# HEALTH BASKET

## Work Package 9:
## Case vignettes

## HUNGARY


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**Research sponsored by the European Commission's**
**6th Framework Programme**

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# I. INTRODUCTION

In this report we provide the resource consumption data, which we have collected, for each case vignettes described in the guidelines for Work Package 9 (later referred to as WP9). In the second chapter, we will provide an overview of the methodology (e.g. data collection process). In Chapter III, we will first consider the description of the cases, then for each case vignette the information about data providers (health care providers, who responded to our request and collected resource consumption and cost data) are presented and the differences in cost structures and the reimbursement data are analysed, which is followed by a discussion regarding the findings. Finally, in Chapter IV, we are going to summarize the main conclusions, which are relevant for the cross country comparison. However, before we continue with the detailed description of the methodology and the presentation of the results, it is important to emphasize some important limitations, which have to be taken into account in the interpretation of the findings:

1. As far as reimbursement of health services is concerned, it is important to note that the NHIFA payment, in principle, covers only the recurrent costs of services. Capital costs are the responsibility of the owners of health care providers (dominantly local governments).
2. In Hungary the practice of informal payments is widespread, and according to research studies, informal payments are an important part of the income of physicians. For instance, Gaal et al (2006) have estimated that those doctors, who receive informal payment at all, in average, took home 60-250% of their official net salaries from informal payments. However, given that there are no accurate estimates of informal payments available for individual services, and that doctors are an unreliable source of information in this respect, we have not included informal payments in our calculations.
3. Unfortunately, the data collection period coincided with the beginning of large scale health care reforms in Hungary, involving for instance the reduction of acute hospital beds with 25%. This was one of the reasons of the low response rate: for most inpatient vignettes we had only two responding hospitals. Although we selected the sample to represent the main type of providers and the geographical location of providers, unfortunately we could not achieve this.
4. Although we have managed to get access to the national database of resource consumption surveys, which were carried out for the purpose of the updating of the Hungarian DRG system, the data we obtained this way were limited in two respects. First, the last data collection took place in 1999. Second, personnel costs were treated partly as indirect costs, partly as part of the costs of individual service items, therefore comparability could not have been ensured. Therefore we have not included these data in our analysis.

# II. METHODOLOGY

## II.1. SELECTION OF DATA PROVIDERS AND OTHER DATA COLLECTION ALTERNATIVES

The Hungarian research team originally planned to use data from a survey undertaken in 1999 by the National Health Insurance Fund (for calculating 'Hungarian DRGs'), and update these data on the basis of expert opinion. However, finally we decided to collect data by a new survey and interviews because the survey from 1999 had some disadvantages (e.g. the prices and the processes of services showed the pattern from 1999 and the data were not available at the level of the hospital).

In Hungary, the main source of delay was the change in the methodology of the data collection (and the shortage of research staff). Finally, we selected 7 hospitals in the 7 regions of Hungary, 1 outpatient clinic, some dentists and 5 general practitioners on a territorial basis. At first we selected 1 hospital per region then we approached one more hospital (P6) because of the low response rate. The hospitals and outpatient clinic are public. There are both private and public providers among the dentists and GPs.

**Table 1. Basic information about data providers**

| ***Providers*** | **Code** | **Region** | **Number of acute beds** | **Number of chronic beds** | **Size of physician's** | **Capacity utilization** | **Number of physicians** | **Number of nursing staff** | **Number of administrator** | **Number of other staff** |
|---|---|---|---|---|---|---|---|---|---|---|
| *provider1* | P1 | Central Transdanubia | 330 | 150 | | 72,88% | 47 | 412 | 32 | 179 |
| *provider2 (dentist2)* | P2 (D2) | Central Hungary | 737 | | | 75,20% | 133 | 535 | 29 | 181 |
| *provider3* | P3 | Southern Transdanubia | 197 | 185 | | 90,36% | 45 | 311 | 27 | 117 |
| *provider4 (outpatient clinic)* | P4 | Central Hungary | 40 | | | n.a. | 9 | 45 | 25 | 6 |
| *provider5* | P5 | Northern Great Plain | 1564 | | | 86,00% | 397 | 1460 | 220 | 430 |
| *provider6* | P6 | Central Transdanubia | 1033 | | | 72,30% | 207 | 716 | 592 | |
| *dentist1* | D1 | Central Transdanubia | outpatient setting | | 72 m² | | 1 | 1 | 1 | 0 |
| *dentist3* | D3 | Central Hungary | outpatient setting | | 45 m² | | 1 | 1 | 0 | 1 |
| *general practitioner1* | GP1 | Central Hungary | | | 40 m² | | 1 | 0,5 | 0 | 0 |
| *general practitioner2* | GP2 | Western Transdanubia | | | 103 m² | | 1 | 1 | 0 | 0,125 |
| *general practitioner3* | GP3 | Central Hungary | | | 120 m² | | 1 | 0,5 | 0 | 0 |
| *general practitioner4* | GP4 | Southern Great Plain | | | 22 m² | | 1 | 1 | 0 | 0,5 |
| *general practitioner5* | GP5 | Central Transdanubia | | | 100 m² | | 1 | 1,0 | 0 | 0 |

## II.2. OVERVIEW OF THE DATA COLLECTION PROCESS

Because of the delay, the research team decided to organize the data collection according to the following way.

The research team translated and adapted the questionnaires of the ten vignettes for the Hungarian data collection. The questionnaires for every vignette (except for cough) were sent to hospital contacts (named hospital coordinators in this research project), who were responsible for organizing the data collection for the inpatient vignettes and for the applicable outpatient vignettes within the hospital. The coordinator at the outpatient clinic received questionnaires for physiotherapy and cough and the GPs received questionnaires for cough. All of these coordinators and GPs are graduates of the Health Management Training Centre's MSc program at the Semmelweis University, which made it possible to have a strong contact and common language with these coordinators. We thought that this way the response rate could be maximised. The research team helped the coordinators in filling the questionnaires over phone, e-mail and personally, some of the GPs were interviewed personally by a member of the research team. Other staff at the providers was interviewed by the coordinators about the care of the last ten cases for each vignette. Unfortunately, despite the good relationship between the coordinators and the members of the research team, the response-rate was very low, which we tried to improve by adding further providers in the sample, where this was possible. The reasons for cancelling participation in the research were e.g. lack of approval of hospital management, shortage of staff, but mainly the unfavourable conditions due to the restructuring of the Hungarian hospital system.[1] Finally, five hospitals, one outpatient clinic, three dentists and 5 GPs provided data (see Table 2).

The research team offered two alternatives to provide data: a) data about the last 10 patients separately according to the vignette-questionnaire, b) the average of data about the last ten patients according to the vignette-questionnaire. Most of the data providers sent the average of the data of the last 10 patients. Some of the data are extracted from the information / accounting system, while others were estimated by experts. The data providers were asked to select only those patients, which fit the indications described in the case vignettes and to give as detailed data as they can, including, where it was appropriate, data according to special procedures, drugs etc.

Because of the long delays and omissions in data provision, the research team had to monitor strictly the data collection procedure.

[1] During the fall of 2006 a striking plan was adopted by the National Assembly, according to which 16,000 acute care beds are being eliminated from the system.

**Table 2. Data providers according to case-vignettes**

| | V1 appendectomy | V2 normal delivery | V3 hip replacament | V4 cataract | V5 stroke | V6 AMI | V7 cough | V8 colonoscopy | V9 tooth filling | V10 physiotherapy |
|---|---|---|---|---|---|---|---|---|---|---|
| *Hospital from Region1* | -- | -- | -- | -- | -- | -- | Not appl. | -- | -- | -- |
| *Hospital from Region2* | -- | -- | -- | -- | -- | -- | Not appl. | P5 | -- | -- |
| *Hospital from Region3* | -- | -- | -- | -- | -- | -- | Not appl. | -- | -- | -- |
| *Hospital from Region4* | P2 | P2 | P2 | P2 | P2 | P2 | Not appl. | P2 | D2 | P2 |
| *Hospital from Region5* | P1 | P1 | -- | P1 | P1 | P1 | Not appl. | P1 | D1 | P1 |
| | -- | -- | P6 | -- | -- | -- | | -- | -- | -- |
| *Hospital from Region6* | -- | -- | -- | -- | -- | -- | Not appl. | -- | -- | -- |
| *Hospital from Region7* | P3 | P3 | -- | -- | -- | -- | Not appl. | P3 | -- | P3 |
| *Outpatient clinic* | Not appl. | Not appl. | Not appl. | Not appl. | Not appl. | Not appl. | GP1 | Not appl. | Not appl. | P4 |
| *GPs* | Not appl. | Not appl. | Not appl. | Not appl. | Not appl. | Not appl. | GP2 GP3 GP4 GP5 | Not appl. | Not appl. | Not appl. |
| *Dentists* | Not appl. | Not appl. | Not appl. | Not appl. | Not appl. | Not appl. | Not appl. | Not appl. | D3 | Not appl. |

## II.3. SOURCES OF DATA AND COST CALCULATION

The survey was made in the autumn of 2006. So, the cost data and prices are from the year 2006. However, we applied the exchange-rate from 2005 (247.07 Ft/€).

The data providers experienced some challenges during data collection. The information systems in the hospitals are at different stage of development. Most hospitals were able to provide unit costs from their accounting systems, but resource use was mainly estimated by experts interviewed.

The GPs and dentists provided data based on estimation. However, for instance the unit costs for drugs come from national database.

Patient-level data in some hospitals could be accessed by the hospital coordinators, but not by the research team. The accounting and information systems at GPs and dentists do not make it possible to access patient-level data. (In Hungary, GPs have to provide detailed case-level data to the health insurance company only from September 2006.)

Overheads are mainly calculated by top-down approach, that is to say, e.g. hospital costs included in overheads are divided by total patient days. Interpretation of overheads may vary between providers.

We asked the providers for information about reimbursements for every vignette. These data come from the accounting system of the hospitals and dentists. However, we could not provide reimbursement data for cough-vignettes because the Hungarian GPs are paid for by capitation.

In Hungary, data providers were asked in the questionnaires to include 'costs directly spent with the respective case and costs which are not directly spent with the respective case per day (but are allocated to it proportionally) e.g. staff assemblies, studying documents' in personnel costs.

However, data providers had problems with the estimation of contact and non-contact time. Unit costs for personnel were mainly calculated by dividing the total personnel cost (gross salary plus additional related costs for employer) by the number of workable minutes, hours or patient days.

Unfortunately, one of the hospitals (its references: provider2 and dentist2) was not able to provide unit cost and number of units used per patient for every vignette. They could only provide personnel cost as a proportion of overhead. The research team extracted this proportion from the overhead and replaced into the personnel cost. However, because of this rough (not vignette-specific) estimation the personnel cost at this provider may be over- or underestimated and may bias the mean costs as well.

It is likely that calculation method of overhead costs varies between Hungarian hospitals. The research team did not determine common method, but providers should have listed the type of costs included in the overheads.

In the case of hospitals the source of the overhead cost data is the accounting system, while in the case of GPs the cost elements of overhead were mainly estimated by them.

The Hungarian hospitals and GPs generally included all medical and non-medical overhead costs, but there might be some variation in the cost types included. Depreciation is included by most of the providers. Opportunity costs and training costs were not estimated by providers. (In the case of provider2 and dentist2 the costs of administrative and other personnel are included in the costs of nursing care because of the above-mentioned rough estimation. Therefore it is likely to underestimate overheads and overestimate the costs of nursing care in the case of this provider.)

The apportionment of overheads was length of stay or session (calculated in patient days for inpatient vignettes, hours for outpatient vignettes and minutes for GPs).

Unfortunately some providers did not send as detailed data as the research team needed. As a result of this the data are aggregated only according to the main cost categories given in the questionnaire.

Unfortunately some providers sent the data in other structure than it was requested. These differences have rendered more difficult comparison and aggregation procedure of the data collected from different providers. The research team often had to ask for further refinement.

Finally, the research team tried to aggregate the data originated from different providers. In the third chapter these aggregated tables and cost data of each provider according to the main cost categories are presented for every case-vignette.

Because of the small case number, only the means of the costs in different categories were calculated. (There were not enough detailed data to calculate e.g. standard deviation because some of the providers sent only the average costs of the ten cases according to cost categories.)

## II.4. DIFFICULTIES DURING WP9

The time period of the data collection was not ideal for the Hungarian health care providers, namely because of the restructuring of the Hungarian hospital system the position of many hospitals became very precarious in these months. These uncertain circumstances made the staff in the hospitals more loaded and reluctant to cooperate.

At the data collection stage the following problems emerged: The information systems are at different state of development in different hospitals that means different workload during data collection. Some providers, e.g. GPs do not have detailed data reporting system about costs at case-level. The provided data were in different structure, it was time consuming to put this information into comparable structure.

Because of the above mentioned data collection procedure (i.e. the research team collected the data not directly but through a hospital coordinator), the application of some methods and definitions may differ from provider to provider. As a result of this, sometimes it was hard to compare and aggregate the data of different providers. For instance, different providers often determined different units of drugs and materials. (We suggested using daily doses as a unit of drugs. However, some of the providers used this while others used number or prepack of drugs.) Because of this the country-level mean of units used and unit costs of materials and drugs often can not be interpreted.

# III. CASE VIGNETTES

In the following part of the report we present the results of survey-based data collection about the cost of ten cases for each vignette in every provider.

## III.1. APPENDECTOMY

The description of case-vignette:

"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."

### III.1.1. INFORMATION ABOUT DATA PROVIDERS

Three hospitals (from the originally involved seven hospitals) were able to send the data for appendectomy-vignette.

**Table 3. Providers' characteristics, for appendectomy**

| | Hospital level | | | | | Department level | | Vignette level | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hospital | Number_of_beds | Capacity_utilization | Number_of_physicians | Number_of_nursing_staff | Number_of_other_staff | Number_of_beds | Number_of_physicians | Number_of_cases | Average_length_of_stay | %_open_surgery | %_laparo-scopic_surgery | Total_Cost (€) | Reimbursement (€) |
| P1 | 480 | 72.88 | 47 | 412 | 211 | 38 | 4 | 10 | 5.36 | 100 | 0 | 526.80 | 420.84 |
| P2 | 737 | 59.00 | 133 | 535 | 210 | 77 | 13 | 10 | 5.1 | 100 | 0 | 369.69 | 587.71 |
| P3 | 382 | 90.36 | 45 | 311 | 144 | 40 | 4 | 10 | 5 | 100 | 0 | 510.31 | 421 - 642 |

### III.1.2. TABLES OF COSTS

The data provided by the three hospitals show some differences in the cost structure (see Table 4.) caused by the difference in the process of care and by the different cost calculation methodology as well.

*Differences in cost calculation methodology*

Provider2 did not report data according to the suggested cost structure regarding the personnel cost because it could only provide personnel cost as a proportion of overhead. The research team extracted this proportion from the overhead and replaced into the personnel cost for normal ward. As a result, the personnel cost for normal ward may be overestimated and the personnel cost for operation and pre-operative care is underestimated. Another possible bias might be due to the fact that the costs of administrative personnel are included in the costs of nursing care. Therefore it is likely to underestimate overheads and overestimate the costs of nursing care in the case of this provider.

Provider1 has included the personnel cost of surgeon and OEP-nurses during operation into the OP-Theatre running costs.

Because of the lack of information about the personnel time of operation at provider2 and partly at provider1, mean value for this number of unit (minutes) is also underestimated.

In the case of provider3 the personnel cost for normal ward is calculated according to a different methodology as in the case of the other 2 providers. (Provider3 calculated cost of 20 minutes per day for physicians' time and 60 minutes per day for nursing time while the others calculated these costs for patient days as apportion base). Because of this the unit personnel cost for normal ward at provider3 is not comparable with the other providers' unit cost.

(In the case of the cost category of laboratory, the number of unit used per patient might be defined differently by provider1.)

*Possible differences in the process of care*

The most striking difference in the practice of the three providers is that provider3 has very high cost for drugs at operation compared to the others. (Provider3 reported the use of injection Midarine for €209 unit cost.) Provider3 also has higher cost for OP-Theatre running costs than the others.

*Some other comments*

Unit costs for overheads significantly differ at the three providers. These differences can not be explained by the different size of providers.

**Table 4. Costs of three providers (P1, P2, P3) and their average costs by categories, for appendectomy**

| AVERAGE OF 3 PROVIDERS (30 CASES) | | | | | | P1 | | | P2 | | | P3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Phase** | **Elements** | **Units** | **No. of units used/ patient** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used/ patient** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used/ patient** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used/ patient** | **Unit Cost €/Unit** | **Total costs €** |
| Pre-operative (admission and planning) | *Diagnostic Procedures* | | | | | | | | | | | | | |
| | Imaging (e.g. ultrasound) | No. | 0.67 | 5.20 | 3.46 | 0.00 | 0.00 | 0.00 | 1.00 | 5.20 | 5.20 | 1.00 | 5.20 | 5.20 |
| | Laboratory (e.g. blood count) | No. | 5.00 | 0.94 | 4.70 | 13.00 | 0.39 | 5.03 | 1.00 | 3.90 | 3.90 | 1.00 | 5.16 | 5.16 |
| | Laboratory (e.g. blood coagulation, C-reactive protein (CRP), etc.) | No. | 3.33 | 2.74 | 9.13 | 8.00 | 2.29 | 18.31 | 1.00 | 3.26 | 3.26 | 1.00 | 5.82 | 5.82 |
| | Other (ECG, etc.) | No. | 1.00 | 1.53 | 1.53 | 1.00 | 1.89 | 1.89 | 1.00 | 1.70 | 1.70 | 1.00 | 1.00 | 1.00 |
| | *Care before OP* | | | | | | | | | | | | | |
| | Surgeon/Physician input | Patient days | 1.00 | 19.01 | 19.01 | 3.00 | 19.01 | 57.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Nursing input | Patient days | 1.00 | 44.02 | 44.02 | 3.00 | 44.02 | 132.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Other (paramedical) | Patient days | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | *Drugs, infusions, injections, etc.* | No. / prepack | 1.67 | 2.27 | 3.79 | 2.00 | 0.47 | 0.94 | 0.00 | 0.00 | 0.00 | 3.00 | 3.47 | 10.42 |
| Operation | OP-Team (altogether or separately) | Min. | | | | | | | | | | | | |
| | Surgeon | Min. | 10.00 | 0.16 | 1.61 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 30.00 | 0.16 | 4.82 |
| | Anaesthetist | Min. | 28.33 | 0.31 | 8.80 | 40.00 | 0.41 | 16.39 | 0.00 | 0.00 | 0.00 | 45.00 | 0.22 | 10.01 |
| | OP-nurses etc. | Min. | 16.67 | 0.09 | 1.47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 50.00 | 0.09 | 4.42 |
| | Drugs (anaesthetics, other?) | No. / prepack | 6.47 | 14.35 | 92.80 | 3.00 | 6.67 | 20.01 | 11.40 | 1.00 | 11.35 | 5.00 | 49.41 | 247.04 |
| | OP-Theatre running costs (e.g. sterilisation) | Min. | 56.67 | 1.90 | 107.76 | 60.00 | 1.39 | 83.25 | 40.00 | 1.80 | 71.90 | 70.00 | 2.40 | 168.12 |
| Wake-up room | Personnel | Hours | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Post-operative | *Normal Ward* | | | | | | | | | | | | | |
| | Surgeon/Physician | Patient days | 4.37 | 11.71 | 51.12 | 3.00 | 19.01 | 57.04 | 5.10 | 17.00 | 86.70 | 5.00 | 1.93 | 9.64 |
| | Nursing | Patient days | 4.37 | 11.08 | 48.39 | 3.00 | 14.67 | 44.02 | 5.10 | 17.00 | 86.70 | 5.00 | 2.89 | 14.45 |
| | Other (e.g. Physiotherapy) | Patient days | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Drugs | No. / prepack | 6.97 | 1.25 | 8.68 | 4.00 | 0.57 | 2.27 | 14.90 | 1.45 | 21.56 | 2.00 | 1.10 | 2.20 |
| | Diagnostic Procedures | No. | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Therapeutic Procedures | No. | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Overhead | Total | Patient days | 4.37 | 14.35 | 62.66 | 3.00 | 29.52 | 88.55 | 5.10 | 15.18 | 77.44 | 5.00 | 4.40 | 22.00 |
| **Total costs ( € )** | | | | | **468.93** | | | 526.80 | | | 369.69 | | | 510.31 |

## III.1.3. REIMBURSEMENT FOR APPENDECTOMY

The reimbursement for appendectomy varies between 421 € and 642 € according to the data of the three providers. The reimbursement exceeds the mean cost at provider2 and provider3 however, provider1 has deficit for appendectomy.

## III.1.4. DISCUSSION

Although the average total costs at provider1 and provider2 are very similar the cost structures are quite different. The proportion of the cost of operation (running costs and drug cost) at provider3 is much higher and the other personnel costs and overheads are much lower than at provider1.

## III.2. NORMAL DELIVERY

The description of the case-vignette:

"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)."

### III.2.1. INFORMATION ABOUT DATA PROVIDERS

Three hospitals (from the originally involved seven hospitals) were able to send the data for delivery-vignette.

**Table 5. Providers' characteristics, for delivery**

| | Hospital level | | | | | Department level | | Vignette level | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hospital | Number_of_beds | Capacity_utilization | Number_of_physicians | Number_of_nursing_staff | Number_of_other_staff | Number_of_beds | Number_of_physicians | Number_of_cases | Average_length_of_stay | Total_Cost (€) | Reimbursement (€) |
| P1 | 480 | 72.88 | 47 | 412 | 211 | 28 | 8 | 10 | 3.15 | 288.85 | 343.93 |
| P2 | 737 | 75.2 | 133 | 535 | 210 | 58 | 17 | 10 | 5.7 | 616.42 | 343.93 |
| P3 | 382 | 90.36 | 45 | 311 | 144 | 25 | 4 | 10 | 5 | 121.44 | 343.93 |

### III.2.2. TABLES OF COSTS

The data provided by the three hospitals show some differences in the cost structure (see Table 6.) which were caused by the difference in the process of care and by the different cost calculation methodology as well.

*Differences in cost calculation methodology*

Provider2 did not report data according to the suggested cost structure regarding the personnel cost because it could only provide personnel cost as a proportion of overhead. The research team extracted this proportion from the overhead and replaced into the personnel cost for normal ward. As a result, the personnel cost for normal ward may be overestimated and the personnel cost for delivery and pre-delivery care is underestimated. Another possible bias might be due to the fact that the costs of administrative personnel are included in the costs of nursing care. Therefore it is likely to underestimate overheads and overestimate the costs of nursing care in the case of this provider.

Provider1 has included the delivery room running costs into the overheads. The included elements of delivery room running costs may vary between provider2 and provider3.

Because of the lack of information about the personnel time of delivery at provider2, mean value for this number of unit (minutes) is also underestimated.

*Possible differences in the process of care*

In the case of provider3 the personnel cost for midwife and nursing during pre- and post-delivery care is much lower than in the case of the other providers.

*Some other comments*

The unit of delivery room running costs was calculated in number, not in minutes.

There is different calculation methodology in personnel cost depending on the unit (patient days or minutes). The personnel unit cost in patient days is not proportional to the personnel unit cost in minutes because staff does not spend the whole day with the given patient, just part of it.

In the case of diagnostic procedures during post-delivery care, the unit and number of unit used per patient might be defined differently by provider1 than by the others.

**Table 6. Costs of three providers (P1, P2, P3) and their average costs by categories, for delivery**

| AVERAGE OF 3 PROVIDERS (30 CASES) | | | | | | P1 | | | P2 | | | P3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Phase** | **Elements** | **Units** | **No. of units used/ patient** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used/ patient** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used/ patient** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used/ patient** | **Unit Cost €/Unit** | **Total costs €** |
| Pre-delivery (admission and planning) | *Diagnostic Procedures* | | | | | | | | | | | | | |
| | Imaging (e.g. ultrasound) | No. | 0.87 | 5.04 | 4.37 | 2.00 | 5.37 | 10.75 | 0.40 | 3.29 | 1.32 | 0.20 | 5.20 | 1.04 |
| | Laboratory (e.g. blood count) | No. | 2.10 | 2.30 | 4.84 | 6.00 | 2.18 | 13.07 | 0.00 | 0.00 | 0.00 | 0.30 | 4.84 | 1.45 |
| | Laboratory (e.g. blood coagulation, C-reactive protein (CRP), etc.) | No. | 0.10 | 2.32 | 0.23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | 2.32 | 0.70 |
| | Microbiology (e.g. examination of swap) | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Cardiotocography | No. | 1.13 | 0.61 | 0.69 | 1.00 | 0.36 | 0.36 | 1.40 | 0.72 | 1.00 | 1.00 | 0.72 | 0.72 |
| | Other (ECG, lung-function, etc.) | No. | 3.33 | 1.70 | 5.65 | 0.00 | 0.00 | 0.00 | 10.00 | 1.70 | 16.95 | 0.00 | 0.00 | 0.00 |
| | *Care before delivery* | | | | | | | | | | | | | |
| | Obstetrician input | Patient days | 0.67 | 4.73 | 3.15 | 1.00 | 4.76 | 4.76 | 0.00 | 0.00 | 0.00 | 1.00 | 4.71 | 4.71 |
| | Midwife input | Patient days | 0.67 | 17.05 | 11.37 | 1.00 | 30.34 | 30.34 | 0.00 | 0.00 | 0.00 | 1.00 | 3.76 | 3.76 |
| | Other (paramedical) | Patient days | 0.33 | 2.89 | 0.96 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 2.89 | 2.89 |
| | *Drugs, infusions, injections, etc.* | No. / prepack | 0.30 | 5.83 | 1.75 | 0.50 | 8.32 | 4.16 | 0.00 | 0.00 | 0.00 | 0.40 | 2.72 | 1.09 |
| Delivery | Delivery Team | Min. | | | | | | | | | | | | |
| | Midwife | Min. | 100.00 | 0.06 | 6.14 | 60.00 | 0.06 | 3.37 | 0.00 | 0.00 | 0.00 | 240.00 | 0.06 | 15.06 |
| | Obstetrician | Min. | 50.00 | 0.08 | 3.94 | 60.00 | 0.08 | 4.76 | 0.00 | 0.00 | 0.00 | 90.00 | 0.08 | 7.06 |
| | Anaesthetist | Min. | 7.33 | 0.39 | 2.85 | 20.00 | 0.41 | 8.19 | 0.00 | 0.00 | 0.00 | 2.00 | 0.17 | 0.35 |
| | Paediatrician | Min. | 13.33 | 0.11 | 1.51 | 20.00 | 0.14 | 2.90 | 0.00 | 0.00 | 0.00 | 20.00 | 0.08 | 1.64 |
| | Delivery room running costs (e.g. sterilisation) | No. | 89.97 | 0.46 | 41.05 | 0.00 | 0.00 | 0.00 | 264.20 | 0.43 | 112.88 | 5.70 | 1.80 | 10.27 |
| Post-delivery (normal ward for mother and child) | Obstetrician | Patient days | 5.23 | 11.27 | 58.98 | 5.00 | 1.45 | 7.24 | 5.70 | 28.33 | 161.49 | 5.00 | 1.64 | 8.20 |
| | Nursing | Patient days | 5.23 | 15.12 | 79.11 | 5.00 | 12.60 | 63.00 | 5.70 | 28.33 | 161.49 | 5.00 | 2.57 | 12.85 |
| | Other (e.g. Physiotherapy) | Patient days | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Drugs | No. / prepack | 1.96 | 1.84 | 3.60 | 1.08 | 1.09 | 1.18 | 0.00 | 0.00 | 0.00 | 4.80 | 2.00 | 9.62 |
| | Diagnostic procedures of mother and child (e.g. imaging, laboratory: blood count, bilirubine) | No. | 8.93 | 1.14 | 10.17 | 2.00 | 1.16 | 2.31 | 22.00 | 0.81 | 17.77 | 2.80 | 3.73 | 10.44 |
| | Therapeutic procedures (e.g. punctures, drainages, special wound dressing) | No. | 0.17 | 8.32 | 1.39 | 0.50 | 8.32 | 4.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Over head | Total | Patient days | 5.23 | 19.20 | 100.48 | 5.00 | 25.66 | 128.31 | 5.70 | 25.18 | 143.51 | 5.00 | 5.92 | 29.61 |
| **Total costs ( € )** | | | | | **342.24** | | | 288.85 | | | 616.42 | | | 121.44 |

### III.2.3. REIMBURSEMENT FOR DELIVERY

The reimbursement for normal delivery is about 343.93 € for all of the three providers. The reimbursement exceeds the mean cost at provider1 and provider3 however, provider2 has deficit for delivery. However, the average total cost of the three providers (342.24 €) is just covered by the reimbursement.

### III.2.4. DISCUSSION

Provider3 has much lower total cost for normal delivery than the others. It is caused mainly by the lower personnel cost for midwife and nursing and by the lower overhead unit cost at provider3.

The high total cost at provider2 comes from the higher personnel cost and delivery room running cost which might be because of the different calculation methodology.

## III.3. HIP-REPLACEMENT

The description of case-vignette:

"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)."

### III.3.1. INFORMATION ABOUT DATA PROVIDERS

One hospital (from the originally involved seven hospitals) was able to send the data for hip-replacement vignette. Finally, we selected one more hospital from the Central Transdanubia region to provide data for hip-replacement vignette.

**Table 7. Providers' characteristics, for hip-replacement**

| | Hospital level | | | | | Department level | | Vignette level | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hospital | Number_of_beds | Capacity_utilization | Number_of_physicians | Number_of_nursing_staff | Number_of_other_staff | Number_of_beds | Number_of_physicians | Number_of_cases | Average_length_of_stay | %_cemented | %_non-cemented | %_partially_cemented | %_combined_rehabilitation | Total_Cost (€) | Reimbursement (€) |
| P2 | 737 | 52.30% | 133.00 | 535.00 | 210.00 | 48 | 10 | 10 | 13.1 | 100.00% | 0.00% | 0.00% | 10% | 1289.71 | 1819.29 |
| P6 | 1033 | 72.30% | 207.00 | 716.00 | 592.00 | 20 | 4 | 10 | 12.7 | 100.00% | 0.00% | 0.00% | 10% | 1297.90 | 1770.57 |

### III.3.2. TABLES OF COSTS

The data provided by the two hospitals show some differences in the cost structure (Table 8.) which might be caused mainly by the different cost calculation methodologies.

*Differences in cost calculation methodology*

Provider2 did not report data according to the suggested cost structure regarding the personnel cost because it could only provide personnel cost as a proportion of overhead. The research team extracted this proportion from the overhead and replaced into the personnel cost for normal ward. As a result, the personnel cost for normal ward may be overestimated and the personnel cost for operation is underestimated. Another possible bias might be due to fact that the costs of administrative personnel are included in the costs of nursing care. Therefore it is likely to underestimate overheads and overestimate the costs of nursing care in the case of this provider.

Because of the lack of information about the personnel time of delivery at provider2, mean value for this number of unit (minutes) is also underestimated.

*Some other comments*

The unit costs for OP-Theatre running costs can not be compared because provider6 calculated it in minutes and provider2 calculated it in number.

Provider6 was not able to give information about the unit and unit cost of drugs.

**Table 8. Costs of two providers (P2, P6) and their average costs by categories, for hip-replacement**

| AVERAGE OF 2 PROVIDERS (20 CASES) | | | | | | P2 | | | P6 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Phase** | **Elements** | **Units** | **No. of units used/ patient** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used/ patient** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used/ patient** | **Unit Cost €/Unit** | **Total costs €** |
| Pre-operative (admission and planning) | *Diagnostic Procedures* | | | | | | | | | | |
| | Imaging (e.g. X-Ray) | No. | 1.15 | 3.97 | 4.56 | 1.00 | 4.18 | 4.18 | 1.30 | 3.80 | 4.95 |
| | Laboratory (e.g. blood count) | No. | 1.00 | 3.90 | 3.90 | 2.00 | 3.90 | 7.79 | 0.00 | 0.00 | 0.00 |
| | Laboratory (e.g. blood coagulation, C-reactive protein (CRP), etc.) | No. | 0.80 | 3.58 | 2.87 | 1.00 | 3.26 | 3.26 | 0.60 | 4.13 | 2.48 |
| | Other (ECG, lung-function, etc.) | No. | 1.50 | 1.91 | 2.87 | 1.00 | 1.70 | 1.70 | 2.00 | 2.02 | 4.04 |
| | *Care before OP* | | | | | | | | | | |
| | Surgeon/Physician input | Patient days | | | | | | | | | |
| | Nursing input | Patient days | | | | | | | | | |
| | Other (paramedical) | Patient days | | | | | | | | | |
| | *Drugs, infusions, injections, etc.* | No. / prepack | | | | | | | | | |
| Operation | *Devices (type of implant, stent, etc.) total price paid by hospital* | No. | 3.00 | 160.58 | 481.74 | 4.00 | 111.55 | 446.21 | 2.00 | 258.64 | 517.28 |
| | OP-Team (altogether or separately) | Min. | | | | | | | | | |
| | Surgeon | Min. | 180.00 | 0.13 | 22.82 | 0.00 | 0.00 | 0.00 | 360.00 | 0.13 | 45.63 |
| | Anaesthetist | Min. | 150.00 | 0.16 | 23.81 | 0.00 | 0.00 | 0.00 | 300.00 | 0.16 | 47.62 |
| | OP-nurses etc. | Min. | 150.00 | 0.06 | 9.26 | 0.00 | 0.00 | 0.00 | 300.00 | 0.06 | 18.53 |
| | Drugs (anaesthetics, other?) | No. / prepack | 5.40 | 1.61 | 8.70 | 5.40 | 0.75 | 4.05 | | | 13.36 |
| | OP-Theatre running costs (e.g. sterilisation) | Min./ No. | 233.50 | 0.20 | 47.76 | 327.00 | 0.25 | 80.32 | 140.00 | 0.11 | 15.20 |
| Wake-up room | | | | | | | | | | | |
| Post-operative | *Normal Ward* | | | | | | | | | | |
| | Surgeon/Physician | Patient days | 12.90 | 10.50 | 135.49 | 13.10 | 17.00 | 222.69 | 12.70 | 3.80 | 48.29 |
| | Nursing | Patient days | 12.90 | 26.45 | 341.15 | 13.10 | 17.00 | 222.69 | 12.70 | 36.19 | 459.60 |
| | Other (e.g. Physiotherapy) | Patient days | 0.15 | 1.69 | 0.25 | 0.00 | 0.00 | 0.00 | 0.30 | 1.69 | 0.51 |
| | Drugs | No. / prepack | 27.90 | 2.29 | 63.79 | 27.90 | 3.44 | 95.96 | | | 31.62 |
| | Diagnostic Procedures (e.g. imaging, laboratory) | No. | 1.35 | 4.82 | 6.51 | 1.00 | 6.86 | 6.86 | 1.70 | 3.62 | 6.16 |
| | Therapeutic Procedures | No. | | | | | | | | | |
| Discharge planning | Drugs given to patient until contact with GP | No. / prepack | | | | | | | | | |
| | Medical aids given to patient | Units | | | | | | | | | |
| | Planned Re-admissions (when part of care episode) | | | | | | | | | | |
| Over head | Total | Patient days | 12.90 | 10.72 | 138.32 | 13.10 | 14.81 | 194.00 | 12.70 | 6.51 | 82.64 |
| **Total costs ( € )** | | | | | **1293.80** | | | 1289.71 | | | 1297.90 |

## III.3.3. REIMBURSEMENT FOR HIP-REPLACEMENT

The reimbursement for hip-replacement varies between 1770.57 € and 1819.29 € according to the data of the two providers. The reimbursement exceeds the total costs (1289.71€ and 1297.9 €) at provider2 and provider6, too.

## III.3.4. DISCUSSION

The total costs for hip-replacement vignette are very close at the two providers although there are some differences in cost-structure. The unit cost for overhead is higher at provider2 while the personnel cost is higher at provider6 however these differences can be due to the different cost calculation methodologies.

# III.4. CATARACT

The description of case-vignette:

"(day-surgery/out-patient procedure): 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 put on the operating list. The case vignette concerns the actual operation in the hospital/ ophtalmologist'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)."

## III.4.1. INFORMATION ABOUT DATA PROVIDERS

Two hospitals (from the originally involved seven hospitals) were able to send the data for cataract.

**Table 9. Providers' characteristics, for cataract**

| | | | | Provider level | | | | | Department level | | Vignette level | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provider | hospital_ setting (0=no; 1=yes) | outpatient_ dep_of_hospital (0=no; 1=yes) | outpatient_ setting (0=no; 1=yes) | Number_ of_beds | Capacity_ utilization | Number_of_ physicians | Number_of_ nursing_staff | Number_of_ other_staff | Number_of_ beds | Number_of_ physicians | Number_of_ cases | Average_ length_of_stay | type_of_lense_ soft (in%) | type_of_lense_ rigid (in%) | Total_Cost (€) | Reimbursement (€) |
| P1 | 0 | 1 | 0 | 480 | 72.88 | 47 | 412 | 211 | 12 | 3 | 10 | 3.42 | 70.00% | 30.00% | 175.13 | 550.80 |
| P2 | 1 | 0 | 0 | 737 | 51.70 | 133 | 535 | 210 | 20 | 8 | 10 | 1.2 | 100.00% | 0.00% | 402.89 | 553.92 |

## III.4.2. TABLES OF COSTS

The data provided by the two hospitals show some differences in the cost structure (see Table 10.) which are caused by the difference in the process of care and by the different cost calculation methodology as well.

*Differences in cost calculation methodology*

In the case of provider1, the personnel cost of OP-Team is included into the OP-Theatre running costs. These personnel cost at provider1 is given separately from running cost. Nevertheless the unit cost of OP-Theatre running costs is higher for provider2 than for provider1. As a result, the mean personnel cost for OP-Team is underestimated.

*Possible differences in the process of care*

The total cost of drugs and devices are higher at provider2 than at provider1

*Some other comments*

The unit costs of overhead are not comparable between the two providers because provider1 calculated it in minutes while provider2 calculated it in patient days.

**Table 10. Costs of two providers (P1, P2) and their average costs by categories, for cataract**

| AVERAGE OF 2 PROVIDERS (20 CASES) | | | | | | P1 | | | P2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Phase** | **Elements** | **Units** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** |
| Site of consultation / operation | O Physicians' office<br>X Out-patient department of hospital | | | | | | | | | | |
| Pre-operative assessment | *Diagnostic Procedures* | No. | | | | | | | | | |
| | Slit-lamp, other? | No. | 1.50 | 0.48 | 0.72 | 3.00 | 0.48 | 1.44 | 0.00 | 0.00 | 0.00 |
| | Laboratory (e.g. blood count, INR, CRP, etc.) | No. | 3.50 | 0.71 | 2.50 | 6.00 | 0.18 | 1.10 | 1.00 | 3.90 | 3.90 |
| | Other (ECG, lung-function, etc.) | No. | 0.50 | 1.70 | 0.85 | 0.00 | 0.00 | 0.00 | 1.00 | 1.70 | 1.70 |
| Procedure | *Devices (type of intra-ocular lens.) total price paid by hospital* | | 1.50 | 129.71 | 194.57 | 1.00 | 129.52 | 129.52 | 2.00 | 129.81 | 259.62 |
| | OP-Team (altogether or separately) | Min. | | | | | | | | | |
| | Surgeon | Min. | 30.00 | 0.34 | 10.20 | 30.00 | | 0.00 | 30.00 | 0.68 | 20.40 |
| | Anaesthetist | Min. | | | | | | | | | |
| | OP-nurses etc. | Min. | 30.00 | 0.34 | 10.20 | 30.00 | | 0.00 | 30.00 | 0.68 | 20.40 |
| | Drugs (anaesthetics, other?) | No. / prepack | 9.00 | 2.75 | 24.79 | 8.00 | 0.18 | 1.44 | 10.00 | 4.81 | 48.14 |
| | OP-Theatre running costs (e.g. sterilisation) | Min. | 30.00 | 0.84 | 25.07 | 30.00 | 0.73 | 22.02 | 30.00 | 0.94 | 28.12 |
| After-Care | Drugs or other given by provider | No. | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Over head | Running Costs of ambulatory service (overhead) | Min./ Patient days | 15.60 | 1.29 | 20.11 | 30.00 | 0.65 | 19.60 | 1.20 | 17.17 | 20.61 |
| **Total costs ( € )** | | | | | **289.01** | | | 175.13 | | | 402.89 |

## III.4.3. REIMBURSEMENT FOR CATARACT

The reimbursement for cataract is between 550.8 € and 553.92 € that exceeds the total cost at provider1 and provider2 as well.

## III.4.4. DISCUSSION

The total cost for cataract is much lower at provider1 than at provider2. Provider1 has lower personnel cost, lower cost of devices and drugs.

In the case of cataract-vignette provider1 services as an outpatient department of hospital setting and provider2 works as a hospital setting. (The average length of stay in table 9. might be in hours for provider1 and in patient days for provider2.)

# III.5. STROKE

The description of the case-vignette:

"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."

## III.5.1. INFORMATION ABOUT DATA PROVIDERS

Two hospitals (from the originally involved seven hospitals) were able to send the data for stroke.

**Table 11. Providers' characteristics, for stroke**

| | Hospital level | | | | | Department level | | Vignette level | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hospital | Number_of_beds | Capacity_utilization | Number_of_physicians | Number_of_nursing_staff | Number_of_other_staff | Number_of_beds | Number_of_physicians | Number_of_cases | Average_length_of_stay | %_of_cases_with_lysis | %_send_to_rehabilitation | Total_Cost (€) | Reimbursement (€) |
| P1 | 480 | 72.88 | 47 | 412 | 211 | 30 | 1 | 10 | 8.94 | 0.00% | 5.00% | 736.34 | 620.79 |
| P2 | 737 | 91.1 | 133 | 535 | 210 | 40 | 5 | 10 | 9.6 | 0.00% | 20.00% | 520.45 | 495.39 |

## III.5.2. TABLES OF COSTS

The data provided by the two hospitals show some differences in the cost structure (see Table 12.) which are caused by the difference in the process of care and by the different cost calculation methodology as well.

*Differences in cost calculation methodology*

Provider2 did not report data according to the suggested cost structure regarding the personnel cost because it could only provide personnel cost as a proportion of overhead. The research team extracted this proportion from the overhead and replaced into the personnel cost for stroke unit. A possible bias might be due to the fact that the costs of administrative personnel are included in the costs of nursing care. Therefore it is likely to underestimate overheads and overestimate the costs of nursing care in the case of this provider.

The nursing care at provider1 might be included into the overhead costs.

*Possible differences in the process of care*

Provider1 reported much higher proportion of cost of drugs in total cost while provider2 reported drug cost only in the main therapy. (This might be only because of the different cost calculation methodologies.) Another difference is that provider1 has cost for discharge planning while provider2 has not.

*Some other comments:*

The personnel unit cost for physicians and nursing is not comparable between provider1 and provider2 because of the different cost calculation methodologies. As a result of this, we can not interpret the mean values for these unit costs.

It is likely that provider1 calculated number of units used for physician time and overhead quite differently than provider2. (The average length of stay at provider1 is not 32.00 days but 8.94 days. So, this number should come from a different calculation methodology.)

**Table 12. Costs of two providers (P1, P2) and their average costs by categories, for stroke**

**AVERAGE OF 2 PROVIDERS (20 CASES)**

| Phase | Stroke | Units | No. of units used | Unit Cost €/Unit | Total costs € | P1 No. of units used | P1 Unit Cost €/Unit | P1 Total costs € | P2 No. of units used | P2 Unit Cost €/Unit | P2 Total costs € |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Emergency dpt. | Nursing | Hours | 1.00 | 21.33 | 21.33 | 2.00 | 21.33 | 42.67 | 0.00 | 0.00 | 0.00 |
| Initial diagnosis (Assessment) | *Diagnostic Procedures* | | | | | | | | | | |
| | Imaging (e.g., CT) | No. | 1.00 | 22.70 | 22.70 | 1.00 | 24.43 | 24.43 | 1.00 | 20.97 | 20.97 |
| | Imaging (e.g., MRI) | No. | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Imaging (e.g., echo-doppler) | No. | 0.10 | 1.88 | 0.19 | 0.00 | 0.00 | 0.00 | 0.20 | 1.88 | 0.38 |
| | Imaging (e.g., angiogram) | No. | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Laboratory (e.g. blood sugar, etc.) | No. | 7.60 | 1.07 | 8.10 | 14.00 | 0.82 | 11.53 | 1.20 | 3.90 | 4.68 |
| | Other | No. | 1.00 | 1.80 | 1.80 | 1.00 | 1.90 | 1.90 | 1.00 | 1.70 | 1.70 |
| Main Therapy | Lysis | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Drugs | No. / prepack | 27.85 | 0.47 | 12.99 | 2.00 | 2.07 | 4.14 | 53.70 | 0.41 | 21.84 |
| Hospital care (convalescence) | *Intermediate Care Unit (Stroke unit)* | | | | | | | | | | |
| | Physicians | Patient days | 20.80 | 5.59 | 116.33 | 32.00 | 2.17 | 69.48 | 9.60 | 17.00 | 163.19 |
| | Nursing | Patient days | 4.80 | 17.00 | 81.60 | 0.00 | 0.00 | 0.00 | 9.60 | 17.00 | 163.19 |
| | Other | Patient days | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Drugs | No. / prepack | 112.00 | 0.75 | 83.65 | 224.00 | 0.75 | 167.29 | 0.00 | 0.00 | 0.00 |
| | Diagnostic procedures (e.g. imaging, laboratory) | No. | 6.00 | 1.10 | 6.58 | 12.00 | 1.10 | 13.16 | 0.00 | 0.00 | 0.00 |
| | Other therapeutic procedures | No. | 2.80 | 0.83 | 2.31 | 0.00 | 0.00 | 0.00 | 5.60 | 0.83 | 4.62 |
| | *Normal Ward* | | | | | | | | | | |
| | Physicians | Patient days | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Nursing | Patient days | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Other | Patient days | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Drugs | No. / prepack | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Diagnostic procedures | No. | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | *Early rehabilitation* | | | | | | | | | | |
| | Physiotherapist | Patient days | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Speech therapist | Patient days | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Other | Patient days | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Discharge planning | Drugs given to patient until contact with GP | No. / prepack | 3.25 | 0.04 | 0.13 | 6.50 | 0.04 | 0.27 | 0.00 | 0.00 | 0.00 |
| | Medical aids given to patient | Units | 1.50 | 0.30 | 0.44 | 3.00 | 0.30 | 0.89 | 0.00 | 0.00 | 0.00 |
| Over head | Total | Patient days | 20.80 | 12.99 | 270.24 | 32.00 | 12.52 | 400.60 | 9.60 | 14.57 | 139.88 |
| **Total costs ( € )** | | | | | **628.39** | | | 736.34 | | | 520.45 |

## III.5.3. REIMBURSEMENT FOR STROKE

The reimbursement for stroke is 495.39 € for provider2 and 620.79 € for provider1. The reimbursements do not cover the costs for stroke according to the data of these two providers (520.45 € and 736.34 €).

### III.5.4. DISCUSSION

The higher cost for stroke at provider1 is caused by the higher overhead cost according to the cost structure. However, to explain this difference we should know the real content of the overhead cost at provider1. There is an important difference in cost calculation methodology.

## III.6. AMI

The description of case-vignette:

"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."

### III.6.1. INFORMATION ABOUT DATA PROVIDERS

Two hospitals (from the originally involved seven hospitals) were able to send the data for AMI.

**Table 13. Providers' characteristics, for AMI**

| | Hospital level | | | | | Department level | | Vignette level | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hospital | Number_of_beds | Capacity_utilization | Number_of_physicians | Number_of_nursing_staff | Number_of_other_staff | Number_of_beds | Number_of_physicians | Number_of_cases | Average_length_of_stay | Number_of_Cardiac_catheter_examination_per_case | Number_of_PTCA_per_case | Number_of_stents_per_case | Number_of_drug-eluting_stents_per_case | Total_Cost (€) | Reimbursement (€) |
| P1 | 480 | 72.88 | 47 | 412 | 211 | 80 | 1 | 10 | 10.41 | 0.00 | 0.00 | 0.00 | 0.00 | 308.91 | 615.73 |
| P2 | 737 | 86.4 | 133 | 535 | 210 | 63 | 11 | 10 | 7.4 | 90.00 | 0.00 | 0.00 | 0.00 | 483.11 | 1001.99 |

### III.6.2. TABLES OF COSTS

The data provided by the two hospitals show some differences in the cost structure (see Table 14.), which are caused by the difference in the process of care and by the different cost calculation methodology as well.

*Differences in cost calculation methodology*

Provider2 did not report data according to the suggested cost structure regarding the personnel cost because it could only provide personnel cost as a proportion of overhead. The research team extracted this proportion from the overhead and replaced into the personnel cost for intensive care unit. A possible bias might be due to the fact that the costs of administrative personnel are included in the

costs of nursing care. Therefore it is likely to underestimate overheads and overestimate the costs of nursing care in the case of this provider.

*Possible differences in the process of care*

Provider2 spent more money on the initial diagnosis phase than provider1.

Provider2 has not reported any cost for main therapy because they transfer the patients to another provider for main therapy (according to the interviews) while provider1 has cost for lysis and drugs during the main therapy.

*Some other comments*

The providers defined unit of diagnostic procedures differently therefore the unit cost of this may not be comparable.

(Provider2 reported a few cost for diagnostic procedure in normal ward however, there are no reported costs for staff in normal ward.)

**Table 14. Costs of two providers (P1, P2) and their average costs by categories, for AMI**

| AVERAGE OF 2 PROVIDERS (20 CASES) | | | | | | P1 | | | P2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Phase** | **AMI** | **Units** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** |
| Emerg-ency dpt. | Nursing | Hours | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Initial diagnosis (Assessment) | *Diagnostic Procedures* | | | | | | | | | | |
| | Imaging (e.g., Echocardiogram) | No. | 0.50 | 6.99 | 3.49 | 0.00 | 0.00 | 0.00 | 1.00 | 6.99 | 6.99 |
| | Imaging (e.g., Angiography) | No. | 0.05 | 6.50 | 0.33 | 0.00 | 0.00 | 0.00 | 0.10 | 6.50 | 0.65 |
| | Imaging (e.g., Scintigraphy etc.) | No. | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Laboratory (e.g., creatine kinase) | No. | 12.10 | 2.48 | 30.04 | 20.00 | 0.96 | 19.14 | 4.20 | 9.75 | 40.94 |
| | Laboratory (e.g., troponin, etc.) | No. | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Other (Electrocardiography etc.) | No. | 3.95 | 2.05 | 8.08 | 4.00 | 2.12 | 8.48 | 3.90 | 1.97 | 7.69 |
| Therap y | Lysis | No. / prepack | 0.50 | 66.38 | 33.19 | 1.00 | 66.38 | 66.38 | 0.00 | 0.00 | 0.00 |
| | Drugs | No. / prepack | 25.50 | 0.41 | 10.46 | 51.00 | 0.41 | 20.91 | 0.00 | 0.00 | 0.00 |
| | PTCA, stenting | No. | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hospital care (convalescence) | *Intensive Care Unit* | | | | | | | | | | |
| | Physicians | Patient days | 6.20 | 10.96 | 67.96 | 5.00 | 2.02 | 10.12 | 7.40 | 17.00 | 125.79 |
| | Nursing | Patient days | 6.20 | 11.61 | 71.99 | 5.00 | 3.64 | 18.18 | 7.40 | 17.00 | 125.79 |
| | Other | Patient days | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Drugs | No. / prepack | 82.10 | 0.56 | 45.57 | 59.00 | 0.59 | 35.02 | 105.20 | 0.53 | 56.12 |
| | Diagnostic procedures | No. | 12.95 | 2.06 | 26.69 | 25.00 | 1.95 | 48.81 | 0.90 | 5.08 | 4.57 |
| | Other therapeutic procedures | No. | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 |
| | *Normal Ward* | | | | | | | | | | |
| | Physicians | Patient days | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Nursing | Patient days | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Other | Patient days | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Drugs | No. / prepack | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Diagnostic Procedures | No. | 0.30 | 6.01 | 1.80 | 0.00 | 0.00 | 0.00 | 0.60 | 6.01 | 3.61 |
| | *Early rehabilitation (if during hospital stay)* | | | | | | | | | | |
| | Physiotherapist | Patient days | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| e planning | Drugs given to patient until contact with GP | No. / prepack | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Medical aids given to patient | Units | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Over head | Total | Patient days | 6.20 | 15.55 | 96.41 | 5.00 | 16.38 | 81.88 | 7.40 | 14.99 | 110.95 |
| **Total costs ( € )** | | | | | **396.01** | | | 308.91 | | | 483.11 |

### III.6.3. REIMBURSEMENT FOR AMI

According to the data of the two providers, the reimbursement for AMI-vignette (615.73 € and 1001.99 € ) is twice as much as the cost of the care (308.91 € and 483.11 €).

### III.6.4. DISCUSSION

The difference in total cost is due to the much higher personnel cost at provider2. (There could be some difference in calculation methodologies behind this.) The cost structure of intensive care unit differs between the two providers, the proportion of the personnel cost at provider1 is much less than at provider2.

## III.7. COUGH

The description of case-vignette:

"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."

### III.7.1. INFORMATION ABOUT DATA PROVIDERS

Five general practitioners (four GPs from the originally involved five GPs and one more through the outpatient clinic) were able to send the data for this vignette.

**Table 15. Providers' characteristics, for cough**

| | GP level | | | | | Vignette level | |
|---|---|---|---|---|---|---|---|
| | size of GP office | | | | | | |
| GPs | floorspace ( m² ) | airspace ( m³ ) | Number_of_physicians | Number_of_nursing_staff | Number_of_other_staff | Number_of_cases | Total_Cost ( € ) |
| GP1 | 40 | 112 | 1 | 0.5 | 0 | 10 | 5.45 |
| GP2 | 103 | 268 | 1 | 1 | 0.125 | 10 | 22.45 |
| GP3 | 120 | 360 | 1 | 0.5 | 0 | 10 | 18.60 |
| GP4 | 22 | 52.8 | 1 | 1 | 0.5 | 10 | 19.92 |
| GP5 | 100 | 270 | 1 | 1 | 0 | 10 | 8.03 |

### III.7.2. TABLES OF COSTS

The data provided by the five GPs show some differences in the cost structure (see Table 16.), which are caused by the difference in the process of care and by the different cost calculation methodology as well.

*Differences in cost calculation methodology*

There were some differences in calculating the unit cost for overhead, its content slightly varies between GPs.

*Possible differences in the process of care*

Three GPs from the five ordered imaging or other diagnostic procedures while the others did not. There are also differences in drug prescription three GPs (GP1, GP2 and GP3) prescribed drugs for much higher total cost than the other two.

The physician's time also varies between the GPs (from 5 to 15 minutes for assessment and from 4 to 11 minutes for therapy and further care). In the case of most of the GPs the physician and the assistants/nurses provided care together for the same patient in the same time. Only one of the GPs (GP5) separates the work procedures of physician and assistant/nurse, so they are able to serve two different patients at the same time (they work in two separate rooms).

*Some other comments*

The personnel unit costs of physicians vary in a quite wide range (0.07-0.17 € per minutes). GP2 calculated unit cost of drug in daily doses while the others in number or prepack.

### III.7.3. REIMBURSEMENT FOR COUGH

The total cost for cough-vignette varies between 5.45 and 22.45 €. However, we do not have information whether there are similar differences in reimbursements for cough or not. We can not calculate reimbursement per case because Hungarian GPs are financed according to capitation (not e.g. according to fee-for-service).

### III.7.4. DISCUSSION

There are about fourfold difference in total costs of cough-vignettes which is mainly caused by the differences in the process of care, e.g. diagnostic procedures and drug prescriptions.

## Table 16. Costs of five GPs and their average costs by categories, for cough

| AVERAGE OF 5 GPs (50 CASES) | | | | | | GP1 | | | GP2 | | | GP3 | | | GP4 | | | GP5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Phase** | **Elements** | **Units** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** |
| Assessment | *Diagnostic Procedures* | | | | | | | | | | | | | | | | | | | |
| | Imaging | No. | 0.26 | 5.08 | 1.32 | 0.00 | 0.00 | 0.00 | 0.30 | 5.08 | 1.52 | 0.00 | 0.00 | 0.00 | 1.00 | 5.08 | 5.08 | 0.00 | 0.00 | 0.00 |
| | Laboratory (e.g. blood count, CRP, etc.) | No. | 0.24 | 2.05 | 0.49 | 0.00 | 0.00 | 0.00 | 1.20 | 2.05 | 2.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Other (ECG, lung-function, etc.) | No. | 0.02 | 2.87 | 0.06 | 0.00 | 0.00 | 0.00 | 0.10 | 2.87 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Physician | Min. | 8.60 | 0.11 | 0.94 | 9.00 | 0.10 | 0.92 | 15.00 | 0.10 | 1.49 | 8.00 | 0.17 | 1.34 | 6.00 | 0.10 | 0.61 | 5.00 | 0.07 | 0.35 |
| | Other personnel (nurse etc.) | Min. | 7.80 | 0.07 | 0.56 | 9.00 | 0.08 | 0.72 | 15.00 | 0.08 | 1.14 | 8.00 | 0.06 | 0.44 | 5.00 | 0.08 | 0.38 | 2.00 | 0.06 | 0.12 |
| Therapy + further care | Drugs prescribed | No. / prepack | 4.61 | 1.56 | 7.18 | 6.33 | 0.25 | 1.56 | 8.00 | 1.01 | 8.09 | 2.60 | 3.79 | 9.86 | 4.00 | 2.78 | 11.11 | 2.10 | 2.51 | 5.27 |
| | Drugs or other goods given by provider | No. / prepack | 0.20 | 1.86 | 0.37 | 0.00 | 0.00 | 0.00 | 0.80 | 1.94 | 1.55 | 0.20 | 1.56 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Other diagnostics prescribed | No. | 0.44 | 2.23 | 0.98 | 0.00 | 0.00 | 0.00 | 1.10 | 2.75 | 3.02 | 1.10 | 1.70 | 1.87 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Second visit scheduled: | Yes (in all cases) | | | | | | | | | | | | | | | | | | |
| | Personnel | Min. | 13.80 | 0.10 | 1.31 | 10.00 | 0.09 | 0.91 | 20.00 | 0.09 | 1.76 | 23.00 | 0.11 | 2.55 | 11.00 | 0.09 | 0.99 | 5.00 | 0.07 | 0.34 |
| Over head | Running costs of ambulatory service | Min. | 16.50 | 0.10 | 1.67 | 14.00 | 0.10 | 1.34 | 25.00 | 0.04 | 1.11 | 19.50 | 0.11 | 2.23 | 12.00 | 0.15 | 1.74 | 12.00 | 0.16 | 1.95 |
| **Total costs ( € )** | | | | | **14.89** | | | 5.45 | | | 22.45 | | | 18.60 | | | 19.92 | | | 8.03 |

# III.8. COLONOSCOPY

The description of case-vignette:

"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."

## III.8.1. INFORMATION ABOUT DATA PROVIDERS

Four hospitals (from the originally involved seven hospitals) were able to send the data for colonoscopy, all of them provide this service in an outpatient setting.

**Table 17. Providers' characteristics, for colonoscopy**

| | | | | Provider level | | | | | Department level | | Vignette level | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provider | hospital_ setting (0=no; 1=yes) | outpatien_ dep_of_ hospital (0=no; 1=yes) | outpatient_ setting (0=no; 1=yes) | Number_ of_beds | Capacity_ utilization | Number_of_ physicians | Number_of_ nursing_staff | Number_of_ other_staff | Number_ of_beds | Number_of _physicians | Number_of_ cases | Average_ length_of_stay | Total_Cost (€) | Reimbursement (€) |
| P1 | 0 | 1 | 0 | 480 | 72.88 | 47 | 412 | 211 | 0 | 3 | 10 | | 45.06 | 28.65 |
| P2 | 0 | 1 | 0 | 737 | | 133 | 535 | 210 | 0 | 1 | 10 | | 16.88 | 28.90 |
| P3 | 0 | 1 | 0 | 382 | 90.36 | 45 | 311 | 144 | 0 | 2 | 10 | 0.06 | 56.09 | 34.32 |
| P5 | 0 | 1 | 0 | 1564 | 86.00 | 397 | 1460 | 650 | 46 | 4 | 10 | 0.04 | 86.43 | 26.15 |

## III.8.2. TABLES OF COSTS

The data provided by the four hospitals show some differences in the cost structure (see Table 18.), which are caused by the difference in the process of care and by the different cost calculation methodology as well.

*Differences in cost calculation methodology*

Provider2 did not report data according to the suggested cost structure regarding the personnel cost because it could only provide personnel cost as a proportion of overhead. The research team extracted this proportion from the overhead and replaced into the personnel cost for examination. As a result, the personnel cost for examination may be overestimated and the personnel cost for assessment and preparation is underestimated.

There are very big differences in the unit costs of overhead because the providers differently defined the content, the included elements of overhead.

*Possible differences in the process of care*

With the exception of provider5, all of the providers prescribed/provided drugs or fluids in the preparation phase. Another big difference in cost structure is that provider2 did not report the use of instrument and drugs for the examination phase. Because of this its cost can be lower even by 10-20 €.

*Some other comments*

Provider5 reported much higher cost for overhead. (We did not manage to get a clear explanation for this.)

### III.8.3. REIMBURSEMENT FOR COLONOSCOPY

The reimbursement for colonoscopy is between 26.15 € and 34.32 € according to the data of the four providers. The reimbursement exceeds the mean cost only at provider2 while the other three providers have deficit for colonoscopy.

### III.8.4. DISCUSSION

The total costs vary in a wide range (16.88 - 86.43 €) for the four providers. The reasons for this might be the different cost calculation methodology for overhead at provider5 and the lack of reporting the use of instrument at provider2.

**Table 18. Costs of four providers (P1, P2, P3, P5) and their average costs by categories, for colonoscopy**

| AVERAGE OF 4 PROVIDERS (40 CASES) | | | | | | P1 | | | P2 | | | P3 | | | P5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Phase** | **Elements** | **Units** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** |
| Assessment + Preparation | *Diagnostic Procedures* | No. | | | | | | | | | | | | | | | |
| | Imaging | No. | 0.43 | 6.36 | 2.70 | 0.00 | 0.00 | 0.00 | 1.20 | 6.85 | 8.22 | 0.50 | 5.20 | 2.60 | 0.00 | 0.00 | 0.00 |
| | Laboratory (e.g. blood count, CRP, etc.) | No. | 2.10 | 1.53 | 3.21 | 5.00 | 1.03 | 5.13 | 0.00 | 0.00 | 0.00 | 0.40 | 1.08 | 0.43 | 3.00 | 2.43 | 7.29 |
| | Other (ECG, lung-function, etc.) | No. | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Physician | Min. | 12.50 | 0.09 | 1.11 | 20.00 | 0.10 | 2.07 | 0.00 | 0.00 | 0.00 | 15.00 | 0.08 | 1.27 | 15.00 | 0.07 | 1.11 |
| | Other personnel | Min. | 22.50 | 0.06 | 1.30 | 30.00 | 0.04 | 1.35 | 0.00 | 0.00 | 0.00 | 30.00 | 0.09 | 2.64 | 30.00 | 0.04 | 1.21 |
| | Drugs prescribed/ provided | No. / prepack | 1.75 | 0.83 | 1.45 | 4.00 | 0.59 | 2.38 | 2.00 | 0.23 | 0.46 | 1.00 | 2.94 | 2.94 | 0.00 | 0.00 | 0.00 |
| | Fluids prescribed/ provided | No. / prepack | 0.63 | 0.49 | 0.31 | 0.50 | 0.98 | 0.49 | 2.00 | 0.37 | 0.74 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Examination (colonoscopy) | Physician | Min. | 31.25 | 0.08 | 2.41 | 30.00 | 0.10 | 3.10 | 45.00 | 0.06 | 2.61 | 20.00 | 0.08 | 1.69 | 30.00 | 0.07 | 2.23 |
| | Other personnel | Min. | 41.25 | 0.05 | 2.25 | 30.00 | 0.04 | 1.35 | 45.00 | 0.06 | 2.61 | 30.00 | 0.09 | 2.64 | 60.00 | 0.04 | 2.43 |
| | Use of instrument (running and depreciation costs) | No. | 1.25 | 9.76 | 12.20 | 2.00 | 9.94 | 19.87 | 0.00 | 0.00 | 0.00 | 1.00 | 18.79 | 18.79 | 2.00 | 5.06 | 10.12 |
| | Drugs provided (especially sedatives) | No. / prepack | 0.65 | 4.00 | 2.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.00 | 4.53 | 9.07 | 0.60 | 2.23 | 1.34 |
| Over-head | Running costs of ambulatory service | Min. | 57.50 | 0.38 | 21.58 | 30.00 | 0.31 | 9.33 | 45.00 | 0.05 | 2.24 | 95.00 | 0.15 | 14.03 | 60.00 | 1.01 | 60.71 |
| **Total costs ( € )** | | | | | **51.12** | | | 45.06 | | | 16.88 | | | 56.09 | | | 86.43 |

# III.9. TOOTH FILLING

The description of case-vignette:

"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."

## III.9.1. INFORMATION ABOUT DATA PROVIDERS

Three dentists from the seven regions were able to send the data for tooth filling. According to the ownership dentist1 and dentist2 are public, dentist3 is private. Dentist2 serves as an outpatient clinic of the hospital the other two dentists are independent outpatient providers.

**Table 19. Providers' characteristics, for tooth filling**

| | | | Provider level | | | Department level | Vignette level | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provider | outpatient_ dep _of_ hospital (0=no; 1=yes) | outpatient_ setting (0=no; 1=yes) | Number_of_ physians | Number_of_ nursing_staff | Number_ of_ other_ staff | Number_ of_physicians | Number_ of_cases | %_ amalgam | %_ composite | Total_Cost (€) | Patient_ Copayment | Reimbursement (€) |
| D1 | 0 | 1 | 1 | 1 | 1 | 1 | 10 | 60.00% | 40.00% | 10.08 | 0.00 | 7.57 |
| D2 | 1 | 0 | 133 | 535 | 210 | 1 | 10 | 50.00% | 50.00% | 5.38 | 0.00 | 5.86 |
| D3 | 0 | 1 | 1 | 1 | 1 | 1 | 10 | 25.00% | 75.00% | 8.61 | 0.00 | 8.46 |

## III.9.2. TABLES OF COSTS

The data provided by the three dentists show some differences in the cost structure (see Table 20.), which are caused by the difference in the process of care and by the different cost calculation methodology as well.

*Differences in cost calculation methodology*

Dentist2 did not report data according to the suggested cost structure regarding the personnel cost because it could only provide personnel cost as a proportion of overhead. The research team extracted this proportion from the overhead and replaced into the personnel cost for therapy. As a result, the personnel cost for therapy may be overestimated and the personnel cost for assessment is underestimated.

*Possible differences in the process of care*

Dentist2 does not have cost for imaging while the others have.

*Some other comments*

Dentist2 did not provide data about the time of assessment and therapy thus we calculated the mean value of the number of unit used from the data of the other two dentists.

**Table 20. Costs of three providers (D1, D2, D3) and their average costs by categories, for tooth filling**

| AVERAGE OF 3 PROVIDERS (30 CASES) | | | | | | D1 | | | D2 | | | D3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Phase** | **Elements** | **Units** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** | **No. of units used** | **Unit Cost €/Unit** | **Total costs €** |
| Assess-ment | Imaging (e.g. X-ray) | No. | 0.60 | 0.84 | 0.51 | 0.80 | 0.38 | 0.30 | 0.00 | 0.00 | 0.00 | 1.00 | 1.21 | 1.21 |
| | Dentist | Min. | 5.00 | 0.11 | 0.57 | 10.00 | 0.13 | 1.28 | 0.00 | 0.00 | 0.00 | 5.00 | 0.08 | 0.42 |
| | Other personnel | Min. | 8.33 | 0.07 | 0.61 | 20.00 | 0.08 | 1.53 | 0.00 | 0.00 | 0.00 | 5.00 | 0.06 | 0.29 |
| Therapy | Dentist | Min. | 16.00 | 0.09 | 1.49 | 15.00 | 0.13 | 1.92 | | | 1.13 | 17.00 | 0.08 | 1.43 |
| | Other personnel | Min. | 21.00 | 0.08 | 1.60 | 25.00 | 0.11 | 2.68 | | | 1.12 | 17.00 | 0.06 | 1.00 |
| | Material (e.g. amalgam) | No. / prepack | 12.68 | 0.14 | 1.75 | 25.30 | 0.06 | 1.48 | 10.00 | 0.22 | 2.17 | 2.75 | 0.58 | 1.60 |
| After care | Drugs prescribed | DD | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Drugs given by provider | DD | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Over-head | Running costs of ambulatory service | Min. | 25.00 | 0.06 | 1.50 | 25.00 | 0.04 | 0.89 | | | 0.96 | 25.00 | 0.11 | 2.66 |
| **Total costs ( € )** | | | | | **8.02** | | | 10.08 | | | 5.38 | | | 8.61 |

## III.9.3. REIMBURSEMENT FOR TOOTH FILLING

The reimbursement for tooth filling varies between 5.86 € and 8.46 € according to the data of the three dentists. In the case of dentist1 the reimbursement (7.57 €) does not cover the total cost (10.08 €) while the total costs for the other two dentists are very close to the amount of the reimbursement.

## III.9.4. DISCUSSION

There is some difference in the total costs of the three providers which caused mainly by the different process of care and the higher personnel cost at provider1.

# III.10. PHYSIOTHERAPY

The description of case-vignette:

"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)."

## III.10.1. INFORMATION ABOUT DATA PROVIDERS

Four providers (three from the originally involved seven hospitals and one outpatient clinic) were able to send the data for physiotherapy. In the case of physiotherapy-vignette they serve as an outpatient department of the hospital.

**Table 21. Providers' characteristics, for physiotherapy**

| | | | Provider level | | | | Department level | | | | Vignette level | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provider | outpatien_ dep_of_hospital (0=no; 1=yes) | Physicians' office (0=no; 1=yes) | Number_ of_beds | Number_of_ physicians | Number_of_ nursing_staff | Number_of_ other_staff | size of departement's rooms (m²) | Number_of _physicians | Number_of_ nursing_staff | Number_of_ other_staff | Number_of_ cases | Total time of therapy (hours) | Total_Cost ( € ) | Reimbursement ( € ) |
| P1 | 1 | 0 | 480 | 47 | 412 | 211 | 182 | 0 | 4 | 10 | 10 | 63.50 | 506.11 | 601.26 |
| P2 | 1 | 0 | 737 | 133 | 535 | 210 | | 1 | 1 | 2 | 10 | 10.00 | 18.34 | |
| P3 | 1 | 0 | 382 | 45 | 311 | 144 | | 0 | 0 | 7 | 10 | 22.50 | 116.84 | 58.76 |
| P4 | 1 | 0 | 40 | | | | 247 | 1 | 3 | 6 | 10 | 23.50 | 305.22 | 421.35 |

## III.10.2. TABLES OF COSTS

The data provided by the four providers, show some differences in the cost structure (see Table 22.), which are caused by the difference in the process of care and by the different cost calculation methodology as well. The length of the therapy varies between 5 and 25 weeks while the total time of therapy varies between 10 and 63.5 hours. There is also a significant difference in the unit costs of physiotherapists (from 0.83 € to 5.99 €). The unit costs of overhead vary from 1.01 € to 7 €. (Provider2 seems to be to have the most unlike practice compared to the others.)

As a result of this, the total costs for physiotherapy-vignette show very big differences (from 18.34 € to 506.11 €).

**Table 22. Costs of four providers (P1, P2, P3, P4) and their average costs by categories, for physiotherapy**

| AVERAGE OF 4 PROVIDERS (40 CASES) | | | | | | P1 | | | P2 | | | P3 | | | P4 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phase | Elements | Units | No. of units used | Unit Cost €/Unit | Total costs € | No. of units used | Unit Cost €/Unit | Total costs € | No. of units used | Unit Cost €/Unit | Total costs € | No. of units used | Unit Cost €/Unit | Total costs € | No. of units used | Unit Cost €/Unit | Total costs € |
| Therapy Week 1 | Physiotherapist | hours | 4.31 | 4.22 | 18.21 | 9.00 | 4.94 | 44.46 | 2.00 | 0.83 | 1.65 | 3.75 | 3.13 | 11.75 | 2.50 | 5.99 | 14.98 |
| Therapy Week 2 | Physiotherapist | hours | 5.56 | 4.34 | 24.12 | 15.00 | 4.94 | 74.11 | 2.00 | 0.83 | 1.65 | 3.75 | 3.13 | 11.75 | 1.50 | 5.99 | 8.99 |
| Therapy Week 3 | Physiotherapist | hours | 3.31 | 3.45 | 11.41 | 3.75 | 4.94 | 18.53 | 3.00 | 0.83 | 2.48 | 5.00 | 3.13 | 15.66 | 1.50 | 5.99 | 8.99 |
| Therapy Week 4 | Physiotherapist | hours | 3.06 | 3.66 | 11.21 | 3.75 | 4.94 | 18.53 | 2.00 | 0.83 | 1.65 | 5.00 | 3.13 | 15.66 | 1.50 | 5.99 | 8.99 |
| Therapy following weeks | Physiotherapist | hours | 13.13 | 5.02 | 65.89 | 30.00 | 4.94 | 148.21 | 1.00 | 0.83 | 0.83 | 5.00 | 3.13 | 15.66 | 16.50 | 5.99 | 98.84 |
| Over head | Running costs of ambulatory service | hours | 29.88 | 3.54 | 105.79 | 63.50 | 3.19 | 202.27 | 10.00 | 1.01 | 10.08 | 22.50 | 2.06 | 46.35 | 23.50 | 7.00 | 164.45 |
| **Total costs ( € )** | | | | | **236.63** | | | 506.11 | | | 18.34 | | | 116.84 | | | 305.22 |

## III.10.3. REIMBURSEMENT FOR PHYSIOTHERAPY

The above mentioned very different total costs for physiotherapy-vignette are covered by the reimbursement in the case of three providers. (Only provider3 has deficit.)

## III.10.4. DISCUSSION

The time of therapy and the cost data of physiotherapy-vignettes are so variable that the comparison of the providers' practice is almost meaningless. (The description of the vignette should be defined more specific.)

# IV. CONCLUSIONS

The WP9 and data collection for this analysis was a great challenge for the Hungarian research team. At first we had to redesign our research plan, we asked hospital coordinators to help us in data collection (interviews etc.) because of the delay and the shortage of research staff. As a result of this, except in the case of GPs we have only indirect link to the information sources. We also had other important problems. The staff of the hospitals was more loaded and reluctant in the period of data collection due to the restructuring of Hungarian hospital system. Finally, the response rate of providers was very low, we had to approach further providers, too.

Because of the above mentioned reasons, the Hungarian data are very variable not only due to the different process of care but due to the different data collection methodologies and definitions of important categories like personnel unit cost or overhead.

Nevertheless, the data and the analysis provide some very important information about cost level and cost structure for the given case-vignettes in Hungary. These data can be compared to the other countries' data provided that researchers are aware of the above mentioned limitations.