total and break-down by cost center. SD and 25 /75% fractiles

	Cost Center (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 speci-fied	Mean (n=8905)	Percentile 25%-75%	SD
Total cost**	605	0.3	0.7	3.5	2.8	17.1	1,114	1,744	868 -2,440	1,062
% of total	(34.7 %)	(0 %)	(0%)	(0.2 %)	(0.2%)	(1%)	(63.9)	(100 %)		
Indirect cost (30%)								523		
Direct Cost								1221		

* anaesthesia and operation
** direct + indirect costs

Comparison of cost with the national tariff:

Table 4.5. National tariff (€) for "normal delivery"

Case-mix group	Title	Tariff (€)
DRG 1407	Uncomplicated vaginal delivery, normal pregnancy and puererum	1,499
DRG 1404	Uncomplicated vaginal delivery, complicated pregnancy and puereum	2,298

Source: tariff catalogue 2004. National Board of Health.

4.5 Discussion

The mean cost calculated from our data lies between the two prices above. However, cost 2004 and tariffs 2004 are not directly comparable as the latter are based on cost data from a previous year. DRG groups and definitions may also change from year to year. Also, our age definition and distribution between prima- and multiparous women, might not be comparable to the total delivery population. Finally, we have excluded eg. the university hospitals. These factors may explain the discrepancies between cost and prices.

5 Hip Replacement (vignette 3)

5.1 Introduction

Admission for a hip replacement in Denmark is fully covered by public funds. The procedure is subject to free choice for the patient who can choose to be operated at any hospital in the country if the waiting time guarantee of two months is not observed by the county. This free choice includes a number of private hospitals which have agreements with the counties[14]. Also, pre-examinations, operations and post-operative examinations and rehabilitation may take place at different hospitals or – at least as far as rehabilitation is concerned - on an outpatient basis by a privately practising physiotherapist.

The general tendency in Denmark in 2006 with regard to elective hip surgery is the implementation of "joint care" concepts. These concepts aim at minimising the patient's waiting time during admission, and at preventing the patient's stress-response through patient education prior to operation, and ultimately reduce the length of stay for the patient. There is furthermore a general tendency in most Danish counties to centralise the activity at specialised departments or hospitals to improve the quality and efficiency of the services.

5.2 Patient inclusion criteria

The wording from the guidelines for WP9 said:
"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)".

5.3 Description of case vignette

The site chosen for the description of the vignette is the Hip Clinic at the Hørsholm Sygehus. This is a hospital specialised in elective surgery with no acute patients. Today, the hospital assumes all of the hip replacement activity in the county, and has fully implemented the concept of "joint care" (accelerated patient episodes) with consequent shortened lengths of stay and lower costs for the hospital[15]

In 2004, which is the year of study, the Hip Clinic shared the county's hip replacement activity with Hillerød Sygehus so that Hørsholm dealt with the less complicated patients and Hillerød with the more complicated patients, including the re-operations. In 2004, the clinic's two operating theatres and 12 surgeons performed 58 % (312) of the total number of hip replacement operations in the county[16] of which some 63 patients were identified from our database search with an average length of stay of 7.8 days.

[14] Bilde L. Ankjær-Jensen A. Danneskiold-Samsoe B. The "health benefit basket" in Denmark – a description of entitlements, actors and decision-making processes in the curative health sector. Eur Jour Health Econ. 2005, suppl 6:11-17
[15] according to the annual figures from the hospital ABC analyses, 2004 and 2005.
[16] Source.: "Årsberetning fra hofteteamet"

The description of the case vignette is based on meetings and interviews with the Head of Unit, the Department Head Nurse and the Hospital Director. Furthermore, the department annual report and guidelines have been used in the description of the vignette.

In 2004, the patient was referred from the GP to the nearest hospital in the county which would investigate the indication for operation through a pre-examination containing various tests. If the indication was found to be there, she would be referred to a second pre-examination preferably 6-8 weeks before her operation. This pre-examination included a number of pre-operative tests, x-rays, blood test "package" and the eliciting of the patient history including her reasons for referral, pain scope and localisation, relevant x-rays, medication and social information etc. The tests etc. would be evaluated by a young physician.

The patient would then be admitted to Hørsholm Hospital the day before the operation where she would receive information about the admission by a nurse and have a BAS-test (blood test). In the description of the vignette, we included the second out-patient pre-examination, taking place at another hospital 6-8 weeks before the operation and the in-patient admission.

In the table below the "generic" vignette from the WP9 guidelines has been adapted to the Frederiksborg county setting; that is, as it took place at the pre-examination hospital and the Hip Clinic at Hørsholm Sygehus in 2004. Cost components and their quantification have have been provided according to the template to the extent it was possible

Table 5.1 Vignette 3: Hip replacement, Hørsholm Sygehus 2004 (Denmark)

Phase	Elements	Units	No. of units used/ patient
Pre-operative (pre-examination = outpatient visit)	Diagnostic Procedures		
	Imaging (X-Ray with fixed magnification)	No.	1
	Imaging (normal x-ray)	No.	0-1
	Laboratory (blood test "package") (1)	No.	1
	Other (ECG, etc.)	No.	1
	Care during pre-examination		
	Anesthesiologist input (2)	Min.	n.a.
	Surgeon/physician input (3)	Min.	20
Preoperative (During in-patient stay)	Diagnositic procedures		
	BAS test	No.	1
	Care before OP		
	Nursing input (4)	Patient days	n.a.
	Drugs, infusions, injections Paracetamol (1/4 DD) Tresolam (0.125 mg)	 DD DD	 0.25 n.a
	Devices: prothesis: uncemented femur (5) Utencils (ECG electrodes etc)	 No.	 1 n.a
Operation	OP-Team (altogether or separately)	Min.	n.a.
	Surgeon (6)	Min.	202
	Anaesthetist (7)	Min.	168
	OP-nurses etc.	Min.	n.a
	Drugs, injections etc. (8) Spinal block Drugs to reduce bleeding (eg.Cyclocapron) Anticoagulative (eg. Fragmin) Antibiotics	 No DD DD DD	 1 1 1 1
	OP-Theatre running costs (e.g. sterilisation)***	Min.	n.a.
Wake-up room****	Intensive Care Unit (9)		
Post-operative (during in-patient stay)	Nursing (10)	min	180-240
	Drugs: Anti-coagulation, analgesia, antibiotics (11)	DD**	
	Therapeutic Procedures (e.g. punctures, drainages, special wound dressing)	No.	n.a.
	Normal Ward		
	Surgeon/Physician (12)	Min.	n.a
	Nursing (13)	Min.	1,200
	Physiotherapy (14)	Min	180
	Drugs (15) Strong analgesia (morphine) Paracetamol (1/4 dd /day)	DD**	 6 2.1
	Diagnostic Procedures X-rays (16)	 No.	 3
	Therapeutic Procedures (e.g. punctures, drainages, special wound dressing)	No.	n.a.
	Drugs given to patient until contact with GP (17)	DD	2
Discharge planning	Medical aids given to patient (18)	Units	3
	Planned Re-admissions (19)	No.	2

Source: interviews with Head of Unit, Dr. Med. Søren Solgaard, Head Nurse Birthe Thomsen and Director Torben Knudsen, May and June 2006. Årsberetning Hofteteamet Fr. Borg Amt 2004, "Optimale patientforløb for patienter henvist mhbl på indsættelse af kunstig hofte og knæ", Ortopædkirurgisk klinik Hørsholm, dec 2005.
.n.a. (not available)

Comments to the table.

1) Blood tests and ECG according to the LABKA standard, eg. blood %, kidney function
2) Anesthesiologist evaluates the patient record, sometimes only by correspondence
3) A young physician estimates the indication based on patient history and pre-operative tests, and informs about the operation (20 min)

4) Nursing input (the nurse welcomes the patient and provides information about the process of admission)
5) 67% of patients : primary non-cemented femur (Department Annual Report)
6) According to the Hospital ABC analysis 2004. All staff time is allocated to activities and therefore figures may not be directly comparable to eg. knifetime and the figures quoted during the interview.
7) Anesthesist injects the spinal block + monitors the patient's condition. Figure is also from the ABC analyses, see (6)
8) Spinal block, drugs to stop bleeding (cyclocapron), anti-coagulation (fragmin), dosis varies with length of operation
9) Patient lies in ICU app 10 hours
10) Nursing: 3-4 hours for infusion control
11) Fragmin 5000 units per day x 1 day + 1 dd antibiotics, Analgesia: morphine 20-25 mg (Oxinorm) + paracetamol (1/4 dd)
12) No clinician is on the ward, but 16-h/24h surveillance by young physician of all surgical patients at the hospital. He/she can call a two specialists (home) each has a salary of 1600 DKK per 24h.
13) Infusion control, change of bandage, wound dressings, pain observation etc. Estimated total nursing time per patient 20 h
14) Estimated physiotherapy input 30 min/day (average LOS in 2004 8 days, estimated in normal ward 6 days = 6 x 30 min = 180 min)
15) Fragmin (5000 units) per day x 6 days (= 6 dd) , Analgesia: morphine (Oxinorm 20-25 mg per day – outphased during stay) + paracetamol (max 6 dd)
16) 3 x-rays (front, side, whole pelvis) are compared with the pre-operative x-rays
17) Oxinorm for 2 days (2 dd)
18) The medical aids come from the municipality (and are not financed by the hospital)
19) Planned re-admissions: 2 out-patient visit (x-ray) 3 and 12 months after operation including consultation with physician 10 min.

5.4 Data from the National Cost Database

The "generic" vignette description was translated into the following inclusion criteria used in the search in the National cost database.

Table 5.2 Inclusion criteria: vignette 3 hip replacement, Denmark

Age and sex	65-75 years old woman
ICD 10 codes	
Primary diagnosis	M16.1 Other type of arthrosis coxae primaria M16.3 Other type of arthrosis coxae dysplastica M16.5 Other type of arthrosis coxae posttraumatica M16.7 Other type of arthrosis coxae secundaria M16.9 Hip arthrosis without specific
Bi-diagnoses	None
Procedure codes (operation)	
NFB20	Implantation of total prothesis in hip joint non-cemented
NFB 30	Implantation of total prothesis in hip joint, hybrid
NFB 40	Implantation of total prothesis in hip joint, cemented

The search in the NCD was performed in two steps as the translation of the "generic" description for the vignette implies two admissions in Denmark: an out-patient admission for the pre-examination and the in-patient admission for operation. The post-operative admissions are not included in the vignette description or the cost estimate.
The cost estimates for the vignette are based on data for a sample of 869 patients having surgery at 36 hospital departments (28 hospitals[17]) meeting the inclusion criteria. From the original sample of 895 patients, 26 were excluded as outliers. Data on the pre-examinations are extracted on the basis of the original patient population of 895, and consist of 1174 observa-

[17] The county of Frederiksborg is counted as one "hospital"

tions (after trimming), indicating that each patient had more than one out patient examination before being admitted for surgery. Average LOS for the admission for surgery was 8 days.

Table 5.3 Out patient pre-examination (s) for patients admitted for Hip replacement Mean cost per admission €, mean total and break-down by cost center. SD and 25 /75% fractiles

Pre-examination (s)											
	Cost Center (€)								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)	Per-cen-tile 25%-75%	SD
Total cost** (% total)		53 (24%)	0	9 (4%)	2 (1%)	18 (8%)	6 (3%)	136 (60%)	225 (100%)	135-302	103
Admission for surgery											
	Cost Center (€)								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 speci-fied	Mean (n=869)	Per-cen-tile 25%-75%	SD
Total cost** (% total)	3,937 (47 %)	130 (2 %)	5 (0%)	580 (7 %)	4 (0%)	86 (1%)	419 (5%)	3,253 (39 %)	8,415 (100%)	6,760 -9796	2,9 77
Pre-ex + Surgery total cost									8,640		
Indirect cost (30%)									2,592		
Direct Cost									6,048		

* anaesthesia and operation
** direct + indirect costs
Figures in brackets are the number of observations the means are based on.

5.5 Price-cost comparison

Table 5.4 Hip replacement 2004, national tariff €

Case-mix group	**Title**	**Tariff (€)**
Pre-examination: BG50A	Ambulatory visit	187
Surgery: DRG 803	Change of large joints	7,470
Total cost (pre-examination +surgery)	Total hip replacement including outpatient pre-examination	

5.6 Discussion

The mean of the total cost of the vignette calculated from database data from 2004 is app. 13% higher than the national tariff from 2004 . There are several possible explanations to this: the price in 2004 is based on data from 2002, and there may have been both a change in practice and in the reporting of data i.e. definition of cost centers since then. Also, the exclusion of university hospitals, the selection af patients, price and wage adjustments etc. may explain the discrepancy. Finally, there may have been a change in the clinical definition, eg. which patients go into which DRG-group. From the tariff catalogues for 2005, 2006 and the preliminary for 2007[18] it can be seen that tariffs for hip replacement have gone up. Therefore, the cost we have calculated may to a larger extent reflect the prices now.

[18] from www.sst.dk

6 Cataract operation (vignette 4)

6.1 Introduction

A cataract operation in Denmark is usually performed on an outpatient basis, either in a hospital ambulatory or by a private specialist. The surgery is performed using local anaesthesia, however, certain groups of patients, such as children or patients with certain handicaps, needs general anaesthesia, and are therefore treated as inpatients (day cases).

6.2 Patient inclusion criteria

According to the guideline for WP 9, the case vignette includes the following patient characteristics:
"Male, 70-75 years old, has consulted a hospital clinic/ ophtalmologist'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/ opthalmologist'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)".

6.3 Description of patient pathway

The site chosen for the description of the patient pathway is the Eye-Clinic at Hillerød Hospital which is part of the hospital sector in the county of Frederiksborg. The clinic performs medical as well as surgical treatment of most eye diseases. The eye-clinic employs 7 physicians and 10 nurses and has no beds. However, in case a patient needs general anaesthesia, beds are "borrowed" from another department at the hospital. In 2004, the clinic carried out 82 surgeries meeting the inclusion criteria of the vignette.

The table below represents the typical pathway for cataract operations for patients at the eye clinic. The description is based on an interview with the head physician and a nurse from the eye clinic.

Before the operation, a preoperative assessment is carried out as a separate visit, and a post operative visit takes place at the clinic the day after the surgery. Post operative eye dripping is done in the patient's home by the patient himself, by relatives or by a municipal health visitor.

According to the interviewees, the pathway described in table 6.1 is representative of most hospital departments in Denmark performing this procedure. However, the cost of the operation will depend on the type of lens used, and whether the physicians are specialists. I.e. some departments may use younger physicians for the preoperative visit who are not yet specialists. The cost for each single surgery will vary according to the patient's condition, i.e. whether the patient needs anaesthetics or has complicating diagnoses.

Tabel 6.1 Pathway for a cataract operation at the Eye clinic in the county of Frederiksborg

Phase	Elements	Resources
Site	Out patient department of hospital	
Preoperative assessment Separate visit	*Nursing activity:* Eye test Measurement of lens Information of patient Planning of post op. (transport, social need of the patient etc.) *Physician activity:* Measurement of pressure in the eye Split lamp Ophthalmoscopy General health check Patient history	30 min. 30 min.
Surgery	*Drugs (eye drops)* Oxybuprocain 0,4% (Anaesthetics) Metaoxedrin 10% (dilatation of the pupil) Cyclogyl 1% (dilatation of the pupil) *Anaesthetics(local):* Xylocain gel Oxybuprocain 0,4% Cocaine 4% *Desinfection* PVP Iodine Knife time (30 – 45 min) *Staff :* 1 physician (specialist) 3 nurses *Consumables:* 3 piece acrylic lens “Butterfly” to fold the lens Knife (non reusable) “Viskoelastica” (to keep the eye stretched) Gloves, sterile Surgery kit from central unit of sterilization	 30 – 45 min. 90 – 135 min.
Post surgery visit Day after surgery	*Staff:* 1 nurse 1 physician *Activities:* Eye test Split-lamp Measurement of pressure in the eye Opthhalmoscopy Information of the patient	 10 min 10 min

6.4 Cost estimate based on the national cost database

Criteria for extraction from the cost database

According to the guidelines for WP9, the estimated cost of this vignette shall cover the actual surgery and any preoperative assessment. As in the Danish context, this means two separate visits, data on two types of outpatient visits should be collected from the cost database. Thus, patient records were extracted from the national cost database using the following criteria:

Table 6.2. Inclusion criteria vignette 4, "cataract operation"

Preoperative visit:	
Age and sex:	Female 70 -75 years
Primary diagnoses (ICD10):	H25
Surgery code (NCSP):	No surgery code
The preoperative visit shall precede a visit with the surgery codes: CJC, CJD or CJE for the same patient. (Visits for the same patient linked via the personal identifier CPR (Central Patient Registry))	
Surgery costs:	
Age and sex:	female 70-75 years
Primary diagnoses, ICD 10:	H25
Surgery code (NCSP):	CJC or CJD or CJE

Results

In total, 856 preoperative visits met the inclusion criteria for *preoperative visits*. After the trimming the number of visits was reduced to 821, representing 11 hospitals. Further 723 visits met the inclusion criteria for cataract *surgery* and after trimming the remaining number of visits were 710 and represented 9 different hospitals.

Table 6.3 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 % total	0	1 (n=689) 0,5 %	184 99,5 %	185 (n=821) 100 %	101 - 174	61	1
Surgery % total	376 (n=722) 63,1 %	1 (n=31) 0,1 %	219 36,8 %	596 (n = 864) 100 %	617 - 756	245	1
Total cost of cataract operation (direct + indirect) % total	376 48,1 %	2 0,3 %	403 51,6 %	781 100 %			2
Indirect (30%)				234			
Direct				547			

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

From table 6.3 it appears that the total cost of a cataract surgery is estimated at 951€, of which 535 €- or nearly 60 % - is the cost of surgery.

With reference to the guidelines, the cost does not include the post surgery follow up visit and the cost of eye dripping (which is not carried out in the hospital).

Comparison of cost with the national tariff

The case mix groups relevant for the vignette, including the national tariff for the groups is described below:

Table 6.4 Groups in the Danish case-mix system (DkDRG/DAGS) – including national tariffs – relevant for vignette 4. Cataract operation.

Case-mix group	Title	Tariff (€)
Preoperative visit:		
BG50A	Ambulatory visit	187
Surgery:		
DRG 205 or	Cateract surgery, with general anaesthesia	1,717
DRG 206	Cateract surgery, without general anaestehesia	720
Total cost		
(Preoperative visit+ surgery)	Cateract surgery, with general anastehesia incl. preop. visit	1,904
	Cateract surgery, without general anaesthesia incl. preop. Visit	907

The cost estimated (951€) is a little higher than the tariff for cataract surgery without general anaesthesia. This result may be explained by the fact that according to the interview persons, most cataract operations are carried out without general anaesthesia, and only few operations are carried out with general anaesthesia.

7 Stroke (vignette 5)

7.1 Introduction

A national Danish project "National Indicator Project"19 (NIP) has developed standards for the treatment of seven frequently occurring conditions including stroke20. Furthermore, the project measures the quality of care, according to the developed standards. According to a report issued by NIP, the treatment of patients with stroke varies from county to county. Thus, the treatment varies according to the number of patients treated in a specific stroke unit, and the number treated in an internal medical department or in a neurological department. Often the patients are admitted to a medical department and then – sooner of later - transferred to a specific stroke unit. Thus the treatment of patients with stroke may consist of a number of subsequent stay, in different hospital departments. Furthermore, the counties differ according to the amount and intensity of rehabilitation offered to the patients, and whether the rehabilitation takes place in a specific rehabilitation unit, or in the medical ward/stroke unit where the patient was initially treated.

7.2 Patient inclusion criteria

According to the guidelines the vignette includes the following cases:
"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."

7.3 Description of patient pathway

The patient pathway is described according to the practice at the Acute Stroke Clinic situated at Hillerød Hospital. The Acute Stroke Clinic is part of The Neurological Department, which again is part of the Neurological and Rehabilitation Unit of the hospital sector of Frederiksborg County.

The Neurological Department, of which the stroke clinic is part, has 45 beds. The Stroke Clinic employs 10 physicians, 13 nurses and 10 nurse assistants. In 2004, the clinic had 109 admissions of patients who met the inclusion criteria for the vignette.

The following information concerning usual treatment of patients with stroke (table 7.1) is based on an interview with the head physician and the head nurse of the clinic.

[19] The National Indicator Project is a concerted action between a number of Danish Institutions.
[20] www.nip.dk

Table 7.1 Pathway for patient admitted with stroke in the acute stroke unit of the county of Frederiksborg

Phase	**Elements**	**Resources**
Stroke Unit	*Nursing activity:* Blood pressure, Pulse, Temperature, Urine test (glucose). Physician activity: Physical examination- including an assessment of the risk of malnutrition. *Imaging:* CT-scan MR-scan (only 10%) Ultrasound X-ray of thorax *Blood tests* *(1s. day- 20 different):* Reed blood cells, White blood cells, Na, Ca, He, Creatinine, Bili, Kidney, Liver, Glucose, coag.fact (div), etc. *(2nd day- 14 different.):* Leucocyt, white blood cells, gamma glutamyl, glucose, thyrotropin, cholesterol (div), triglycerides etc.	
Main therapy	*Medication:* On arrival: ASA Each day during the stay: - If no cerebral haemorrhage: ASA, Dipyridamol. - If arterial fibrillation: Maravan (blood dilutive) - If high cholesterol: Cimvastin 40 mg	300 mg x 1
Hospital care	*Physician activity:* Preventive conversation with the patient about the following subjects: - Lifestyle (smoking, alcohol, over-weight, exercise) - Blood pressure - Cholesterol Physician Nursing *Therapy during the stay:* Physioterapy Occupational therapy Speech therapist *Length of stay :* If no complication, the patient is transferred to rehabilitation unit after 3 -4 days	 1 hour per day 5- 6 hours per day 1 hour per day 1 hour per day 1 hour per day 3-4 days

In the county of Frederiksborg, patients are admitted directly to the stroke unit from the ambulance. Early rehabilitation is carried out at the stroke unit, but after 4-5 days the patient is transferred to a rehabilitation unit, located at another hospital. The length of stay in the rehabilitation unit will be around 4 weeks, during which time the patient will receive one hour of physiotherapy and 1 hour of occupational therapy every day.

7.4 Cost estimate based on the national cost database

Data on patient records (admissions) were collected from the national cost database using the following criteria:

Table 7.2. Inclusion criteria for vignette 5: "stroke"

Age and sex:	Woman 60 – 70 years
Diagnosis (ICD10):	I63 or I64

Results

In total, 947 admissions met the inclusion criteria. After trimming the number of admissions was reduced to 867 admissions at 38 different hospitals. The mean length of stay was 11 days.

Table 7.3 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 Specified	Mean (n=867)	Percentile 25%-75%	SD
Total cost (dir.+indirect)	147	186	12	67	607	4,413	5,432	1,842- 6,007	6,669
% of total	2.7 %	3.4 %	0.2 %	1.2 %	11.2 %	81.2 %	100 %		
Indirect cost (30 %)							1,630		
Direct Cost							3,802		

Source: National Cost database

* 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.

According to table 7.3 the average total cost per admission for the admissions included in the vignette was 5,432 €. It appears from the table that most of the costs (81%) occur in the bed department. Physiotherapy and occupational therapy constitutes 607 € – or around 11% - of the total cost.

It is also seen from table 7.3 that there is a large variation in the total cost. This variation may be explained by the variation in the treatment of patients with stroke. As explained in the introduction of this section, patients with stroke are often admitted to a medical department, and then - sooner or later - transferred a stroke unit or a rehabilitation unit where the stay may be longer. It is not possible to distinguish between the different kinds of admission[21], therefore the data collected from the cost database may consist of both types of admissions. The estimated cost therefore is an average of different types of admissions for stroke patients; both some very short acute stays and some longer rehabilitation stays.

Comparison of cost with the national tariff

In the Danish DRG system (DkDRG), patients with stroke are grouped in DRG nr. 111. The national tariff in 2004 was 5,751 €. Thus the national tariff is very close to the calculated average cost of 5,432 €.

[21] The unit of record in the cost data base is a stay (or a visit) in a department

8 AMI (vignette 6)

8.1 Introduction

Guidelines for the treatment of patients with Acute Coronary Syndrome (ACS) have been developed by Danish Coronary Society (www.cardio.dk). According to the guidelines ACS may be divided into 3 subgroups:

- AMI with ST-segment elevation in the ECG (STEMI)
- AMI without ST-segment elevation in the ECG (non-STEMI)
- Unstable angina

Patients are diagnosed on the basis of three criteria:

- Symptoms (i.e. chest pain)
- ECG results
- Biochemical tests

The treatment path can be divided into three possible pathways (subgroups). According to the guidelines patients with a STEMI should be having a surgery (PCI) as fast as possible – but within 12 hours after the début of the chest pain. In Denmark PCI, is centralised to 5 Heart Centres. Patients admitted to local hospital with the symptoms of STEMI should therefore immediately be transferred to the nearest Heart Centre. Some ambulances are equipped for the diagnostics of heart patients (ECG monitors and Telemedicine equipment), implying that the ambulance are able to transport the patient directly to a heart centre. If a patient due to the geographical distance can not be operated within 12 hours, the patient is treated with thrombolyses at the local hospital.

8.2 Patient inclusion criteria

According to the guidelines the vignette includes the following cases:
"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."

8.3 Description of treatment path

The site chosen as a reference case for this vignette is Department of Cardiology at the Gentofte Hospital in the county of Copenhagen. Gentofte Hospital is one of the 5 heart centres in Denmark.

The department of cardiology has 64 beds, and employs 37 physicians and 128 nurses. In 2004 the department treated 181 patients meeting the inclusion criteria for the vignette.

The description below is based on interviews with nurse and physician representatives from Department of Cardiology.

Table 8.1 Standard procedures for assessment of acute patients with ACS

Phase	Elements	Resources
Emergency department	Nursing activity: Blood-pressure, pulse, temperature, urine test (glucose) ECG	

On the basis of the ECG test results, the patients are divided into non-STEMI and STEMI, and the treatment parts for each patient category is described below.

Table 8.2 Treatment pathway for patients with non-STEMI

Phase	Elements	Resources
Emergency department	*Lab tests:* CRP, Na, Kas, Crea, CKMB, CK-total, TNT, TSH, INR, P-Glucose, Lipidfraction *Medication:* ASA Clopidigrel (Plavix). *Nursing activities:* Nursing record, contact to relatives *Physician activities:* Patient history, assessment of risk factors, analysing of test results. Establishment of Venflon (Iv) If AMI is still suspected, the patient is transferred to bed department, accompanied by a physician	 300 mg 600 mg
Bed department	*On arrival at department (nursing activity):* Blood-pressure, temperature, pulse. *Diagnostic test:* ECG (On arrival and every day in the first 3 days of the stay) X-ray of thorax Ecco cardiography *Blood test:* Coronary enzymes (after 6-9 hours and again after 12-14 hours).	
Main therapy	*Medication (every day during stay):* LMH (The first 3 days of the stay) Nithroglycerine (In case of pain) Copidogrel (Plavix) Betabloccer Simvastin (level of cholesterol) ASA *Procedure: (after 3 - 4 days)* KAG (30 – 45 min) 1 physician 2 nurses If relevant PCI (60 – 120 min)* 1 physician 3 nurses Stents** (implants) *Length of stay:* Patient is discharged after 5 days	 75 mg 25 mg x 2 40 mg. 75 mg. 30 min 60 min 60 – 120 min 180 – 360 min 1,345 € 5 days

* The time estimate for PCI includes the preceding KAG. The duration of the PCI among other things varies according to the patient's condition

** Varying types and number of implants are used depending on the patient's condition. The cost is an estimated average

If the ECG shows a STEMI, patients are immediately transferred to a surgical room, where a PCI is carried out.

Table 8.3 Pathway for patients with STEMI

Phase	Elements	Resources
Main therapy	*Procedure: PCI (60 – 120 min)**	
	1 physician	60 – 120 min
	3 nurses	180 – 360 min
	Stents** (implants)	1,345 €
Bed department	*On arrival at the department (nursing activity):*	
	Blood-pressure, Temperature, Pulse	
	Diagnostic tests	
	ECG on arrival and the first 3 days of the stay	
	X-ray of thorax	
	Echo cardiograph	
	Lab.tests:	
	CRP, Na, Kas, Crea, CKMB, CK-total, TNT, TSH, INR, P-Glucose, Lipid fraction	
	Coronary enzymes (after 6-9 hours and again after 12 -14 hours)	
	Medication (every day):	
	Clopidogrel (Plavix)	75 mg.
	Betabloccer, Metropolol	
	Simvastatin (cholesterol)	40 mg.
	ASA	75 mg
	Clopidogrel	75 mg.
	Length of stay	
	Patient is discharged after 4 days	4 days

* The time estimate for PCI includes the preceding KAG. The duration of the PCI among other things varies according to the condition of the patient

** Varying types and number of implants are used depending on the patient's condition.

All patients are offered rehabilitation after discharge from department. The rehabilitation consists of

1 outpatient visit at the physician 4-6 weeks after discharge, and

4 visits (on average) in a nurse staffed ambulatory covering the following themes:

- Advice on life style (smoking, diet)
- Discussion of the patients mental reaction after the AMI
- Measurement of the patients blood pressure and cholesterol
- Furthermore, the patient is offered physiotherapy

8.4 Cost estimate based on the national cost database

Criteria for extraction from national cost database

Patient records were extracted from the national cost database, using the following criteria:

Table 8.4. Inclusion criteria for vignette 6: "AMI"

Age and sex:	male 50 – 60 years
Diagnosis (ICD 10):	I213 or I214

Results

In total 748 admissions met the inclusion criteria. After trimming the number of admissions was reduced to 688, representing 34 different hospitals.

An analysis of the cost data shows a large variation in the cost, depending on whether the patients have had an operation or not. The cost of an admission with ACS – therefore is shown for patients with and without surgery – separately.

Patients without surgery

528 patients representing 33 hospitals meeting the inclusion criteria were treated without a surgery. The mean length of stay was 6 days.

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	157 5,0%	64 2,0%	4 0,1%	24 0,8%	9 0,3%	54 1,7%	2,836 90,1%	3,150 100%	1,407-4,047	2,982
Indirect cost (30%)								945		
Direct cost								2,205		

*Clinical Physiology also includes Clinical Physiology-Nuclear Medicine

It appears from table 8.5 that the average total cost of an admission of a patient with ACS, with no surgery is 3,150 €. Most of the cost – 90 % is not explained and therefore incurs in the bed department.

Patients with surgery

In total 160 patients representing 2 hospitals meting the inclusion criteria, were treated with a surgery. The mean length of stay was 3 days.

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	7,269 51,2%	24 0,2%	78 0,5%	1 0,0%	3 0,0%	46 0,3%	6,771 47,7%	14,192 100%	12,311-14,651	3,998
Indirect (30%)								4,258		
Direct cost								9,934		

Source: National cost database

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 14,192 €. The cost of surgery and anaesthesia constitutes 7,269 € – or 51 % of the total costs.

Comparison with national tariff

Patients meeting the criteria for inclusion in the vignette may be grouped into the following DRGs:

Table 8.7. National Tariffs 2004, vignette 6: "AMI"

DRG	National tariff €
507 By-pass operation	18,252
521 Implant of ICD	35,800
523 AMI Procedure group B	8,462
524 AMI Procedure group A	4,630
529 Ischemic heart diseases. No AMI. Unstable Procedure Group B	6,993
530 Ischemic heart diseases No AMI. Unstable Procedure Group A	2,960
545 Other surgery on Circulatory System	8,848
546 AMI	3,156
548 Ischemic heart disease, No AMI, unstable	1,823

It appears that the tariffs for DRGs in question vary a lot, among other things depending whether a surgery – and which surgery - is carried out. The cost calculated for ACS treated with surgery (14,192 €) does not represent a specific which type of surgery, but may represent an average of different kinds of surgery, and thereby different DRGs. The cost estimate however seems to represent an average of the costs of the different DRGs with surgery.

The cost calculated for ACS not treated with surgery (3,150 €) is very close to the cost of DRG 546 AMI, and DRG 524 AMI. Procedure group A.

9 Cough (vignette 7)

9.1 Introduction

Out-patient services in the primary care sector are covered by national health insurance and provided by a number of privately practicing providers who are reimbursed through the National Health Care Reimbursement Scheme using centrally negotiated prices[22]. The General Practitioner is the gatekeeper to practically all parts of the health sector, and is the relevant provider for this vignette. GPs practices in Denmark are either organised as group practices with more than one GP (owned by all or by one of the GPs) or single practices with only one GP who is also the owner of the practice.

General practitioners are paid by the county through a combination of capitation fee and fees for service. Fees for service for GPs consist of a basic fee for consultation, which is always released at the patient contact (telephone consultation, office consultation, e-mail consultation), and supplementary fees for services, including (named) laboratory tests and examinations[23].

For this vignette, we contacted more than 60 GP with a single-GP practice by letter and telephone, and got acceptance to participate from six of whom two subsequently cancelled the appointment. Finally, four GPs have provided the information regarding the patient pathway and the time estimates included.

As it was not possible to get data from the individual GP accounts, data to value costs ("direct and indirect costs") come from a survey from the central GP organization ("PLO"). This survey includes cost (staff salary and other costs eg. material) and practice figures from a representative sample of the GP annual accounts in 2004[24].

9.2 Patient inclusion criteria

The wording for vignette 7 in the guidelines for WP9 said
"Parents presenting at a GP/ paediatric GP office with their 2 yr. old boy having cough and fever (38.5°C) since two days. Drug prescriptions and whether a second visit is scheduled should be noted".

9.3 Methods, data and assumptions

We asked the GPs to consider the last 10 patients of this kind and provide a description of the pathway and time estimates for the different procedures.

[22] Bilde L. Ankjær-Jensen A. Danneskiold-Samsoe B. The "health benefit basket" in Denmark – a description of entitlements, actors and decision-making processes in the curative health sector. Eur Jour Health Econ. 2005, suppl 6:11-17
[23] Bilde L, Ankjær-Jensen A. Approaches for price setting and cost assessment in the Danish Health sector. DSI København 2005, published at www.dsi.dk and www.ehma.org
[24] (n=253 practices in total, 90 single practices) Omkostningsundersøgelsen 2004, Praktiserende Lægers Organisation, September 2005).

The pathway for this patient described by the participating GPs turned out to be more or less identical:
First the GP discusses the patient history with the parents (eg. symptoms etc.) and then examines the child (looks at the general state of wellbeing, stethoscope examination of lungs and heart, looks in ears and throat). If this general examination reveals symptoms of a bacterial infection, a CRP and /or a tympaneometri (in some cases cultivation from throat) are undertaken. All GPs estimated the "risk" of undertaking one of these procedures at 10% (1 out of 10 patients), the assumption is that 1/10 of a CRP is undertaken and that this test would be negative. In case of a negative examination result, the patient is not offered any treatment or rescheduling of appointment. Only, the parents are to call again should the child's condition deteriorate.

The costing on the vignette was based on the following assumptions:

Table 9.1 Assumptions used in the calculation of the cost of vignette 7 "cough"

Assumptions	Hals*	Vallenbæk	Randers	Hinnerup
a) No of patients registered in practice	2,350	2,076	1,480	900
b) No of direct consultations per year in practice	5,000	7,794	4,300	4,063
c) GP work hours (net) per year	1,530	1,530	1,530	1,530
d) GP time with patients % of total work hours	90	95	90	80
c) 1 person yr of staff, work hours	1,530	1,530	1,530	1,530
d) Staff time with patients % of total work time	90	90	90	50
e) GP direct cost per hour (DKK)	557	557	557	557
f) Staff cost per hour (DKK)	227	227	227	227
g) Material cost per GP hour (DKK)	41	39	41	46
h) Overhead per hour w. patients (GP+staff) (DKK)	162	357	147	297

* The GPs are mentioned by the name of the city in which their practice is located

a) No.of insured patients registered (quoted by the GPs)
b) Direct consultations. Generally, GP consultations consist of telephone consultations, visits to patients and direct consultations in practice.
c) This figure varies a great deal in reality. The assumption chosen corresponds to 35 work hours (net) per week.
d) quoted by the GPs
e) average profit before taxes in 2004 ("Omkostningsundersøgelsen"), divided by c
f) average staff cost including social costs ("Omkostningsundersøgelsen") divided by c
g) total annual material costs ("Omkostningsundersøgelsen") allocated according to the GP time per patient
h) Overhead = from the annual account ("Omkostningsundersøgelsen") = Total minus direct costs. Allocated according to total GP and staff time with patients.

Calculation of overhead

In the calculation of overhead, the annual account information displayed in the table below from the national cost survey was used. As a first step, all direct cost components were deducted from the total costs, e.g. the cost of pharmaceuticals, material and bandages (6,6% of total costs) and clinical staff salary costs including social costs (app. 43% of total costs).

The second step was then to add the proportion of direct costs not allocated to direct costs corresponding to the cost of indirect staff time and material. As a third step, all indirect costs were allocated to each patient using the proportion of GP and staff time with the patient quoted by the GPs as an allocation key. This figure resulted in an indirect cost per patient hour which was used to calculate the final indirect cost figure for each patient.

GP accounts information 2004 (national mean for single practices n=90)

Description	DKK 2004	% of total costs	Allocated to	Allocation key
Pharmaceuticals, material and bandages	56,342	6.6	Direct costs	Proportion of GP time with patients
Transport total	33,630	4.0	Indirect costs	
Advertisements, flowers, stamps etc	21,236	2.5	Indirect costs	
Audit	32,195	3.8	Indirect costs	
literature	3,033	0.4	Indirect costs	
Rent, heating, gas	100,379	11.8	Indirect costs	
Subscriptions, insurance etc.	18,406	2.2	Indirect costs	
Employed doctor's salary	33,729	4.0	Direct costs	Proportion of staff time with patients
Other office salaries	306,422	36.1	Direct costs	Proportion of staff time with patient
ATP, PKU	8,276	1.0	Direct costs	
Cleaning	17,355	2.0	Indirect costs	
telephone	19,698	2.3	Indirect costs	
Other personnel costs	20,975	2.5	Indirect costs	
IT (operation.and maintenance)	26,486	3.1	Indirect costs	
Maintenance and investments on the annual account	29,448	3.5	Indirect costs	
Interest rates	15,434	1.8	Indirect costs	
Depreciation	21,772	2.6		
Salary sum tax	37,159	4.4	Direct costs	Proportion of staff time with patients
Payment for doctors on guard service	7,170	0.8	Indirect costs	
Courses and seminars	5,078	0.6	Indirect costs	
Other operational costs	22,324	2.6	Indirect costs	
Total annual costs	836,546	98.7		
Income transferred to spouse	11,138			
Total	847,684	100,00		

Source: the cost survey 2004, Danish Association of General Practitioners ("omkostningsundersøgelsen 2004")
To adjust EURO figures to 2005, multiply by 1.024 (price/wage/exhange rate adjustment). To adjust Danish Kroner figures multiply by 1.027.

Table 9.2 Cost of vignette 7: "Cough" at a General Practitioner

Phase			Hals		Vallensbæk		Randers		Hinnerup	
Assess-ment	Diagnostic procedures	Units	No.	Cost (DKK)	No.	Cost (DKK)	No.	Cost (DKK)	No.	Cost (DKK)
	Cost of material (eg. CRP)	No.	0.1	10.2	0,1	6.8	0.1	8.5	0,1	5.8
	GP	Min	15	139.25	10	93	12.5	116	7,5	70
	Staff	Min.	5	18.9	5	18.9	5	18.9	5	18.9
Therapy +	Drugs prescribed	DD	0	0	0	0	0	0	0	0
Further care	Drugs or goods given	DD	0	0	0	0	0	0	0	0
	Other diagnostics prescribed	No	0	0		0				
	Second visit sched-uled		NO		NO		NO		NO	
	Personnel	Min		0		0		0		0
Overhead *	Indirect costs	**		54		37		104		62
Total cost vignette DKK				222.35		156		247		157
Total € (100 € = 743 DKK)				29.9		21		33.3		21

The mean cost per patient to be calculated from the figures above is DKK 196 or € 26.32

Prices (based on the NHCRS fee Schedule for general practice, April 2004)

Basic fee	DKK 106.81 (€ 14.38)
FFS (CRP)	DKK 59.31 (€ 7.98)
FFS Tympanometry	DKK 94.89 (€ 12.77)
Capitation (per quarter)	DKK 64.80 (€ 8.72)

To adjust EURO figures to 2005, multiply by 1.024 (price/wage/exhange rate adjustment). To adjust Danish Kroner figures multiply by 1.027.

9.4 Discussion

In the ideal world, each GP should have quoted the real direct and indirect costs to value their time and material estimates, based on their annual account in 2004. This was not at all possible and therefore, the pragmatic approach described above was chosen, despite the very broad assumptions regarding costs (all GP costs are equal to the average), annual work time, GP earnings etc.

In the real world, costs may vary more between GPs than the ones calculated above, due to different housing prices and differences in work hours, time with patients.

Also, as we did not have sufficient data to find ideal overhead allocation keys for all indirect costs, we therefore used the GP and staff time with patients (as opposed to indirect time). This is however, assumed to be the best method in the absence of suitable keys for all overhead costs.

The prices based on the Health Care Reimbursement Fee Schedule quoted include the basic fee for a consultation, the fees for services for CRP and tympaneometri, and the capitation per quarter. The total price for this particular vignette lies between 23 and 44 € depending on the patient's attendance frequency (i.e. how much of the capitation fee should be "allocated" to each visit), and the number and type of services offered.

Due to the estimate chosen to cost GP time "profit", costs and prices are somewhat interdependent in this particular case, and therefore reservations should be made as to a comparison of costs and prices in this case.

10 Colonoscopy (vignette 8)

10.1 Introduction

Colonoscopies in Denmark are mainly carried out on an outpatient basis in the hospital sector, but may also be carried out by private specialist. Most hospitals in Denmark has established a specific department for endoscopy examinations. The Danish Surgical Society has developed guidelines for the diagnostics and treatment of colorectal cancer.

10.2 Patient inclusion criteria

The vignette includes the following cases:
„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."

10.3 Description of the patient pathway

The description of the patient pathway is the hospital sector of the county of Frederiksborg. Here, colonoscopy is carried out in an specialised endoscopy Clinic, located at the Hillerød Hospital. The clinic is part of the Surgical and Anaesthesia Department, however the physicians performing the examinations are employed by the surgical departments, while the nurses assisting during the examination, and taking care of the observations afterwards are employed at the Surgical/Anaesthesia Department.

The Endoscopy Clinic carried out 27 colonoscopies meeting the inclusion criteria in 2004.

The following information about local guidelines for Colonoscopy is based on an interview with the leading physician for endoscopies at Hillerød Hospital, and nurse representative from Anaesthetic Department.

As the vignette includes patients with a positive faecal occult blood test, i.e. determined by a general practitioner, the examination only includes one visit. Before arriving for the examination the patient is supposed to have carried out a purgation of bowels, using instructions sent to him by the department. The patient has to buy and pay for the necessary medication for this procedure (Phosforal) himself (27 €). Patients which are expected not to be able to carry out a purgation of bowels themselves will be purged at the hospital and thus treated as inpatients (day case).

Table 10.1 Pathway for a colonoscopy, outpatient visit at the Hillerød Hospital

Phase	Elements	Resources
Site of consultation	Outpatients department of hospital	
Preparation	*Nurse activity:* Take up medical record *Medication:* Benzodiazepin (dormicum) Fentanyl (haldid)	
Examination	*Colonoscopy (30 – 60 min):* 1 Physician 2 nurses *Consumables* (non reusable, drugs) Examination is carried out using flexible scopes with magnetic scans	 30 – 60 min 60 – 120 min 94-108 €
After examination	Patient rests in a wake-up room for 1 – 2 hours under the observation by a nurse Nursing time	 15 min*

* 2 nurses observes 16 patients in the wake up room

According to the interview persons the treatment path presented in the table 10.1, very much represents the general practice in Denmark. Variation may occur as the medication for purgation of bowels is either provided by the hospital or has to be bought by the patient himself.

10.4 Cost estimate based on the national cost database

Patient records were extracted from the cost data base using the following criteria:

Table 10.2 Inclusion criteria, vignette 8 "colonoscopy"

Age and sex	male 55 -70
Diagnosis (ICD10)	C18, C19Z03 or K63
Surgery (NCSP)	UJF32

Results

In total 439 records were extracted from the cost database, after trimming the number of records were reduced to 426, representing 24 hospitals.

In the table below, the average cost of a colonoscopy is estimated to 5,100 kr. of which 3,700 – or 72% - is the cost of surgery.

Table 10.3 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/ Anaesthe (n=386).	Lab. (n=209)	Radiology (n=57)	Pathology (n=224)	Not specified	Mean (n=426)	Percentile 25-75	SD	
Total cost (direct+indirect) % of total	499 72,6%	5 0,7%	4 0,6%	20 2,9%	160 23,2%	688 100%	475-850	254	1
Indirect (30%)						206			
Direct						482			

Source: National cost data base

Comparison of cost with national tariff

As Colonoscopy is carried out as an outpatient visit, in the Danish case mix system it will be covered by the DAGS. Two different DAGS may be relevant:

Table 10.4 National tariff, 2004, €, Colonoscopy

DAGS	Name	National tariff (€)
PG05G	Complex Colonoscopy, Sigmoidescopy, ERCP or Endoscopy in lower bowel region.	586
PG05H	Simple Colonoscopy, Sigmoidescopy, ERCP or Endoscopy in lower bowel region.	349

Thus the estimated cost (688 €) is larger than the tariff for both the simple and the complex examination, implying that the cases selected for the vignette may represent more expensive patients.

11 Tooth filling (vignette 9)

11.1 Introduction

In Denmark municipal dental care has been determined by law since 1972. It means that all persons born after 1965 have participated in systematic dental care during childhood and youth.

The municipal dental care offers free preventive dental care and dental treatment and provides systematic control and regular visits at dental care clinics for everybody under 18 years of age[25].

In the municipal dental care there is an increased focus on preventive dental care e.g. instructions on teeth brushing and use of dental floss aiming at good dental hygiene, and information on teeth damaging foods and beverages.

The free municipal dental care usually takes place in a municipal dental care clinic but in some cases private dentist who has made an agreement with the municipality may provide the service. Children and young people under 16 years of age may choose another provider than the municipal dentist eg. a private dentist or a municipal dentist in another municipality. In these cases, there may however, be a patient co-payment.

It is estimated that almost 100% of all children and young persons under 18 participate in the municipal dental care[26].

11.2 Patient inclusion criteria

The wording from the guidelines for WP9 said:
"Ca. 12 y/o child presents with a toothache in a lower molar tooth at dentist's office; after diagnosis, the dentist decides to provide an Amalgam filling."

We contacted different municipal dental care until five had accepted to participate in the project. However, by 17 July, we had only received information from four of the five municipal dental care clinics which is why we have based the costing on data from only four providers.

The municipal dental care institutions participating are:
Århus Municipality, dentist, deputy chief in the municipality
Albertslund Municipality, dentist in Albertslund municipal dental care
Vejle Municipality, dentist in municipal dental care
Esbjerg Municipality, dentist in municipal dental care

The number and types of employees have been provided by the institutions themselves.

[25] Bilde L. Ankjær-Jensen A. Danneskiold-Samsoe B. The "health benefit basket" in Denmark – a description of entitlements, actors and decision-making processes in Danish health sector. DSI København 2005. published at www.dsi.dk and www.ehma.org.
[26] Source: Tandplejens struktur og organisation, Sundhedsstyrelsen, 2004 og interview med de kommunale tandplejere (4 kommuner)

Information in the descriptions below has been collected as telephone interviews.

To adjust EURO figures to 2005, multiply by 1.024 (price/wage/exhange rate adjustment). To adjust Danish Kroner figures multiply by 1.027.

11.3 Description of case vignette

In the tables below the "generic" vignette from the WP9 guideline has been adapted to the Danish setting as it takes place in the municipal dental care clinics.

Case A

The description of case A takes place at a municipal dental clinic which employs 63 dentists, 107 assistants, 19 dental hygienists, 2 dental technicians and 4.5 secretaries.

Table 11.1 Vignette 9: Tooth filling, Case A, Denmark, costs in DKK and €

Phase	Elements	Units	Unit Cost	No. of units used	Total costs DKK	Total costs €
Diagnosis and examination	Dentist	Min.	4.16[a]	5	20.80	2.80
	Dentist nurse	Min.	2.08	5	10.40	1.40
Assessment	X-ray	No.	[b]	1		
	Dentist	Min.	4.16	5	20.80	2.80
	Dental nurse	Min.	2.08	10	20.80	2.80
Therapy	Dentist	Min.	4.16	35	145.60	19.60
	Dental nurse	Min.	2.08	35	72.80	9.80
	Material (anaesthesia) (sprøjte eller lattergas)		[b]	[b]		
	Material (plastic)		[b]	[b]		
Overhead	Running costs of ambulatory service and material[c]		35%		101.92	13.72
Total					393.12	52.92

a The unit salary costs : an average salary cost per hour including social cost has been quoted by the interviewee
b material costs included in overhead
c Overhead is 35% on top of salary costs. It covers material and rent, heating, electricity, water, cleaning etc. Capital costs and depreciation are not included

Case B

The municipal dental care clinic in case B described below employs 11 dentists, 17 assistants, 5 dental hygienists, 2 dental technicians (1 combined) and 1 secretary.

Table 11.2 Vignette 9: Tooth filling, Case B, Denmark, Costs in DKK and €

Phase	Elements	Units	Unit Cost DKK	No. of units used	Total costs DKK	Total costs €
Diagnose and examination	Dentist	Min.	4.63	5	23.15	3.12
	Dentist nurse	Min.	3.30	5	16.50	2.22
Assessment	X-ray	No.	10.00[a]	0,1	1.00	0.13
	Dentist	Min.	4.63	1	4.63	0.62
	Dental nurse	Min.	3.30	4	13.20	1.78
Therapy	Dentist[c]	Min.	4.63	19	87.97	11.84
	Dental nurse	Min.	3.30	19	62.70	8.44
	Material (anaesthesia)		6.13[b]	0,85	5.21	0.70
	Material (amalgam)		6.72	1	6.72	0.90
Overhead	Running costs of ambulatory service[d]		25%		55.27	7.44
Total					276.35	37.19

a x-ray in 10% of the cases when needed
b Material unit costs are excl. VAT
c The unit salary cost is gross salary including social costs measured against working hours in the professional agreement

- Dentist unit cost: 400,000 DKK a year / 1,440 working hours
- Dental nurse unit cost: 300.000 DKK a year / 1,517 working hours a year

d Overhead is 25%. It covers rent, heating, electricity, water, cleaning etc. (as quoted by the interviewee who also refers to the memo by the Association of Municipalities which states 18.7 %)
Capital costs and depreciation is not included in the overhead

Case C

The municipal dental care clinic in Case C desribed below employs 12 dentists, 28 assistants, 3 dental hygienists, 2 dental technicians and 2 secretaries.

Table 11.3 Vignette 9: Tooth filling, Case C, Denmark, Costs in DKK and €

Phase	Elements	Units	Unit Cost DKK	No. of units used	Total costs DKK	Total costs €
Diagnosis and examination	Dentist	Min.	5.21	-		
	Dentist nurse	Min.	2.90	-		
Assessment	X-ray	No.	2.10	1	2.10	0.28
	Dentist	Min.	5.21	-		
	Dental nurse	Min.	2.90	-		
Therapy	Dentist	Min.	5.21	35[a]	182.35	24.54
	Dental nurse	Min.	2.90	35	101.50	13.66
	Material (anaesthesia)[b]	No.	6.52	1	6.52	0.88
	Material (plastic)	No.	5.61	1,5	8.42	1.13
Overhead	Running costs of ambulatory service[c]		18.7%		56.27	7.57
Total					357.16	48.06

a Examination and treatment take 35 min in total
b Material unit costs are excl.VAT
c Overhead is 18,7%. It covers rent, heating, electricity, water, refuse (renovation?), cleaning, telephone, computers, maintenance, average costs of employee training and transport, literature etc. Source: Memo from The Municipality Association.
Capital costs and depreciation are not included

Case D

The municipal dentistry in Case D described below employes 19 dentists, 34 assistants, 6 dental hygienists and 2 secretaries.

Table 11.4 Vignette 9: Tooth filling, Case D, Denmark, Costs in DKK and €

Phase	Elements	Units	Unit Cost	No. of units used	Total costs DKK	Total costs €
Diagnosis and examination	Dentist	Min.		-		
	Dentist nurse	Min.		-		
Assessment	X-ray	No.	n.a.	1	6,05	0,81
	Dentist	Min.		-		
	Dental nurse	Min.[a]	2,76	3	8,28	1,11
Therapy	Dentist	Min.	4,66	30	139,8	18,81
	Dental nurse	Min.	2,76	50	138	18,57
	Material (anaesthesia)		n.a.	1	6,33	0,85
	Material (dycal and amalgam)		n.a.	1	6,72	0,90
Overhead	Running costs of ambulatory service[b]		18,7%		57,09	7,68
Total					362,25	48,73

a The unit salary cost: as this information was not available until mid-August, the salary costs are base on the average of the other cases

b Overhead is 18,7%. It covers rent, heating, electricity, water, refuse (renovation?), cleaning, telephone, computers, maintenance, average costs of employee training and transport, literature etc. Source: Note from The Municipality Association. Capital costs and depreciation are not included

11.4 Discussion

During the last 20 years there has been a significant improvement in the tooth health of Danes. In 2003, 60% of all 12 year olds are caries free and the average caries experience for 12 year olds is a little more than one[27].

The vignette 9 as described in the guidelines is not a typical case in Denmark due to the systematic control and regular visits in dental care and focus on preventive activities for many years. Tooth problems in a 12 year old child will be discovered and treated before the child has a toothache, at the regular visits at the municipal dental care.

Therefore the vignette descriptions reflect the rare cases with aching caries.

[27] Tandplejens struktur og organisation

12 Ambulatory Physiotherapy (vignette 10)

12.1 Introduction

All Danish citizens are entitled to rehabilitation after hospitalization according to the law. However, the counties themselves are free to organise the services as they wish and therefore, there is great variation in the provision of rehabilitative services after an operation[28].

After anterior cruciate ligament reconstruction, all patients are offered ambulatory rehabilitation at a public hospital. Some patients choose rehabilitation outside the hospital instead eg. at a privat physiotherapist.

12.2 Patient inclusion criteria

The wording from the guidelines for WP9 said:
"Male 25-35 years after anterior cruciate ligament reconstruction, consulting for ambulatory rehabilitation after discharge from hospital (with a referral if necessary in the country). Repair and hospital stay were without complications and discharge occurred after average length of stay. Please specify the duration and frequency of physiotherapy (e.g. 4-6 weeks, 3 times per week with 1 hour per session)."

Information in the descriptions below has been collected at telephone interviews with the following hospital departments:
Frederiksberg Hospital, Physiotherapy Department
Horsens Hospital, Physiotherapy Department
Århus Hospital, Physiotherapy Department

12.3 Description of the case vignette

In the tables below the "generic" vignette from the WP9 guideline has been adapted to the Danish setting as it takes place in the physiotherapy department at the three hospitals.

To adjust EURO figures to 2005, multiply by 1.024 (price/wage/exhange rate adjustment). To adjust Danish Kroner figures multiply by 1.027.

[28] Bilde L. Ankjær-Jensen A. Danneskiold-Samsoe B. The "health benefit basket" in Denmark – a description of entitlements, actors and decision-making processes in Danish health sector. DSI København 2005. published at www.dsi.dk and www.ehma.org.

Case A

The first department has one head therapist, 4 department physiotherapists, 1 clinical development physiotherapist, 2 physiotherapists on training and 41.9 normal physiotherapists employed.

Table 12.1 Vignette 10: Ambulatory Physiotherapy, Case A, Denmark, Costs in DKK and €

Phase	Elements	Units	Unit Cost	No. of units used	Total costs DKK	Total costs €
Site of consultation	Out-patient department of hospital					
Day of Operation	Short conversation with physio-therapist					
Therapy Week 2	Physiotherapist a)	Hours		2-3		
Therapy Week 3	Physiotherapist a)	Hours		2-3		
Therapy following weeks	Physiotherapist a)	Hours		2-3		
Therapy in total	Physiotherapist a)	Hours	59,87 b)	40	2,395	322
Overhead	Running costs of ambulatory service • in the department • in the hospital		c) 26% 29%		 623 875	 84 118
Total					3,893	524

a The ambulatory physiotherapy is planned with 4 persons in a group guided by one physiotherapist. Every person in the group gets individual guidance and training depending on the level of function in the knee. The therapy is 2-3 sessions a week lasting 1 hour per session. Al together the therapy is 40 hours of training over four months.

b The unit wage costs is gross wage incl. pension measured to working hours in the agreement

- Physiotherapy unit cost: 342.000 DKK a year / 1,428 working hours divided in four due to the four patients in a group guided by one physiotherapist so every patient “uses” 0.25 physiotherapist in a session lasting one hour.

c Overhead first 26% from functions in the department and then an additional 29% from joint functions in the hospital

Case B

The second department employs 14.08 physiotherapists, 1.03 senior physiotherapists, 1.03 department physiotherapist, 1 clinical development physiotherapist and 2 training physiotherapists.

Table 12.2 Vignette 10: Ambulatory Physiotherapy, Case B, Denmark, Costs in DKK and €

Phase	Elements	Units	Unit Cost DKK	No. of units used	Total costs DKK	Total costs €
Site of consultation	Out-patient department of hospital					
Day of Operation	Short conversation with physiotherapist					
2 weeks after operation	Control visit at physiotherapist	Hours	229,21 b)	0,75	172	23
Therapy Week 3	Physiotherapist a)	Hours	229,21	0-1		
Therapy Week 4	Physiotherapist a)	Hours	229,21	0-1		
Therapy following weeks	Physiotherapist a)	Hours	229,21	0-1		
10-12 weeks after operation	Control visit at physiotherapist	Hours	229,21	0,75	172	23
Overhead	Running costs of ambulatory service • in the department • in the hospital		c) 10% 30%		 34 103	 5 14
Total					481	65

a In case there are no problems with the knee the patient gets a training programme with exercises for self training at home.
If there is a problem with e.g. bend/stretch or strength in the knee the patient is offered to participate in group training in the physiotherapy department at the hospital. Normally there are 5-6 persons in a group training 45 min. once a week with a physiotherapist – the training continues as long as needed all based on the patients level of movement and/or strength in the knee.
b The unit wage costs is gross wage incl. pension measured to working hours in the agreement

- Physiotherapy unit cost: 312,400 DDK a year / 1363 working hours.

c Overhead quoted by the department

Case C

The third department whose patient pathway is described below, employs 2 chief therapists, 5 department therapists, 58.45 physiotherapists, 5.6 training therapists, and 22.5 ergotherapists.

Table 12.3 Vignette 10: Ambulatory Physiotherapy, Case C, Denmark, Costs in DKK and €

Phase	Elements	Units	Unit Cost	No. of units used	Total costs DKK	Total costs €
Site of consultation	Out-patient department of hospital					
Before operation	Information meeting	Hours	236.83 b)	1	236.83	32
2 days after operation	Control visit at physiotherapist	Hours	236.83	1	236.83	32
2 weeks after operation	Control visit at physiotherapist	Hours	236.83	1	236.83	32
Therapy Week 3	Physiotherapist a)	Hours		0		
Therapy Week 4	Physiotherapist a)	Hours		0		
Therapy following weeks	Physiotherapist a)	Hours		0		
After control visit at physio-therapist	Private physiotherapist a)	Visit		5		
Overhead	Running costs of ambulatory service • in the department • in the hospital		c) ? 24.2%		- 171.94	23
Total					882.43	119

a After the two control visit 2 and 14 days after operation the patient is referred to rehabilitation at a private physiotherapist. The county pays 5 visits at the private physiotherapist.
b The unit wage costs is gross wage incl. pension measured to working hours in the agreement

- Physiotherapy unit cost: 338,200 DKK a year / 1,428 working hours.

c Overhead – de kunne ikke oplyse den interne overhead

12.4 Discussion

As can be seen from the results, there is a large variation in the cost estimates provided by the three sites and also there will be differences in the individual cost per patient of providing the services, as in many cases, the services is adapted to individual patient needs.

However, it can be assumed that the three cases provided show what may be characterised to be a minimum level of post-operative rehabilitation to what may be characterised as a maximum.