

USING DATABASES FOR THE EVALUATION OF THE MEDICAL ACT AND INTEGRATION WITH EUROPEAN INFORMATION SYSTEMS IN THE SURGERY OF CONGENITAL HEART DISEASES

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Keywords: healthcare management, pediatric surgery, congenital malformations, medical databases, information systems in healthcare

Abstract: The management of a pediatric cardiovascular surgery centre presents a series of specific challenges. In this paper, we present how databases were used to evaluate the medical act in the Pediatric Cardiovascular Centre in IBCvT Tîrgu-Mureș structure, in order to follow the evolution in time of the patients, monitor re-interventions, to control costs and to enable data integration of the centre with the European information systems established in this domain.

Cuvinte cheie: management sanitar, chirurgie pediatrică, malformații congenitale, baze de date medicale, sisteme informatice în domeniul medical

Rezumat: Managementul unui centru de chirurgie cardiovasculară pediatrică prezintă o serie de provocări specifice. În această lucrare vom prezenta modul în care au fost utilizate baze de date pentru a evalua actul medical în cadrul Centrului Cardiovascular Pediatric din structura IuBCvT Tîrgu-Mureș, cu scopul de a urmări evoluția în timp a pacienților, de a monitoriza reintervențiile, de a controla costurile și de a oferi posibilitatea integrării datelor centrului cu sistemele informaționale europene consacrate în acest domeniu.

INTRODUCTION

In Romania, as in other countries, cardiovascular disease is the leading cause of morbidity and mortality. Young children with congenital heart disease - infants and newborns concerned the experts involved in the diagnosis and treatment of these malformations. The incidence of 8 per 1,000 live births is maintained in all regions. According to international statistics in Romania more than 950 children are born each year with congenital heart disease. Most of these children die in the first month and first year of life. Although some of these complex cardiac malformations are associated with other malformations and difficult to correct or recovered, another large part of these children are treated and recovered can become healthy adults.

To address this problems, in our country, it was opened on the basis of recommendations made by European and American Pediatric Cardiovascular Centre (PCC) at the Institute of Emergency for Cardiovascular Diseases and Transplantation Tîrgu-Mureș (IBCvT), established through cooperation between SMURD (SCJU Mureș), clinical neonatology wards (SCJU Mures) - UGON level III pediatric cardiology (IBCvT) and pediatric cardiac surgery (IBCvT).

The main objective of this centre is to develop a functional complex of diagnosis and treatment of cardiac children. The young child with congenital heart disease should undergo general or special care while pediatric initial noninvasive diagnostic procedures are made - Echocardiography - then invasive hemodynamic exploration to establish without delay anatomic diagnosis and functional consequences, establishing treatment indications.

In this context, the medical management of these malformations presents specific challenges.

PURPOSE

In this paper, we present how the specific databases were used to evaluate the medical act in the Pediatric Cardiovascular Center in IBCvT Tîrgu-Mureș structure, in order to follow the evolution in time of the patients, monitor re-interventions (a specific type pathology addressed), to control costs and to enable data integration of the centre with the European informational systems established in this domain.

METHODS

To assess the medical act and to follow every hospitalized case to the CCP, it is used an information system named "factors" in which medical operations are recorded in a textual catalogues compatible with EACTS.(1)

The system contains three catalogues:

- A catalogue of the patients, all relevant data about them;
- A catalogue of operations or surgery;
- A catalogue of diagnostic and medical manoeuvres, divided into categories and subcategories.

These tables are connected using linked tables (2) to model the complete data of each intervention: diagnosis or diagnoses list for complex congenital malformations; list of medical manoeuvres performed and any possible events or postoperative complications. Re-intervention are recorded as successive admissions of the same patient, at readmissions time, de doctor can access all the information which are already in the system relative to the case in question.

For monitoring and financial control of CPP activities, all costs of medical acts performed are recorded using average costs determined under former budget application to the clinical department level. This method has the advantage of ease of

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Article received on 24.05.2013 and accepted for publication on 30.07.2013
ACTA MEDICA TRANSILVANICA September 2013;2(3):231-233

implementation, but does not reflect the value of consumption per patient in real time

In the present article we centralized data processed in the information system of CPP, collected during 2005-2010.

RESULTS

Based on the data entered into the information system, we counted the number of surgeries in children during 2007 - 2009 (table no. 1).

Table no. 1. The situation of surgery in children

Year	2009	2008	2007
Total	371	325	312
open heart surgery	225	221	202
closed heart surgery	146	104	110

Using data gathered, detailed analyzes were performed by type of abnormality, taking into account the number and type of manoeuvres performed, the frequency of complications and the association between malformations. For this paper, we chose to present two examples of two important problems that are found in the centre casuistry: tetralogy of Fallot and Ebstein's anomaly type that affects the tricuspid valve. We selected data recorded at single operating rooms (room no. 4 of CPP structure).

In the period 2005 - 2010 in the operating room mentioned before were performed 34 interventions for correction of tetralogy of Fallot type, a congenital malformation which accounts for approximately 6,8% of the total number of congenital heart malformations.(3) The total number of manoeuvres performed for these cases is presented in table no. 2.

Table no. 2. Number of manoeuvres in cases of tetralogy of Fallot type

Manoeuvres	No.
ASD creation/enlargement	1
ASD partial closure	2
ASD repair, Primary closure	5
DORV, Intraventricular tunnel repair	1
PDA closure, Surgical	9
PFO, Primary closure	3
RVOT procedure	5
Shunt, Ligation and takedown	4
TOF repair, No ventriculotomy	1
TOF repair, Ventriculotomy, Nontransanular patch	7
TOF repair, Ventriculotomy, Transanular patch	26
VSD repair, Patch	1
Valve replacement, Pulmonic (PVR)	1
Valvuloplasty, Pulmonic	1

Also, there have been a minimum number of complications (table no. 3).

Table no. 3. Complications related to cases of tetralogy of Fallot type

Complications	No.
Arrhythmia	1
Pneumonia	1
Other postoperative complication	1

In the same period, the manoeuvres related to interventions on the tricuspid valve for Ebstein anomaly – 37 cases were analyzed (table no. 4).

Table no. 4. Number of manoeuvres in cases of Ebstein anomaly

Manoeuvres	No.
ASD repair, Primary closure	7
AVC (AVSD) repair, Complete (CAVSD)	1
AVC (AVSD) repair, Intermediate (Transitional)	2
AVC (AVSD) repair, Partial (Incomplete) (PAVSD)	1
Bidirectional cavopulmonary anastomosis (BDCPA) (bidirectional Glenn)	1
Conduit reoperation	1
Delayed sternal closure	1
Ebstein's repair	1
PA, reconstruction (plasty), Branch, Central (within the hilar bifurcation)	1
PDA closure, Surgical	8
PFO, Primary closure	6
Pericardial effusion, Requiring drainage	1
RVOT procedure	3
VSD repair, Patch	17
VSD repair, Primary closure	7
Valve replacement, Aortic (AVR), Bioprosthetic	1
Valve replacement, Pulmonic (PVR)	1
Valve replacement, Tricuspid (TVR)	3
Valve surgery, Other, Pulmonic	1
Valvuloplasty, Mitral	1
Valvuloplasty, Pulmonic	1
Valvuloplasty, Tricuspid	33

The system also recorded the complications related to these cases (table no. 5).

Table no. 5. Complications related to cases of Ebstein anomaly

Complications	No.
Cardiac dysfunction resulting in low cardiac output	1
Arrhythmia	1
Arrhythmia necessitating pacemaker, Permanent pacemaker	1
Sternum left open, Unplanned	1
Other postoperative complication	1

All these analyses, in conjunction with the financial information related to medical manoeuvres, represent a useful tool for management control and forecasting (4) at CCP.

In terms of monitoring and financial control, we analyzed the structure of income and expenditure of the Institute for 2009 (table no. 6).

Table no. 6. Structure of the revenues and expenditures for 2009 IBCvT Tîrgu-Mureş

Chapter	Lei
Operating income	36.620.661
Revenue from contracts with CAS	32.028.335
Other income from services	154.515
Chapter	65.442

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Income from research activities	473
Revenue from sale of goods	2.738.763
Revenues from budget allocations to special destinations	1.349.638
Revenues from excise	229.912
Income from sponsorship	53.583
Income from donations	245
Financial income	34.018.992
Operating expenses	2.601.913

Although the entire Institute is in surplus, Cardiovascular Surgery Department expenses are higher than the income, according to the relative value of the case (VR), although the case-mix index value at the section is the highest. The largest share in the total expenditure of the department of cardiovascular surgery belongs to children ICU section, who is not releasing patients.

Recording each manoeuvres in the computer system, allowed us to calculate the average cost of cases solved using estimated prices.

Tariff value per case resolved at IBCvT decreased to 1568 lei in 2010 from 1,650 lei in 2009, and ranks in most cases below the surgical case by VR.

DISCUSSIONS

According to the latest assessments, some basic characteristics of the health status of UE population are demographic aging and high level of prevalence for chronic diseases. These characteristics occur on the background of a rising level of expectations oriented toward the health system linked with new diagnosis and therapeutic possibilities. In this context, the treatment of congenital heart malformations, that leads to the recovery of the affected children and their survival to healthy adulthood takes on a particular order of importance.

At the EU level there is at present an increase in pressure for the expenses relating to health, which is not always accompanied by matching results.

Many European countries have answered this pressure by more stringent measures to control costs, although their original targets had been improving equity, access to services or state of health. From this context, there results the dilemma of contemporary medical management, which must divide available resources between the moral imperative to maintain the solidarity, and the public character of health services and the financial imperative to control costs.

CONCLUSIONS

Detailed record of interventions in each case of surgical manoeuvres executed aiming at congenital heart malformations are an important tool for the management of such a centre, offering extensive control possibilities. This approach also enables the manager to perform analyses of historical data to predict future trends related to the workload and budget of the Centre.

In terms of expenditure of clinical departments, the introduction of a "barcodes" application to track consumptions in each patient in real-time, would significantly optimize forecasting, control and cost management activity.

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