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Results of the establishment of an organizational model in a cardiovascular surgery service

Resultados da implementação de modelo organizacional de um serviço de cirurgia cardiovascular

Fernando A. ATIK[1], Maria Fernanda M. A. GARCIA[2], Linda Maria SANTOS[3], Renato B. CHAVES[3], Cristiano N. FABER[1], Ricardo B. CORSO[1], Nubia W. VIEIRA[4], Luiz Fernando CANEO[5]

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Abstract

Objective: **Increasing complexity of patients referred to cardiac surgery demands more effective heart centers, in order to maintain the same quality. The aim of this study is to examine the short-term effect of adoption of an organizational model on surgical outcomes.**

Methods: **From January 2006 to June 2007, 367 consecutive adult patients underwent cardiovascular surgery. Pre-, intra- and postoperative data were prospectively collected and transferred to an institutional database. Organizational model was established in August 2006, and based on integrated multiprofessional team work patient-centered, evidence-based medicine with standardized patient care and personal conflict management. The outcomes studied were hospital mortality and combined adverse events (death, stroke, acute myocardial infarction and acute renal failure), by using multivariate logistic regression analysis.**

Results: **After establishment of such model, there was reduction of hospital mortality (from 12% to 3.6%, relative risk= 0.3; *P*=0.003) and combined events (from 22% to 15%, relative risk=0.68; *P*=0.11). Operations performed previously to the model were independently associated with higher mortality (OR=2.5; *P*=0.04), adjusted to preoperative characteristics and Euroscore risk stratification system. Other predictors of mortality were age > 65 years (OR=6.36; 95%CI 2.57 - 17.21; *P*<0.0001) and cardiopulmonary bypass time > 145 minutes (OR=8.57; 95%CI 3.55 - 21.99; *P*<0.0001).**

Conclusion: **Marked improvements in surgical outcomes depend on development of cardiac surgery centers based on organizational models similar to the model proposed in this study.**

Descriptors: **Cardiovascular surgical procedures. Outcome and process assessment (health care). Institutional organization.**

1. Specialist, Cardiovascular Surgeon.
2. Specialist, Coordinator of the Intensive Care Unit.
3. Specialist, Assistant Physician of the Cardiology Department.
4. Specialist, Medical Board.
5. PhD, Supervisor of the Cardiovascular Surgery Department.

This study was carried out at the Cardiology Institute of Distrito Federal, Cardiology University Foundation, Brasília, DF, Brazil.

Correspondence address:
Fernando A. Atik.
SQSW 102, bloco D, apto 508 - Brasília, DF, Brazil - CEP 70670-204
E-mail: atikf@mac.com

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Resumo

Objetivo: **A crescente complexidade de pacientes encaminhados a cirurgia cardíaca exige maior eficiência dos serviços que prestam assistência, no sentido de manter a mesma qualidade. O objetivo é examinar o impacto, em curto prazo, da adoção de um modelo organizacional nos resultados cirúrgicos.**

Métodos: **No período entre janeiro de 2006 a junho de 2007, 367 pacientes adultos consecutivos foram submetidos à cirurgia cardiovascular. Os dados pré, intra e pós-operatórios foram colhidos prospectivamente e armazenados em um banco de dados institucional. Modelo organizacional foi implementado em agosto de 2006 e se baseou em trabalho multiprofissional integrado centralizado no paciente, medicina baseada em evidências com condutas padronizadas e resolução de conflitos interpessoais. Os desfechos estudados foram mortalidade hospitalar e eventos combinados (óbito, acidente vascular cerebral, infarto agudo do miocárdio e insuficiência renal aguda), por meio de regressão logística multivariada.**

Resultados: **Após a adoção do modelo, houve redução da mortalidade hospitalar (de 12% para 3,6%, risco relativo= 0,3; *P*=0,003) e de eventos combinados (de 22% para 15%, risco relativo= 0,68; *P*=0,11). Operações realizadas anteriormente à implementação do modelo estiveram associadas independentemente com maior mortalidade (OR=2,5; P=0,04), ajustada para características pré-operatórias e complexidade pelo EuroSCORE. Outros preditores de mortalidade foram idade > 65 anos (OR=6,36; IC95% 2,57 - 17,21; *P*<0,0001) e o tempo de circulação extracorpórea > 145 minutos (OR=8,57; IC95% 3,55 - 21,99; *P*<0,0001).**

Conclusão: **A rápida melhora dos resultados cirúrgicos depende da composição de serviços de cirurgia cardíaca embasados em modelos organizacionais semelhantes ao proposto.**

Descritores: **Procedimentos cirúrgicos cardiovasculares. Avaliação de processos e resultados (cuidados de saúde). Organização institucional.**

INTRODUCTION

Changes in the profile of patients with structural heart disease have been observed in recent decades, due to greater longevity of the general population and the increased severity of those referred for surgical treatment [1]. Consequently, greater demand of care regarding volume and seriousness requires more efficiency from hospitals and professionals involved in care, in order to maintain the same quality.

In this sense, the technological development of medicine has allowed that high complexity cardiovascular surgeries be performed safely, and with progressively better outcomes in centers of excellence worldwide [2-4]. Institutional and personal factors are involved in these good outcomes, and include the incorporation of new diagnostic and therapeutic less invasive methods, improvements in clinical treatment, indication and surgical planning, greater experience and systematization of surgery and anesthesia, and better understanding of postoperative care. The formation and maintenance of integrated multidisciplinary teams and establishment of local quality control have particular relevance, because they are the base of cardiovascular surgery programs of excellence [5].

Quality control programs aim at adequacy of hospitals units and professionals involved in order to provide the best possible medical care. With this, the influence of organizational factors in the surgical outcomes can be minimized, with only the team human error [6] and individual factors linked to the patient, such as, socioeconomic status, severity of the disease and its comorbidities [7,8].

Although the literature is extremely important for the development of medical practice in various specialties, there are few publications aiming at hospital organizational aspect and its quality control. Little evidences correlates integrated measures for care to outcomes after heart surgery [9-11], which encourages broad discussion on the subject, considering the increasing transparency of the outcomes of medical procedures to the lay public [12] and the consequent tendency of payment based on parameters such as quality and performance [13].

The aim of this study is to assess the short-term impact of the adoption of an organizational model of cardiovascular surgery service on the surgical outcomes.

METHODS

From January 2006 to June 2007, 367 consecutive adult patients underwent cardiovascular surgery and were included in the study, without exclusion criteria. Pre-, intra and postoperative variables were collected prospectively and stored in institutional computed database, approved for clinical research by the Research Ethics Committee.

Characteristics of the hospital unit and history of the organizational model creation

The Heart Institute of Distrito Federal (InCor-DF) was created through an agreement between Zerbini Foundation, Ministry of Defense, House of Representatives and Federal Senate. The project was initiated in early 2003, period in which director plans were established of each hospital area, with clinical management protocols similar to those on the Heart Institute, Clinics Hospital of the Faculty of Medicine, University of São Paulo. Most of the medical team was formed in the latter institution. InCor-DF is a tertiary hospital composed of 100 beds, for the treatment of high-complexity cardiac patients at national health system and private health insurance. The hospital was opened for care in November 2004, and its first pediatric surgery was performed in February 2005 and the first surgical procedure was performed in adults in May 2005. The volume of surgical procedures has increased steadily over time (Figure 1).

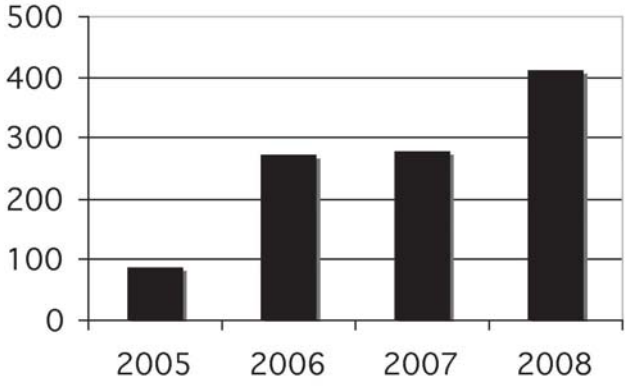

Fig. 1 – Number of adult patients undergone surgery at InCor – DF per year since the first heart surgery in adult patient, in May 2005

Vocational, technical and personal long-term training in several Brazilian and foreign institutions (FAA NFC) enabled the creation of a own vision of care, incorporating positive features of each service and seeking to minimize its weaknesses. Between July 10-30, 2006, the situational diagnosis of service problems at InCor-DF was performed, by knowing its data deeply, in addition to the observation in locus of the preoperative discussions, the fulfillment of surgical procedures, the management of anesthesia and CPB, and postoperative care. Given these data, a report was issued with respect to the problems identified (Table 1) and a plan for structural changes of care was created, which was initiated in August 2006. The results of the establishment of the plan of action were assessed from September 2006 (Figure 2).

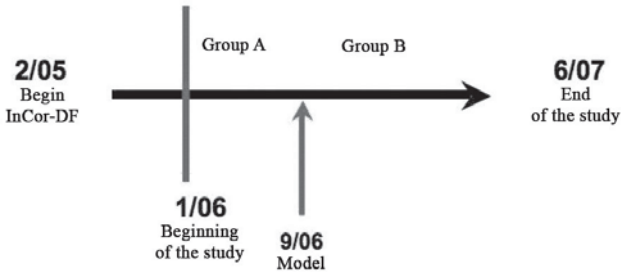

Fig. 2 – Time line of the study, including the definition of the studied groups

Characteristics of the organizational model

Although there are specific characteristics that can be easily measured by means of medical management protocols based on well-established clinical evidences, others characterists are generic, subjective and more difficult to be measured. As a premise of this model, all members of the medical team worked, at the time of this study, under exlusive dedication. The establishment of the measures did not imply increased hospital costs. The main characteristics of the proposed organizational model are listed below:

1. Medical care focused on the patient: all team members, regardless of their personal interests, should focus directly on the patient first. This includes all multidisciplinary areas that deal with care. No member of the team is more important than the other. Instilling in the professionals the notion of a team, sharing the successes and failures with all;

2. Development and fulfillment of care protocols by means of evidence-based medicine (Table 6). Periodic review of these protocols according to new evidences from literature and/or service needs;

3. Postoperative multidisciplinary daily visits, team decision-making. All relevant complications are assessed and performed jointly, regardless of the time and day of week;

Table 1. Main problems and changing plan on the situation diagnosis before the new organizational model

Problems	Actions
Authorization for surgery by the cardiologist without preoperative discussion	• Creation of a weekly clinical-surgical meeting: discussion of surgical indication for all patients to be operated in the service; • Decision of the best therapeutic option in a global context (comorbidities, age, social status, quality of life); • Discussions based on national and international guidelines; • Surgical plan: technique and intraoperative management.
Inadequate global assessment of the patient	• Creation of a multidisciplinary program of outpatient preoperative care (physician, nurse, physiotherapy, nutrition, dental and social/psychological when necessary).
Unofficial surgical list.Random schedule of procedures	• Creation of an official surgical line, focusing on the more severe cases or inpatients; • Early programming of surgery of the next week, seeking to merge the degree of severity of the patients; • Recording of the more complex procedures in the first hours of the day, with the better trained team.
Performing procedures according to personal preferences of each professional at the time of surgery	• Respect for the decisions previously taken at the weekly clinical-surgical meeting in relation to the type of operative approach; • *Briefing, debriefing;* • *Checklist.*
Lack of standardization in the management of anesthesia Lack of interaction between anesthesiologist, surgeon and perfusionist	• Development of specific protocols of anesthesia for cardiovascular procedures based on data available in the literature; • Standardization of use of vasoactive drugs (very high doses), volume replacement (very poor), glycemic control, etc.
Shortage of highly trained professionals in specific care of cardiac patients	• Creation of training programs for physicians, nursery, physiotherapy and nutrition professionals (medical residency in cardiology and heart surgery, nursing and physiotherapy training with specialization in cardiology, surgical instrumentation courses). Training of new physicians on duty; • Investment in Continuing Education.
Care of cases in the Intensive Care Unit and Heart Surgery Postoperative by intensivist physicians without the involvement of the cardiologist	• Change in postoperative medical team, being the Unit under supervision of cardiologists trained in Intensive Care.
Sided view of the patient in the operating room and Postoperative Unit. Lack of integration and problems of relationship among teams	• Detachment of personal vanity and resolution of interpersonal conflicts, in order to improve the patient's health; • Commitment of integration and respect between the work of the teams; • Sharing of responsibilities; • Overview and discussion of the cases together. Multidisciplinary visits involving cardiologists/intensivists, surgeons, physiotherapists, nurses, nutritionists and physicians from other specialties (Commission of the Hospital Infection Control, Hematologist); • Daily visits, including weekends, with the professionals involved.
Management of postoperative cases by extension of knowledge acquired in the treatment of severe patients and the various shock states	• Creation of a Manual of Heart Surgery Postoperative Routines based on data from current specific literature and experience acquired over the years in reference centers nationally and internationally; • Establishment and review of these routines as training acquired in accordance with advances in the literature.
Unknowing about the surgical results by the surgical teams	• Creation of an institutional database to collect information related to pre-and intra-operative parameters, as well as the data on postoperative complications; • Extraction and periodic analysis of these data in search of early detection of the main problems and solutions.
Indiscriminate use of antibiotics and blood products	• Discussions with the Infection Commission. Collection of cultures. Knowledge of the susceptibility profile of microorganisms of the institution. Decolonization of patients referred from other hospitals; • Discussion with Hematology. Judicious use of blood products, including toleration to lower hematocrit.
Little incentive to scientific production	• Preparation of scientific studies from the institutional database; • Incentives for discussion of scientific studies among residents.

4. Resolution of interpersonal conflicts in the team: valuing of the virtues of each, potentiating them in favor of the team. Constant vigilance of the conflicts and resolution of them as soon as they were detected;

5. Creation of an institutional database, with periodic extraction of such data in order to identify problems early, understand their causes and the potential means to correct them. Creation of a multidisciplinary group of quality control within the institution that is responsible for managing and extracting of the data. All phases of care should be involved, from the outpatient clinics, emergency unit, operating room, including also the intensive care unit.

6. Teaching and research. Periodic meetings on morbidity and mortality. Clinical research applied to the needs of the service. Disclosure of knowledge through the training of new professionals (programs of medical residency and specialization in nursing and physiotherapy in cardiology).

Outcomes studied

The outcomes studied in this study were hospital mortality and combined events, defined by any combination of two or more events of death, stroke, myocardial infarction and acute renal failure.

Hospital mortality was defined as death from any cause occurred after the surgical procedure during the same hospital stay or within 30 days after hospital discharge.

Stroke was defined by focal brain injury identified by neurological examination performed by a specialist and confirmed by computed tomography or magnetic resonance imaging. Neurocognitive changes, confusion or mental changes were excluded, since they were not associated with focal lesions.

Postoperative myocardial infarction was defined by elevated myocardial specific enzyme creatine kinase more than 10 times the reference value (normal up to 4 IU/L) associated with at least one of the following criteria: appearance of new pathological Q waves or new left branch block under electrocardiogram, and new changes in segmental contraction on echocardiography.

Acute renal failure was defined by need for dialysis (hemodialysis or hemofiltration) in postoperative patients who has not used this therapy previously.

Statistical analysis

Categorical variables were expressed by frequencies and percentages and the continuous variables were expressed through means and standard deviation. Continuous variables with heterogeneous distribution were expressed by medians and confidence intervals relating to one standard deviation. When comparing the preoperative and intraoperative characteristics and events of morbidity and mortality between groups, chi-square, Fisher exact, Student's t test were used when indicated. Multivariate logistic regression was used to determine the risk factors for death and combined events, whereas two models for each of the outcomes have been created.

Variables significantly (P<0.05) related to each of the events by univariate analysis were retained. Then, stepwise backward logistic regression was used in the construction of multivariate models. Calibration and discrimination of the models were determined by the Hosmer-Lemeshow test and the ROC curve analysis (reveiver-operating characteristic), respectively.

RESULTS

Preoperative characteristics

The patient's preoperative characteristics in both groups are shown in Table 2. Due to the type of the study, the groups showed differences in some preoperative variables. Group A patients were more likely to the presence of chronic lung disease (28% versus 11%, P<0.0001) and myocardial infarction (39% versus 25%, P=0.02). Furthermore, patients in group B, presented more often in functional classes I and II, while those from group A presented in functional classes II and III (P<0.0001).

The groups were considered comparable regarding important preoperative variables, such as gender (P= 0.73), age (P= 0.08), ejection fraction (P=0.71) and logistic EuroSCORE (P=0.13) and additive (P=0.48), among others.

Intraoperative characteristics

The groups were similar regarding the type of surgery (Table 3). There was a significant reduction in aortic clamping time in group B (86 ± 47 versus 98 ± 48, P= 0.01), result of a series of changes aiming at greater systematization of the surgical procedures. Although there were minimization of the cardiopulmonary bypass time, this was not significant.

Impact of organizational model in surgical outcomes

Postoperative morbidity and mortality are shown in Table 4. After the adoption of the model, there was a reduction in hospital mortality (from 12% to 3.6%, relative risk = 0.3, P=0.003) and combined events (from 22% to 15%, relative risk = 0.68 P=0.11). When morbidities were analyzed individually, there were no significant reductions in re-exploration for bleeding (from 9.8% to 6.2%, P=0.2), stroke (from 4.6% to 3.1 %, P=0.44), need for hemodialysis (from 5.8% to 2.6%, P=0.12) and use of intra-aortic balloon (15% to 9.8%, P=0.13). However, the postoperative implant of a permanent pacemaker increased significantly in group B (3.6% versus 0.5%, P=0.03).

Table 2. Preoperative characteristics according to the group studied

	Group A N=173	Group B N=194	*P*
Demographic data			
Male (%)	103 (60)	112 (58)	0.73
Age (years ± sd)	58 ± 14	56 ± 15	0.08
Symptoms			
Functional class			
(New York Heart Association)			
I	23 (13)	75 (39)	
II	81 (47)	70 (36)	<0.0001
III	58 (34)	42 (22)	
IV	11 (6)	7 (3)	
Cardiovascular data			
Coronary artery disease	113 (65)	63 (64)	0.78
Acute coronary syndrome	43 (25)	42 (22)	0.47
Prior myocardial infarction	68 (39)	25 (25)	0.02
Myocardial infarction <30 days	26 (15)	20 (10)	0.17
Number of obstructed arteries:			0.47
Left coronary branch	15 (8.7)	23 (12)	
Single-vessel	6 (3.4)	8 (4.1)	
Double-vessel	16 (9.2)	20 (10)	
Triple-vessel	91 (53)	86 (44)	
Atrial fibrillation	20 (12)	24 (12)	0.81
Arterial hypertension	14 (8.1)	17 (8.8)	0.82
Ejection fraction	57 ± 13	58 ± 14	0.71
Vascular risk-factors			
Diabetes mellitus	51 (29)	49 (25)	0.36
Arterial hypertension	110 (64)	109 (56)	0.15
Dyslipidemia	86 (50)	90 (46)	0.53
Comorbidies			
Chronic respiratory	48 (28)	22 (11)	<0.0001
failure Stroke	13 (7.5)	9 (4.6)	0.25
Preoperative hematocrit (%)	41 ± 5.8	42 ± 6.4	0.52
Renal function			
Serum creatinine (mg/dl)	1.13 ± 0.45	1.09 ± 0.31	0.46
Dyalitic renal chronic disease	3 (1.7)	1 (1)	0.62
Surgical risk			
Logistic Euroscore	4.4(1.5,14.2)	4(1.2,17.5)	0.13
Additive Euroscore	5.4 ± 2.9	5.2 ± 3.5	0.48

Table 3. Operative data according the studied group

	Group A N=173	Group B N=194	*P*
Reoperation (%)	26 (15)	28 (14)	0.87
Combined surgeries (%)	30 (17)	39 (20)	0.5
Type of isolated surgery			
Coronary	94 (54)	96 (49)	
Valve	43 (25)	46 (24)	
Aorta	5 (2.9)	8 (4.1)	0.38
Congenital	0	3 (1.5)	
Others	1 (0.5)	2 (1)	
Perfusion duration (min ± dp)	118 ± 58	109 ± 57	0.13
Clamping duration (min ± dp)	98 ± 48	86 ± 47	0.01

Table 4. Morbidity and mortality outcomes according to the group studied

	Group A N=173	Group B N=194	*P*
Hospital mortality	20 (12)	7 (3.6)	0.003
Combined events	38 (22)	30 (15)	0.11
Postoperative myocardial infarction	14 (8.1)	19 (9.8)	0.57
Re-exploration for bleeding	17 (9.8)	12 (6.2)	0.2
Stroke	8 (4.6)	6 (3.1)	0.44
Atrial fibrillation	32 (18)	31 (16)	0.52
Need for hemodialysis	10 (5.8)	5 (2.6)	0.12
Need for intra-aortic balloon	26 (15)	19 (9.8)	0.13
Respiratory insufficiency	2 (1.2)	2 (1)	0.91
Ventricular arrhythmia	14 (8.1)	10 (5.1)	0.26
Permanent pacemaker	1 (0.5)	7 (3.6)	0.03
Mediastinitis	3 (1.7)	4 (2.1)	0.81
Intensive care unit stay (days, median, sd)	2 (2; 8.6)	3 (2; 6)	0.22

Table 5. Multivariate analysis of the outcomes studied

Variables	Estimation ± SE	OR	95% IC	*P*
Death+				
Intercept	4.45 ± 0.5			
Age>65 years	-1.85 ± 0.48	6.36	2.57-17.	<0.0001
CPB>145 minutes	-2.15 ± 0.46	8.57	3.55-21.9	<0.0001
Group A	-0.46 ± 0.24	2.5		0.04
Combined events §				
Intercept	2.41 ± 0.25			
Age>65 years	-1.21 ± 0.29	3.35	1.91-5.99	<0.0001
CPB>145 minutes	-1.34 ± 0.3	3.81	1.11-6.95	<0.0001

+ Hosmer-Lemeshow test, P=*0.53; C-statistic 0.81.*
§ Hosmer-Lemeshow test, P=*0.11; C-statistic 0.68.*
SE: standard error; OR: odds ratio; CI: confidence interval; CPB: cardiopulmonary bypass

Surgeries performed prior the establishment of the model were independently associated with higher mortality (OR=2.5, *P*=0.04), as well as the age over 65 years (OR=6.36; 95% CI 2.57 - 17, 21; *P*<0.0001) and the cardiopulmonary bypass time exceeding 145 minutes (OR=8.57; 95% CI 3.55 - 21.99; *P*<0.0001), as detailed in Table 5.

Risk factors for the occurrence of combined events were age over 65 years (OR= 3.35; 95% CI 1.91 - 5.99; *P*<0.0001) and cardiopulmonary bypass time exceeding 145 minutes (OR=3.81; 95% CI 1.11 - 6.95; *P*<0.0001).

DISCUSSION

Main findings

In this study, it was shown that the establishment of organizational model characterized primarily by the multidisciplinary care team, focused on the patient, and with standardized behaviors led to significant improvement of surgical outcomes. It should be emphasized that the drastic change in outcomes was achieved quickly, a result of dedication, commitment and adherence of the team to the model of care and proposed measures.

There was a nearly fourfold increase in hospital mortality, whereas the period of time prior to the establishment of the model was an independent risk factor for death as well as the age and duration of prolonged cardiopulmonary bypass. The latter are already recognized risk factors identified in other studies [7.14]. Although the reduction of combined events was not significant, it reached approximately 30%, as well as the re-exploration

Table 6. Care protocols established in the intensive care unit and heart surgery postoperative.

Measures established
Vigorous volume replacement in search of the normalization of tissue perfusion parameters in the first 6-12h after surgery.
Standard prescription in the immediate postoperative period and standardization in sample collection
Standardization of the use of vasoactive drugs, avoiding the use of excessive doses of drugs and their side effects
Macro-hemodynamic data correlation (Swan-Ganz catheter), when available, with macro-hemodynamic data (parameters of tissue perfusion) and volume status, ventricular function and clinical presentation of the patient.
Establishment of a protocol of mechanical ventilation and ventilator weaning in conjunction with the physiotherapy team in order to minimize the risk of respiratory complications (atelectasis, ventilator-associated pneumonia).
Strict control of blood glucose through the use of continuous intravenous insulin therapy (target: CBG between 70 and 150 mg%)
Prophylaxis of atrial fibrillation by pacing with epicardial pacemaker, early use of beta-blockers and maintenance of electrolyte levels within normality.
Monitoring of postoperative bleeding and reducing the number of blood transfusions through the judicious use of blood products, including toleration to lower hematocrit.
High degree of suspicion for possible cases of cardiac tamponade and early surgical approach
Interaction with the Nephrology team and early use of dialysis, when indicated, in cases of acute renal failure
Gastric protection and prophylaxis of routine deep vein thrombosis
Commitment of all professionals related to patient care in the postoperative period, multidisciplinary daily visits at ICU and decision-making together.

for bleeding, stroke and need for intra-aortic balloon. There was a 55% reduction in the need for hemodialysis after the adoption of the model. The postoperative care standardization was particularly involved in improvement of these outcomes, characterized by early correction of shock state, monitored by parameters of tissue perfusion, standardization in the use of vasoactive drugs, appropriate volume replacement, avoiding high doses of diuretics, minimization of the blood products transfusion, early extubation and strict control of blood glucose (Table 6).

It should be emphasized that these outcomes reflect only the beginning of a program of quality control, whose work is ongoing. The fulfillment of the institutional database has been essential in monitoring these outcomes in time, an important tool for assessing the shortcomings of the operating system as well as the surgeon himself. Morbidity must necessarily be included as an indicator of quality in heart surgery, in addition to risk-adjusted surgical mortality.

Brazil reality

The results presented herein are not overlapping those of the great centers of the first world. In fact, it is known that the outcomes of heart surgery performed in Brazil are not comparable to those from developed countries [8], despite the Brazilian databases available do not fulfill a detailed analysis of the surgical risk scores and reflect only the patients in National Health System [7]. Indeed, the reality of Brazilian heart surgery is unique due to individual and organizational characteristics of the health system. Therefore, one should be cautious in adopting practices widely used in the United States and Europe, because they are based on studies performed in these places, and do not necessarily reflect the Brazilian particularities [15].

The great majority of the population of low socioeconomic status, depends on an inadequate public health system. Late diagnosis and treatment are often, which increases the surgical risk, because patients are already in advanced stages of the disease. The gap between the amount of government investment and rising demand of heart surgery is evident, in addition to problems of payment of the procedures by the government. In this sense, professionals with inadequate remuneration, with inappropriate work conditions, obviously are discouraged to fulfill the quality care.

It should be noted that our service does not present the structural limitations intrinsic to the Brazilian reality. The hospital's construction was funded by the federal government and was equipped like the best private hospitals in the country. In addition, medical professionals worked on an exclusive dedication at the time of establishment of the organizational model, which hardly happens in other regions, encouraging, certainly, improvement of the quality of care.

Quality in heart surgery

Stamou et al. [11] showed that quality control programs lead to significant reduction of hospital mortality in heart surgery. Despite the measures established vary according to the hospital, whose routines are inherent to their realities, the aim of all institutional programs would improve the quality of care. Consequently, this may improve the performance and shorten hospital costs related to high morbidity. The effectiveness of such programs is based on the norms of conduct within the hospital, regardless of individual preferences; on the teamwork, on the care focused on the patient, on a consistent and effective communication between professionals and openness to change conducts.

The fulfillment of the cardiovascular surgery program proposed herein is not intended to establish dogmas of conduct that may be adopted in other services, nor to attain degree of superiority over other Brazilian programs that work well for much longer. Probably, many of the Brazilian centers already use many of the same features presented herein, but perhaps not so systematically and integratedly. Meetings of morbidity and mortality are very important and should be performed in a constructive manner [16]. Similarly, applied clinical research has also essential importance in the detection of service problems and changing conducts. Continuing education and residency programs and multidisciplinary training are essential for maintaining the quality, knowledge dissemination and maintenance of the team's motivation.

However, there are dynamic human factors that often escape our control, such as changing rotation of residents [17], level of nursing training [18] and excessive hours of professionals's work.

Initiatives of the State and specialty medical societies

Monitoring of the heart surgery outcomes is performed by several government agencies in developed countries, through voluntary or mandatory databases, and are the main instrument of knowledge of the specialty reality. Recently, The Society of Thoracic Surgeons (United States) has created an executive committee of quality control of cardiovascular surgery services, which aims to detail the current status of programs, identify possible deviations from the medical practice considered optimal, and propose interventions that might implement the system locally [19]. The State regulation on the operation of the sector is already a reality in Canada [20], where some postulate that diseases that have low frequency and heterogeneity of presentation should be screened for centers of excellence that can provide better treatment than others, a concept of regionalization of care based on performance [15].

In Brazil, as the outcomes are dependent on the structure

and allocation of human and material resources, it is vital to have a review of government investments in hospitals accredited aiming at expansion, modernization and advanced training of personnel. It should be created, together with the specific society, a high-complexity national policy of care that requires minimum standards, both institutional and professional, as well as minimum number of procedures. Achievement of a national database is in progress [7].

Study limitations

The limitations of this study are inherent to its retrospective feature. The groups were not comparable in relation to a series of preoperative characteristics, and were temporally distinct. It is possible that better results could be associated with increased service experience, not only the establishment of the model. However, it is noteworthy that the leadership team involved in this process has already had training and experience on the subject, acquired in reference centers nationally and internationally.

Other risk factors classically associated with increased mortality, such as, female gender, diabetes, ventricular dysfunction, reoperation, advanced functional class and EuroSCORE did not obtain statistical significance probably due to the limited number of patients in this study.

CONCLUSIONS

The final responsibility on the success or failure of evolution of the surgical patient rests primarily on surgeon. Despite some unfavorable organizational factors often be distant from this professional, these factors undoubtedly have a direct impact on the results. In view of these peculiarities, there is an urgent need for involvement of specialty societies, especially with respect to the monitoring of surgical outcomes, demand for better working conditions and investment in professional training and research applied to daily practice.

The quality control of the surgical team depends on the involvement of all and it is a dynamic, uninterrupted, unrelenting process involving frequent re-evaluation and readjustment. It is noteworthy in this context the clear importance of teamwork and a process of openness to change, against which can always be opposition and personal interests. It is up to leaders responsible for establishing the organizational model, the responsibility for a work of breaking paradigm aiming at a greater good: the patient's health.

It can be concluded that the rapid improvement of surgical outcomes depends on the establishment of heart surgery services based on organizational models similar to that proposed.

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