Prolonged intensive care treatment of octogenarians after cardiac surgery: a reasonable economic burden?†

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Received 25 September 2012; received in revised form 5 March 2013; accepted 21 March 2013

Abstract

OBJECTIVES: In accordance with the rising prevalence of octogenarians undergoing cardiac surgery, these patients utilize an increasing portion of intensive care unit (ICU) capacities, provoking economic and ethical concerns. In this study, we evaluated the outcomes and costs generated by the prolonged postoperative ICU treatment of octogenarians.

METHODS: Between July 2009 and August 2010, 109 of 1063 patients required ICU treatment of at least 5 days after cardiac surgery. Patients were retrospectively assigned to either Group A (age <80, n = 86) or Group B (age ≥80, n = 23). Operative risk, mortality, length and costs of ICU treatment were analysed and compared. After 1 year, survival, quality of life (QOL) and functional status were assessed.

RESULTS: Hospital mortality was 31.4% in Group A and 56.5% in Group B. Survivals of discharged patients after 1 year were 83% (Group A) and 80% (Group B), respectively. Log EuroSCORE I of octogenarians was significantly higher (30 ± 17 vs 20 ± 16, P < 0.001). No significant differences (Group A vs Group B) were found between the groups concerning length of ICU treatment (20 ± 21 vs 16 ± 14 days, P = 0.577) or costs (27 205 ± 29 316€ vs 21 821 ± 16 259€, P = 0.812). Functional capacity, calculated by using Barthel index, was high (Group A: 87 ± 22 and Group B: 67 ± 31, P = 0.108) and did not differ significantly between groups. QOL, measured with the short form-12 health survey, did not differ significantly between groups (physical health summary score: P = 0.27, mental health score: P = 0.885) and was comparable with values of the age-adjusted general population.

CONCLUSIONS: Presented data propose that advanced age is correlated with a higher mortality, but not with prolonged ICU treatment or higher costs after cardiac surgery. Considering the encouraging functional status and QOL of the survivors, the financial burden caused by octogenarians is justified.

Keywords: Octogenarians • Cardiac surgery • Intensive care • Outcomes • Quality of life

INTRODUCTION

According to the demographic development of the general population, octogenarians represent a continuously growing proportion of patients referred to cardiac surgery. The annual report of the German Society of Thoracic and Cardiovascular Surgery [1] documented in 2012 that already 13.4% of all operated patients were older than 80 years. Despite the fact that these patients have typically a higher risk profile than younger patients, associated with an increased perioperative morbidity and mortality, numerous publications showed [2-5] that generally, the outcome of octogenarians after cardiac surgery is good and patients profit from an improved quality of life (QOL).

The above-mentioned report also clearly shows that the annual number of TAVI procedures performed is tremendously increasing.

In 2012, already 30.5% of all isolated aortic valve replacements were performed with a transcatheter procedure. This minimally invasive method was developed to offer a surgical treatment option also for elderly patients who are suffering from significant comorbidities and bearing an unjustifiable risk for conventional heart surgery. Although the results of TAVI are convincing, this specific patient group is at great risk of a prolonged postoperative intensive care unit (ICU) treatment.

Long-term postoperative ICU treatment of octogenarians though, provokes concerns about the meaningfulness of therapy with special regard to ethical and cost-effectiveness considerations. Interestingly, there is only little data available concerning this topic, so that the management of critically ill octogenarians after cardiac surgery is more experience-based than evidence-based, and decision-making may be unreasonably influenced by economic constraints.

We conducted this study to evaluate mortality, functional outcomes, QOL and generated costs of octogenarians suffering from prolonged ICU treatment after cardiac surgery.

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MATERIALS AND METHODS

Patient population

We retrospectively identified all patients who required a minimum ICU stay of five consecutive days after cardiac surgery between August 2009 and July 2010 at our department. In this period, a total number of 1063 patients underwent heart surgery. One hundred and nine patients met the above-mentioned inclusion criteria and were assigned to either Group A (age <80 years) or Group B (age ≥80 years). Both study cohorts were retrospectively analysed and prospectively followed.

The study was approved by the Ethics Committee at the Medizinische Hochschule Hannover.

Data collection

The medical records of the 109 included patients were reviewed to gain information about patient demographics, operative risk (logistic EuroSCORE I), operative variables and postoperative data, including survival, length of stay and postoperative complications. All patients discharged alive were contacted by telephone ~1 year after surgery to obtain follow-up information.

The follow-up interview contained two health surveys to evaluate functional status and QOL as well as questions concerning the actual housing situation.

Costs generated by the patient’s ICU treatment were obtained from the hospital’s financial accounting department. Total costs of ICU treatment are composed of the following factors: medical and nursing staff, non-medical personal and material infrastructure, medication, medical materials and medical personal and material infrastructure.

For calculation of the total hospital costs, expenses for ICU treatment, surgical procedures and general ward were added up.

Functional status

For assessment of patient’s functional status, the Barthel index [6] was calculated. Information about the activities of daily life like eating, transferring, grooming, toileting, bathing, dressing, walking, climbing stairs and incontinence (bladder and bowel) were collected and points were assigned according to the level of performance. The values range from 0 to 100, with 0 points meaning maximal dependence on help and 100 points absolute independence in daily life activities.

The Barthel index serves as the gold standard in the health-care sector to measure patients’ ability to participate in specific rehabilitation programmes as well as to determine nursing care levels.

During follow-up interviews, patients were not only asked to answer questions about the actual functional status, but also to provide information about the preoperative ability to manage daily life activities in order to calculate the preoperative Barthel index retrospectively.

Quality of life assessment

To evaluate QOL of the survivors, the short form (SF)-12 questionnaire was used. This is a short, multipurpose health survey containing 12 questions selected from the original SF-36 health survey [7]. These questions include self-assessment of health, physical and social functioning, physical and mental role limitation, mental health and pain. The standardized answers are scored, combined and weighted to create two component summary scales of mental and physical health-related QOL. These summary scores range from 0 to 100. The SF-36 manual provides a large sample of summary scores of the German population. From this sample, age and gender-matched norm values can be calculated and compared with the study group.

Statistical methods

Descriptive statistics are presented as mean ± standard deviation and as a percentage for discrete variables. The statistical significances were determined using Student’s t-test or the $\chi^2$-test when appropriate. Pre- and postoperative values of the Barthel index were compared with the Wilcoxon matched pairs test. Scoring of the SF-12 questionnaire was performed according to the guidelines provided by the German SF-36 manual. For comparison of patients’ physical and mental summary health scores, the Mann-Whitney U-test was adopted. Significance was assessed at a P-level <0.05.

Data were stored and analysed by the use of the software SAS® JMP® 8 (SAS Institute, Inc., Cary, NC, USA) and IBM® SPSS® Statistics 19 (SPSS, Inc., an IBM company, Chicago, IL, USA).

RESULTS

Study groups

In total, 109 patients divided up into 2 cohorts, were included in this study. Group A consisted of 86 patients (mean age 69.0 ± 7.6 years), representing 9.5% of all patients younger than 80 years ($n$ = 906) operated in the study period. Twenty-three patients were included in Group B (mean age 84.1 ± 3.7 years; $P$ = 0.021), which accounts for 14.6% of all octogenarians ($n$ = 157) undergoing heart surgery between August 2009 and July 2010.

Demographic data and preoperative characteristics are presented in Table 1. Both cohorts predominantly consisted of male patients (Group A: 65.2%, Group B: 72.1%; $P$ = 0.525), and the distribution of preoperative risk factors was similar. Mean logistic EuroSCORE I of the octogenarians was significantly higher (30 ± 17 vs 20 ± 16; $P$ = 0.001) compared with the younger patients (Group A). Operative risk, calculated with EuroSCORE II, which was introduced in October 2010 also showed significantly higher values in the octogenarian group (20 ± 13 vs 15 ± 13; $P$ = 0.036).

The most frequently performed cardiac procedures in the octogenarian group were combined procedures (39.1%), followed by aortic valve replacement (26.1%) and reoperations (17.4%). The younger patient cohort most often underwent coronary artery bypass grafting (CABG) (40.7%), combined procedures (29.1%) and reoperations (16.2%). In both groups, ~30% of all cases were considered emergency procedures. The exact distribution of cardiac procedures is shown in Table 2.

Intensive care unit treatment and survival

In-hospital mortality of Group A was 31.4% and significantly lower ($P$ = 0.029) compared with 56.5% in Group B. Mean duration of

ICU treatment was not significantly different between patient cohorts (20.3 ± 21.2 vs 16.3 ± 14.0 days;  P = 0.577, Fig. 1).

Reasons for prolonged ICU treatment are listed in Table 3. Respiratory insufficiency and haemodynamic instability were most frequently responsible for long-term ICU stay. The frequency of tracheotomy and postoperative cardiac support with an intra-aortic balloon pump or extracorporeal membrane oxygenation (ECMO) was similar. The need for renal replacement therapy was significantly higher in the older patient cohort (40.7 vs 69.6%;  P = 0.013). The distribution of neurological complications like stroke and severe organic psychosyndrome did not show significant differences either. Detailed numbers are shown in Table 4.

Average costs of ICU treatment per person, including also all deceased patients did not differ significantly ( P = 0.812) between

Table 1: Patient demographic and characteristics

<table>
<thead>
<tr>
<th></th>
<th>Group A (age &lt;80 years)</th>
<th>Group B (age ≥80 years)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>69.0 ± 7.6</td>
<td>84.1 ± 3.7</td>
<td>0.021</td>
</tr>
<tr>
<td>Sex (male)</td>
<td>72.1% (n = 62)</td>
<td>65.2% (n = 15)</td>
<td>0.525</td>
</tr>
<tr>
<td>Non-elective procedures</td>
<td>30.2% (n = 26)</td>
<td>30.4% (n = 7)</td>
<td>0.985</td>
</tr>
<tr>
<td>Critical preoperative state</td>
<td>23.3% (n = 20)</td>
<td>21.7% (n = 5)</td>
<td>0.825</td>
</tr>
<tr>
<td>Arterial hypertension</td>
<td>80.2% (n = 69)</td>
<td>86.9% (n = 20)</td>
<td>0.445</td>
</tr>
<tr>
<td>Peripheral artery disease</td>
<td>27.9% (n = 24)</td>
<td>30.4% (n = 7)</td>
<td>0.812</td>
</tr>
<tr>
<td>Diabetes</td>
<td>39.5% (n = 34)</td>
<td>34.8% (n = 8)</td>
<td>0.676</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>19.8% (n = 17)</td>
<td>21.7% (n = 5)</td>
<td>0.835</td>
</tr>
<tr>
<td>Renal insufficiency</td>
<td>33.7% (n = 29)</td>
<td>43.5% (n = 10)</td>
<td>0.390</td>
</tr>
<tr>
<td>Preoperative dialysis</td>
<td>5.8% (n = 5)</td>
<td>0% (n = 0)</td>
<td>0.119</td>
</tr>
<tr>
<td>Mean ejection fraction (%)</td>
<td>49.5 ± 16.8%</td>
<td>51.7 ± 16.2%</td>
<td>0.947</td>
</tr>
<tr>
<td>Ejection fraction &lt; 30%</td>
<td>13.9% (n = 12)</td>
<td>8.7% (n = 2)</td>
<td>0.486</td>
</tr>
<tr>
<td>EuroSCORE I</td>
<td>20.2 ± 16.1</td>
<td>30.3 ± 16.9</td>
<td>0.001</td>
</tr>
<tr>
<td>EuroSCORE II</td>
<td>15.1 ± 13.4</td>
<td>19.8 ± 13.2</td>
<td>0.036</td>
</tr>
</tbody>
</table>

Table 2: Cardiac procedures

<table>
<thead>
<tr>
<th></th>
<th>Group A (age &lt;80 years)</th>
<th>Group B (age ≥80 years)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coronary artery bypass grafting</td>
<td>40.7% (n = 35)</td>
<td>13.0% (n = 3)</td>
<td>0.008</td>
</tr>
<tr>
<td>Aortic valve replacement</td>
<td>7.0% (n = 6)</td>
<td>26.1% (n = 6)</td>
<td>0.017</td>
</tr>
<tr>
<td>Mitral valve surgery</td>
<td>3.5% (n = 3)</td>
<td>0% (n = 0)</td>
<td>0.164</td>
</tr>
<tr>
<td>Combined procedures</td>
<td>29.1% (n = 25)</td>
<td>39.1% (n = 9)</td>
<td>0.355</td>
</tr>
<tr>
<td>Reoperations</td>
<td>16.3% (n = 14)</td>
<td>17.4% (n = 4)</td>
<td>0.899</td>
</tr>
<tr>
<td>Aortic operation</td>
<td>2.3% (n = 2)</td>
<td>4.3% (n = 1)</td>
<td>0.618</td>
</tr>
<tr>
<td>Tricuspid valve surgery</td>
<td>1.2% (n = 1)</td>
<td>0% (n = 0)</td>
<td>0.490</td>
</tr>
<tr>
<td>Re-exploration</td>
<td>18.6% (n = 16)</td>
<td>17.4% (n = 4)</td>
<td>0.890</td>
</tr>
<tr>
<td>Operation time (min)</td>
<td>294.7 ± 118.7</td>
<td>281.9 ± 103.3</td>
<td>0.650</td>
</tr>
<tr>
<td>Cardiopulmonary bypass time (min)</td>
<td>178.4 ± 90.5</td>
<td>161.3 ± 73.9</td>
<td>0.705</td>
</tr>
<tr>
<td>X-clamping time (min)</td>
<td>113.6 ± 60.1</td>
<td>118.4 ± 57.8</td>
<td>0.574</td>
</tr>
</tbody>
</table>

Table 3: Main reasons for prolonged ICU treatment

<table>
<thead>
<tr>
<th></th>
<th>Group A (age &lt;80 years)</th>
<th>Group B (age ≥80 years)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circulatory instability</td>
<td>39.5% (n = 34)</td>
<td>34.7% (n = 8)</td>
<td>0.676</td>
</tr>
<tr>
<td>Respiratory insufficiency</td>
<td>47.7% (n = 41)</td>
<td>39.1% (n = 9)</td>
<td>0.463</td>
</tr>
<tr>
<td>Neurological disorders</td>
<td>11.6% (n = 10)</td>
<td>21.7% (n = 5)</td>
<td>0.233</td>
</tr>
<tr>
<td>Sepsis</td>
<td>5.8% (n = 5)</td>
<td>4.3% (n = 1)</td>
<td>0.778</td>
</tr>
<tr>
<td>Renal failure</td>
<td>1.2% (n = 1)</td>
<td>0% (n = 0)</td>
<td>0.490</td>
</tr>
</tbody>
</table>

Figure 1: Total duration of ICU treatment (days).
both groups and added up to 27 205 ± 29 316 € in Group A and 21 821 ± 16 259 € in the octogenarian group (Fig. 2). The greatest proportion of ICU treatment costs were expenses for medical and nursing staff (Group A: 52.1%; Group B: 53.3%), followed by cost of non-medical personal and material infrastructure (Group A: 16.0%; Group B: 15.4%), medication (Group A: 13.5%; Group B: 11.3%), medical materials (Group A: 12.5%; Group B: 13.8%) and medical personal and material infrastructure (Group A: 5.2%; Group B: 5.4%).

Calculated total ICU costs represent 66.0% of total hospital cost for the treatment of Group A (41 007 ± 31 346 €) and 59.6% of the octogenarians (36 639 ± 18 561 €). In the same lapse of time, average costs of an uncomplicated CABG procedure were 10 936 € and 15 823 € for any kind of isolated valve replacement.

Follow-up

According to the above-mentioned in-hospital mortality, 59 patients of Group A and 10 of Group B were discharged from hospital. Mortality during the 1-year follow-up period was 16.9% (n = 10) in Group A and 20% (n = 2) in Group B (P = 0.653). In Group A, 50% (5 patients) of patients died due to cardiac reasons and 50% due to non-cardiac reasons (sepsis 40%, renal failure 10%). In the octogenarian cohort, non-cardiac reasons for death applied in all cases (sepsis 50%, cancer 50%). After 1 year, 57.0% (n = 49) of the younger study cohort and 34.8% (n = 8) of the octogenarians were still alive. The corresponding Kaplan–Meier survival curve is displayed in Fig. 3.

All survivors participated in the follow-up health survey, which was completed in 100%.

Postoperative functional capacity of the patients, measured with the Barthel index, was not significantly different, regardless of the different study cohorts (86.6 ± 22.1 vs 67.1 ± 31.2; P = 0.108). Compared with the retrospectively calculated preoperative levels, the Barthel index of the octogenarians was not significantly lower (75.7 ± 30.9 vs 67.1 ± 31.2; P = 0.343), while the postoperatively assessed Barthel index of the younger patients showed a significant decrease (97.2 ± 6.3 vs 86.6 ± 22.1; P = 0.001; Fig. 4).

In both study groups, the majority of the patients was living at home (87.8% vs 80%). Ten percent of the survivors of each group were living in a nursery home and 2% of the patients of Group A and 10% of the patients of Group B had to be treated in a hospital at the time of follow-up.

During the whole follow-up period, rehospitalization rate was 28.6% in Group A and 50% in the octogenarian group. QOL was assessed with the physical health summary (PHS) and mental health summary (MHS) score of the SF-12 health survey. Mean PHS (41.5 ± 10.8 vs 35.6 ± 11.8; P = 0.270, Fig. 4) and MHS scores (52.1 ± 8.9 vs 51.3 ± 11.4; P = 0.885, Fig. 4) of the study groups did not vary significantly and both reached levels of calculated, age-adjusted norm values.

**DISCUSSION**

In the light of rising economic constraints in the health care sector, cost-effectiveness calculations of medical therapies belong nowadays to the most important criteria for decision-making. Although there exists a consensus that octogenarians should generally have access to cardiac surgery [2–5], prolonged and intensive medical treatment of octogenarians after surgery is viewed very critically. The reason for this is the assumption that the hospitalization of old and critically ill patients consumes a great portion of economic and medical resources with questionable benefits for the patients.

The results of our study show that octogenarians suffering from an ICU treatment longer than five consecutive days after cardiac surgery have a very high likeliness of in-hospital death. Mortality was as high as 56%, which means a significantly worse outcome compared with the younger group. At the 1-year follow-up, 80%...
of the discharged octogenarians were still alive whereas survival rate of the younger patients was 83%.

At first view, outcomes of the octogenarians may be discouraging, but these results have to be interpreted differently. Several publications, including a paper of Nilsson et al. [8] showed that the preoperatively calculated EuroSCORE I is highly predictive regarding perioperative morbidity and length of postoperative ICU stay. The older patient cohort (mean age 84.1 ± 3.7 years) had a logistic EuroSCORE I of 30 ± 17 and therefore has to be regarded as critically ill and at very high risk for a complicated postoperative course.

Various risk-scoring models [9] have been developed to predict an adverse postoperative course. Messaoudi et al. [10] could identify, in a recent qualitative review, the most important risk factors for long length of ICU stay, though different interpretations of prolonged ICU treatment made the analysis difficult. Most of these predictive factors like age, non-elective surgery, complex cardiac procedures and pulmonary or renal disease applied frequently, particularly to the octogenarian group.

Due to these facts, we therefore interpret our results concerning hospital mortality and follow-up survival as reasonable for these critically ill and very old patients. Reference data regarding the survival of octogenarians suffering from prolonged ICU treatment after open-heart surgery are not available so far.

Taking the achievable outcome into account, a prolonged and intensified postoperative medical treatment is only justified if the survivors profit sustainably from the performed surgery. We tried to evaluate the potential benefits to the survivors with the help of the Barthel index for measurement of functional capacity and the SF-12 questionnaire to assess QOL.

The Barthel index of the octogenarian group showed a satisfying high degree of mobility and independence in daily life activities, in comparison with the younger patient cohort also. Interestingly, pre- and postoperative calculated Barthel index did not differ significantly, whereas the younger patient group suffered from a significant decrease of functional capacity. The achieved level was still high, though. The fact that 80% of the octogenarians were living independently at home at the time of follow-up confirms these findings. Evaluation of QOL, measured with the mental and physical health scores of the SF-12 questionnaire, showed similar encouraging results. Achieved scores of the elderly patients were comparable with values of the younger patient cohort as well as values of age-matched norm samples. In other words, surviving octogenarians subjectively enjoyed life at the same levels as the average, age-adjusted population.

Again, actual and comparable data in literature are not available so far. Engoren et al. [2] published a comparison of outcomes, functional status and costs between septuagenarians and octogenarians after cardiac surgery in 2002. He described a good functional status of the elderly patients after cardiac surgery, similar to those of the younger patients. Huber et al. [11] reported, in 2007, a remarkable QOL and an improved functional status of octogenarians after cardiac surgery combined with satisfying mid-term survival. Recently, Chaturvedi et al. [12] released their observations of survival, functional status and leisure activities of octogenarians undergoing heart surgery. Findings also confirmed a highly independent life of octogenarians with satisfying social and leisure engagement up to 5 years after surgery. Hofhuis et al. [13] could demonstrate that octogenarians recovered after an ICU stay >48 h to levels similar to that of the normal population, regarding health-related QOL measured with the SF-36 test. Although all publications do not analyse specifically the outcome after prolonged ICU stay, their findings show that octogenarians have the ability to recover completely after open-heart surgery and to cope with daily routine satisfyingly.

In 2011, Sündermann et al. [14] published their experience with the additional assessment of patient’s frailty. The aim of the study was to add the factor ‘biological age’ to the common risk score models for the prediction of cardiac surgery related mortality. Results showed a significant correlation between 30-day mortality and the new frailty score, although the ability of this frailty score to predict perioperative mortality was not better than that of the traditional risk models. Nevertheless, this publication makes a strong argument that we should not overestimate age as decision criteria and should try to include ‘soft’ parameters like biological age or frailty in our therapy considerations.

From the economic point of view, our findings may be controversial. Total costs of ICU treatment of the octogenarian cohort are comparable with those of the younger patients, but outcome is significantly worse. Therefore, much more money and resources are spent on the elderly. In our opinion though, the prospect of total and long-lasting recovery of even critically ill octogenarians justifies a prolonged postoperative ICU therapy without any treatment limitations.

The presented results are based on a single-centre study, which implies some limitations. Our treatment strategies can differ from...
those of other institutions and therefore our results may not be representative. Due to the fact though, that our department is a mid-sized operative unit offering the whole spectrum of adult cardiac surgery except heart transplantations, our patient collective as well as the distribution of cardiac procedures should be representative of contemporary cardiac surgery. Another limitation is the small patient number of the elderly patient cohort. Due to the high in-hospital mortality, only relatively few survivors exist, which impairs the statistical power of this study. Therefore, a multicentre analysis should be conducted to confirm our findings.

Conflict of interest: none declared.

REFERENCES


APPENDIX. CONFERENCE DISCUSSION

Dr W. Eichinger (Munich, Germany): I have two questions. Can you again comment on your selection trigger of more than five days ICU treatment? Why did you not include all operated patients in your analysis if you want to answer the question of an economic burden?

And my second question, you report on a nearly identical quality of life for surviving octogenarians pre- and postoperatively compared to a significant reduction of the quality of life for the surviving younger patients. Can you speculate on the reasons for this difference because it is astonishing.

Dr Deschka: Regarding our selection criteria, our clinical experience and also the analysis of the medical records showed that patients who stay a minimum of five days on ICU always have medical reasons and a complicated postoperative course, and these are never reasons like logistics. So we chose the five-day cut-off point. And regarding the second part of your question, our main interest was the octogenarians, and especially the long-term treatment of the octogenarians, because our objective was to see if the octogenarians have a capacity to recover from a complicated postoperative course.

And in relation to the second question, the quality of life did not differ significantly in the younger patients between pre- and postoperatively. It was the Barthel Index. And if you look at the numbers, you will see that the Barthel Index preoperatively of the younger patients is really high. It is about 90%. So I think that it is not so astonishing that they reduced functional capacity a little bit after cardiac surgery after a prolonged ICU treatment. But, still, they reach a good functional status.

Dr C. Alhan (Istanbul, Turkey): How is it possible to come to a conclusion that length of ICU stay and generated costs are not age-dependent? They are in a group of patients where more than half of them died in the ICU. If they had not died, they would cost much more.

Dr Deschka: This is right. I mean, from the economic point of view, the results are quite controversial, that is right. If you take the whole cohort and break it up, the surviving octogenarians generate more cost because you have to include the dying octogenarians. But if you operate on the patients, then you have to treat them.

Dr P. Gerometta (Milan, Italy): May I ask you just one question? Your cut-off was five days. Did you find any relationship to the day of the week when they were operated upon? I mean, does weekend influence the length of stay? Probably not in this very selected group, but normally what happens in many hospitals is that patients tend to stay in intensive care over the weekend, or is it not the case?

Dr Deschka: I would say that the weekend, per se, does not influence the transfer policy. But it might be that for logistical reasons, such as there being no beds available for intermediate care treatment so that the patients have to stay one day longer. But that is why we took five days as the cut-off point.