



## Newsletter from the Association for European Paediatric Cardiology

### An update on the state of paediatric cardiology and cardiac surgery in Europe

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IT IS ALWAYS BEST IF GOOD INFORMATION IS available concerning the day-to-day activities of any profession. In this respect, we can learn greatly from input different centres, practising in different countries, and involved in paediatric cardiology and paediatric cardiac surgery. This information permits proper planning and, in turn, the optimisation of working practises. In 1999, the Association for European Paediatric Cardiology held its second inventory to establish the activities in Europe in its various fields. The first survey provided valuable information about the activities from 1991.<sup>1</sup> The updated information now permits us to chart changes in the activities. This is necessary if we are properly to plan the infrastructure, and establish the appropriate numbers of personnel working in these fields. The following 30 European countries are represented in the Association: Austria, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Macedonia, the Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and Yugoslavia.

#### Setup

A questionnaire was sent to all known centres in Europe dealing with congenital cardiac malformations, in total 230 centres. A total of 718,316,587 inhabitants live in these countries, of whom 18% are children, or 135,251,965 in real numbers.<sup>1,2</sup> The same questions were asked as in the first inquiry,<sup>1</sup> except for the addition of a question about transplantation of the heart, and the heart and lungs.

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#### Results

The rate of response was 76%. From the results, we extrapolated the findings to a 100% situation. In this way, we provide an approximation of the total activity in Europe. The overall extent of all diagnostic activities is shown in Table 1. Table 2 shows the number of patients seen as in-patients in the hospitals, and those seen at outpatient clinics in that year. The total number of therapeutic interventions, either achieved by cardiac catheterisation or cardiac surgery, are presented in Table 3. The total number of paediatric cardiologists, and the places available for training, is calculated at 1,500 (Table 4).

Table 1. Calculated number of diagnostic investigations in Europe in 1998.

Electrocardiograms	720,259
Phonocardiograms	45,743
Echo Doppler investigations	649,174
Catheterisations Diagnostic	26,450
24 hours Holter	64,718
Stress test	24,745
Electrophysiologic Studies	2583
Antenatal	36,569
Magnetic Resonance Imaging	4433

Table 2. Calculated number of treated in hospital and outpatient clinic for paediatric cardiology and heart surgery in Europe in 1998.

Inpatients	70,366
Out patients	378,779

Table 3. Calculated number of patients treated by therapeutic heart catheterisation and heart operation in Europe in 1998.

Therapeutic heart catheterisations	11,563
Heart Surgery	34,194

Table 4. Calculated number of paediatric cardiologists and training places in Europe in 1998.

Total of paediatric cardiologists:	924
Total of training places:	517

There remains a considerable difference between the various countries with regard to the available therapeutic options. This is well illustrated by the disparities in the number of cardiac operations carried out for each million children in each country, as shown in Table 5. Assuming that a cardiac operation is a major event, with a clear indication, as was done in 1991, we took the average of the five countries with the highest number of cardiac surgical procedures as the norm for the remaining countries so as to establish how many operations should have been performed in the ideal situation. These idealised calculations provide a total of 56,751

Table 5. Heart operations per million children (0–14 years) per country in Europe in 1998.

Country	Heart surgery/Million children
Austria	378
Belgium	426
Bosnia-Herzegovina	45
Bulgaria	203
Croatia	279
Czech Republic	249
Denmark	365
Finland	367
France	235
Germany	411
Greece	136
Hungary	248
Ireland	314
Italy	309
Latvia	201
Macedonia	0
Netherlands	413
Norway	No response
Poland	269
Portugal	280
Romania	152
Russia	0
Slovak Republic	304
Slovenia	No response
Spain	149
Sweden	349
Switzerland	469
Turkey	96
United Kingdom	262
Yugoslavia	7

cardiac surgical operations per year for children in Europe with congenital cardiac malformations. This number is appreciably greater than the total number of operations performed as shown in Table 3.

## Discussion

If our present findings are compared with those obtained in 1991, an increase was found for all diagnostic activities except for phonocardiography, which showed a strong decrease (Fig. 1). There was no substantial increase, however, in diagnostic catheterisations. The other procedures all showed major increases. This provides strong evidence for the abandonment of phonocardiography as a diagnostic procedure, although it still has its merits for the purposes of teaching.

We have looked at the same way for the stream of patients (Fig. 2). There is an obvious increase in patients seen, particularly pronounced for those admitted to hospital and those seen in clinics. The number of treatments is also increasing (Fig. 3), particularly with regard to interventional catheterisations. When the percentage of therapeutic catheterisations is compared to the total number of catheterisations, there was an increase from 18% in 1991 to 28% in 1998. This underlines the new importance and settled position of this therapeutic measure.

The data for heart surgery are also of interest. In total there was an increase of 34% compared to 1991. In detail, there is a spectacular increase in open heart surgery in infants (70%) as well as older children (31%). Whereas the increase of closed heart surgical procedures are not so striking, only 6% in infants and 8% in older children. So, primary corrective surgery and more complex surgery is done.

There is no shift from older children to infants in heart surgery. The percentage of infants compared to older children operated on remained stable, being 43% in 1991 as opposed to 45% in 1998. Perhaps this finding can be explained by the increasing number of re-operations in older children.

Throughout Europe, there were some 181 transplantations of the heart. No detailed information is available, however, as to how many of these were performed in infants as opposed to children. We cannot compare these findings with results in 1991 because this item was not included in the earlier questionnaire.

All this information now makes it possible for us to make proposals for the planning of manpower. Assuming that cardiac surgical procedures are carried out according to the results of diagnostic catheterisations, or echo-Doppler investigations and that therapeutic catheterisations are performed

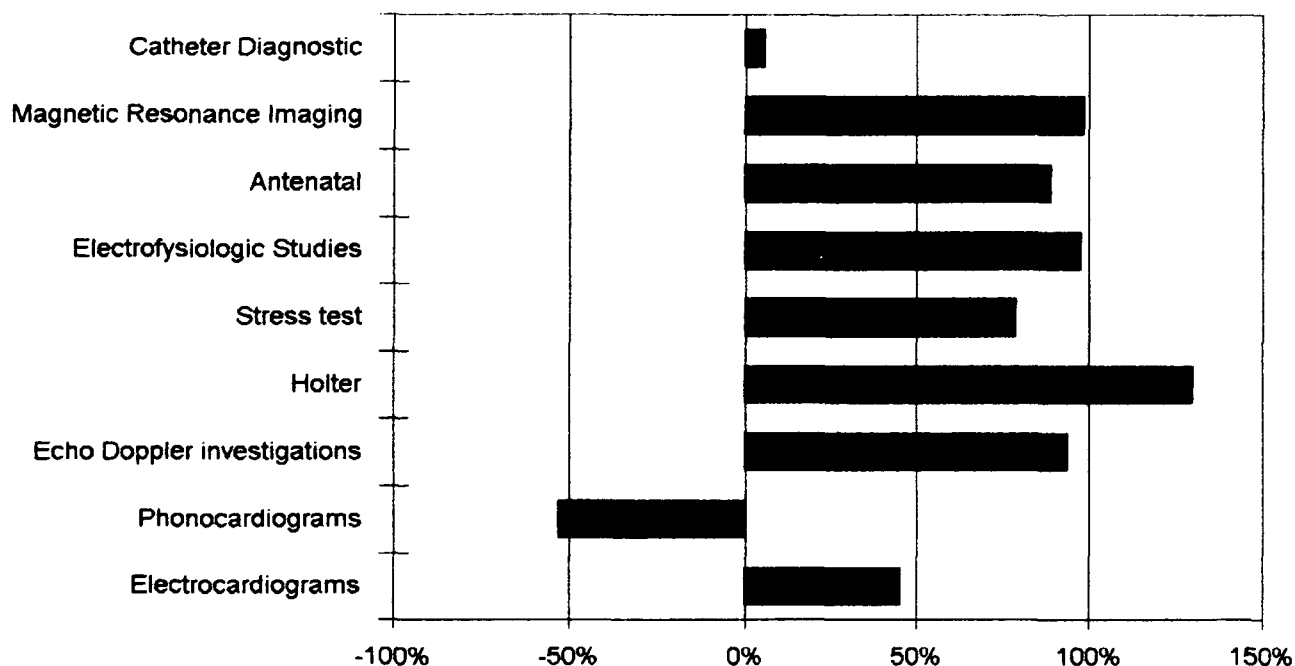


Figure 1. Percent change in diagnostic procedures between 1991 and 1998.

by paediatric cardiologists, we can calculate the number of paediatric cardiologists in relation to these therapeutic measures by linear regression (Fig. 4). In the past, this kind of information has been greatly in demand. Such calculations, nonetheless, provide only an estimate of what is required. Another means of planning the necessary

workforce would be to calculate the time needed to achieve all activities carried out by the professionals working in the field. The latter calculations perhaps provide the more optimal means of steering the process. This process is called Continuous Medical Development. In the future this approach will become increasingly important.

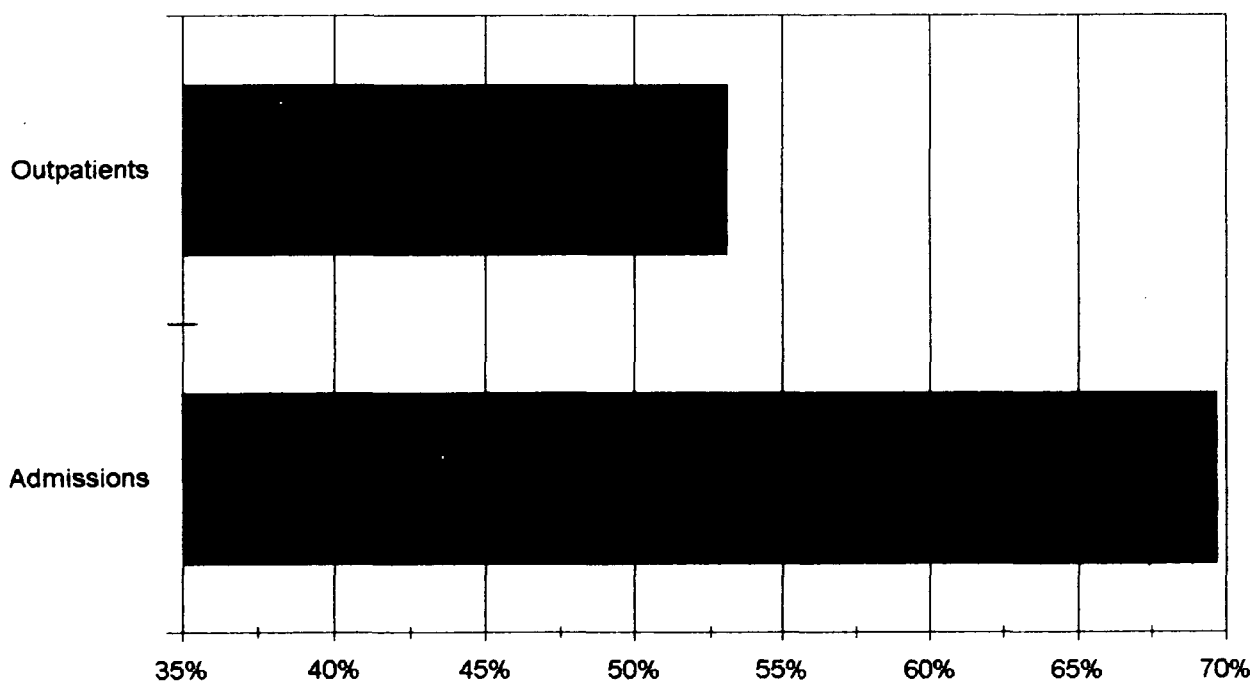
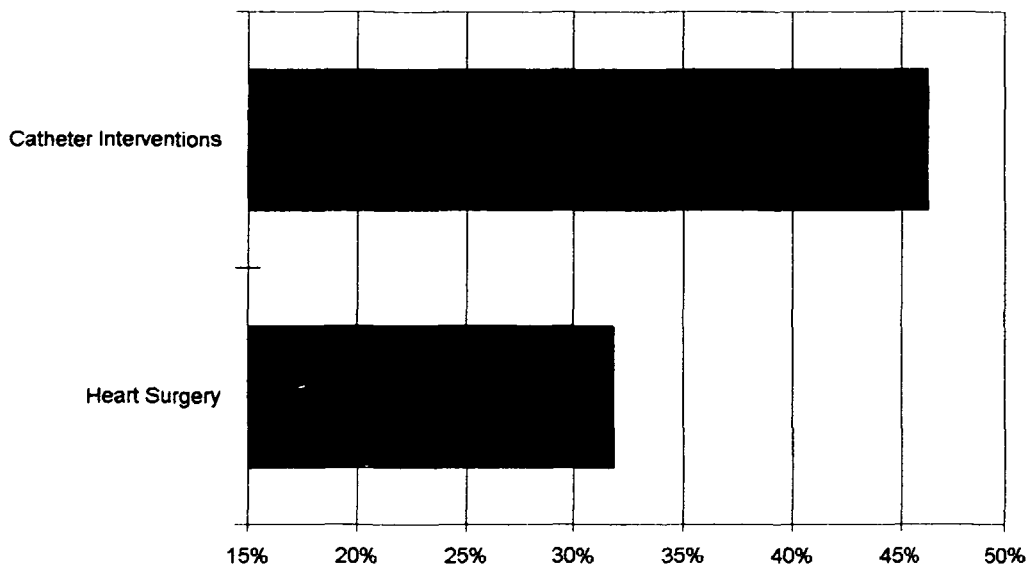


Figure 2. Comparison between the number of treated out patients and in clinic patients between 1991 and 1998.



**Figure 3.**  
Comparison of the number of treatments between 1991 and 1998.

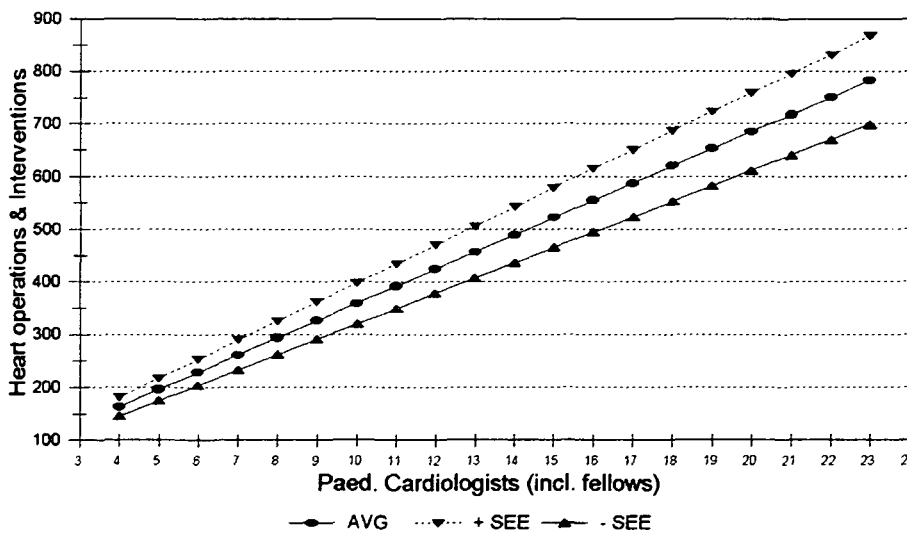
**Summary and conclusions**

There are, of course, limitations to the investigation as described above. The results depend on the information given. But still this remains true for both years investigated. Given this fact, it must be possible to make some conclusions. There can be no doubt concerning the major increase in the total number of activities. Other diagnostic modalities than diagnostic cardiac catheterisation have become relatively more important. Therapeutic measures are still increasing. It is to be expected that this increase will continue in the future. Not all countries are presently able to provide the necessary facilities for therapeutic intervention. Some children from these countries continue to undergo surgery on other countries, either in Europe or elsewhere. We will see what the

future brings. For our next inquiry, to be held in about five years time, we also need to include the activities for treatment of congenital cardiac diseases in adults. Most children undergoing treatment are now reaching adulthood. This means that, in the future, there will be more adults than children with congenital cardiac diseases. Many, if not most, of these will continue to require special medical support.

**References**

1. Editorial: Paediatric Cardiology and Cardiac Surgery in Europe. Daniëls O, Choussat A. *European Heart Journal*, 15 (1994) 158 – 159.
2. *The World Fact book 1999*. CIA, USA.
3. *World Development report 1999/2000* The World Bank Oxford University Press.



**Figure 4.**  
Relation between total number of heart operations and therapeutic catheterisation and the number of paediatric cardiologists, including training places. Calculated by linear regression analysis.