Reducing cancellations of pediatric ambulatory surgery at an Algerian University Teaching Hospital

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Abstract

Background and Objectives: The cancellation of elective surgery in children leads to costly waste for the institution and causes emotional stress for the child and his family. The objective of this work is to analyze the evolution of the last-minute cancellation rate of outpatient surgery in children, as an indicator of quality, its causes and to evaluate the effectiveness of the improvement program cancellations.

Materials and methods: A prospective, mono-centric descriptive study that took place in the pediatric surgery department of the University Hospital Center (UHC) Abdelkader Hassani of Sidi-Bel-Abbès. The study spanned a period of 2 years (2013-2015) to identify cancellations in pediatric outpatient surgery. We recorded all admissions to the operating room, and cancellations. Reasons for cancellation were categorized into two broad categories: patient-related and facility-related cancellations.

Results: Over a two-year period, 2487 patients were scheduled for elective surgery at the Pediatric Surgery Department of Sidi-Bel-Abbès University Hospital, of which 1162 children were eligible for outpatient surgery 46.7%, 159 interventions were canceled (13.7%). The average age of patients who have been canceled is 5 years. Patient reasons, administrative reasons accounted for respectively 58.5%, 41.5% on all cancellations. The cancellation concerned more than 61.8% urogenital surgery, 22.5% orthopedic surgery.

Conclusion: Through the quality improvement program, significant reductions have been reported, the cancellation rate has dropped from 20.4% to 3.5%. If the rate has become lower compared to other rate in the world, the impact can be significant by improving institutional resources and waiting lists.

Keywords: Elective, surgery, ambulatury, cancellation, hospital.

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Introduction

Anaesthesia for paediatric outpatient surgery has experienced exponential interest in recent years. It is developing, in particular, because of technological progress, an evolution encouraged by public authorities and health professionals. This development would promote better financial efficiency and improve the quality of care for young patients. However, they demand an adaptation of the organization of the service and a particular vigilance to the reception of the young patient. The cancellation of an elective surgery leads to a costly waste for the institution and causes emotional stress for the child and his family. Cancellations and deprogramming are poorly understood by most clinicians.

The aim of this study is to analyze the evolution of the last-minute cancellation rate of outpatient surgery, as an indicator of quality, its causes and to evaluate the effectiveness of the cancellation improvement program.

Materials and methods

Characteristics of the study: A prospective descriptive, monocentric study that took place in the pediatric surgery department of the University Hospital Center (UHC) Abdelkader Hassani of Sidi-Bel-Abbès, a city located in the west of Algeria. The study spanned a period of 2 years (July 2013-June 2015) to identify cancellations in pediatric outpatient surgery.

Study Population

The paediatric surgery department is located at the UHC, it has two operating rooms including outpatient surgery and conventional surgery. The majority of surgical patients come from the wilaya of Sidi-Bel-Abbès, the others come from neighboring wilayas and even those from southern Algeria.

All our patients were evaluated preoperatively by anaesthesia consultation, after evaluation by the surgeon, following which, patients eligible for outpatient surgery were scheduled. The day before the surgery, the parents of the patients are called by a medical secretary of the pediatric surgery department to confirm the arrival of their child and to reiterate the information with respect to the preoperative fast, and if the child is sick or not. On the day of the intervention, the Anesthesiologist verifies the child's state of health and the conformity of the patient's medical file. Patients have been put on a waiting list in case a program is cancelled.

We recorded all admissions to the operating room, and cancellations. Operative cancellations were defined as surgical cases that were recorded in the operative list (calendar) and were not performed on the scheduled date. All cancellations of scheduled elective operations for patients who did not attend admission to hospital or who were not admitted due to unavailability of bed were included. Patients who died before the planned surgery were excluded.

All cancellations were recorded in a predefined form that included information on the patient's age, hospital identification number, cancellation date, type of operation, surgeon and anesthesiologist, the associated medical problems and the alleged reasons for cancellation. For each cancelled operation, the form has been

completed by the responsible anaesthesiologist. Medical records of the cancelled cases were reviewed to identify the associated medical conditions, preoperative anesthetic evaluations and management plans recommended to improve the preoperative status of patients with associated chronic medical conditions. Patients who were not present were contacted by the department's medical secretary to establish the reason for their absence. Reasons for cancellation were categorized by the authors into two broad categories : patient-related and facility-related cancellations.

Data analysis

Frequencies and percentages have been reported to describe the data. Data were analyzed using SPSS, version 20. Chi-square analysis was used for comparisons between the two groups in both years. The P value <0.05 was considered statistically significant.

In order to optimize operating room occupancy rates, the avoidable nature of canceled interventions was analyzed. The cancellation was considered avoidable when it was possible to anticipate this cancellation of at least 24 hours, by different strategies. Conversely, accidental cancellations the same day were considered non-avoidable.

Results

Over the two-year period (July 2013-June 2015), 2487 patients were scheduled for elective surgery at the Pediatric Surgery Department of Sidi-Bel-Abbès University Hospital, of which 1162 children were eligible for outpatient surgery. 46.7%, these results are illustrated in Table 1.

Table 1 Overall sociodemographic data of scheduled patients.

	n	%
Mean Age		
Months	62.0 + 44.1	
Years	5.2+3.7	
Age Range		
6 months to 6 years	115	72.3
Greater than 6 years	44	27.7
Gender		
Male	125	78.6
Female	34	21.4
Parental Sociocultural Level		
High	47	29.5
Average	94	59.0
Low	18	11.5
Overall Surgical Activity	2487	
Ambulatory Surgical Activity	1162	46.7

The average age of patients who have been cancelled is 5 years with a minimum of 6 months and a maximum of 15 years. The age group from 6 months to 6 years represents 72.3% with a male predominance of 78.6%, the sex ratio is 3.6 / 1.

The socio-cultural level of parents of patients is average in 59% of cases, with a high level of 29.5% of cases. These results are shown in Table 1. One hundred and fifty nine interventions were canceled (13.7%).

The cancellation rate decreased from 20.4% in the first year of study to 3.5% of cases during the second year of study. The cancelled surgical procedures are divided between urological surgery, visceral surgery, orthopedic surgery, plastic surgery and proctological surgery, this distribution is illustrated in Figure 1.

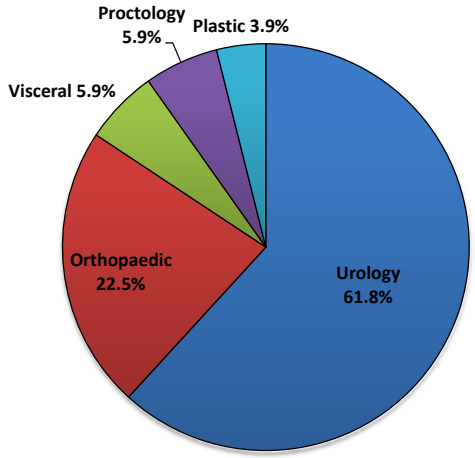

Figure 1 Distribution of Cancellations by Surgical Speciality.

During the second year of study, the doctor cancelled in 68.7% of the cases during the second year of study, with the parents cancelling in 31.3% of the cases The grounds for cancellation were reported (Figure 2): during the first year of study, the call of the day before was not ensured in 21% of cases, with the physician cancelling in 63.6% of cases.

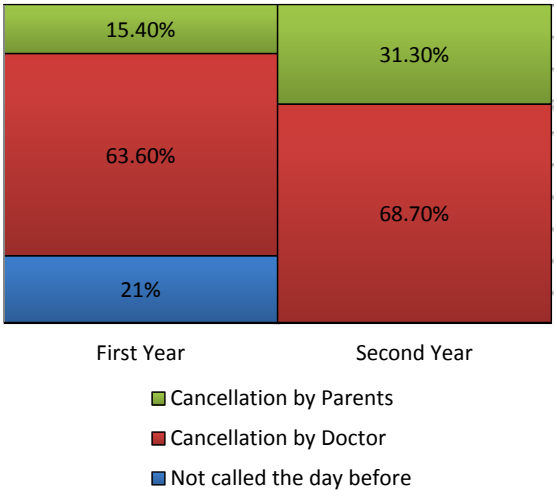

Figure 2 Reasons for cancellation.

The reasons for cancellation were divided into patient-related causes and settlement-related causes are shown in Table 2. Patient-related causes accounted for 58.5% of the overall causes that the arrival of the sick child represented 24.5% of cases, parents were unreachable in 13.2% of cases. Settlement-related cases accounted for 41.5% of cases, the most common, the incomplete file in 11.4% of cases and the occurrence of an unexpected emergency in 12.5% of cases.

We analyzed the factors related to the cancellation of surgical procedures, including age, 82% of cancelled children were aged less than six years and 43% of cancelled patients were classified as ASA 3.

To limit these cancellations, the causes of cancellation were divided into (Figure 3):

- foreseeable cancellations: non-compliance with preoperative fasting, incomplete file, child not present.
- unforeseeable cancellations: sick child, lack of equipment in the operating room.

Table 2 Causes of Patient Deferment.

	n	%
Patient related causes	93	58.5
Child sick	39	24.5
Not fasted	6	3.8
Uncontactable	21	13.2
Already operated upon	6	3.8
Family impediment	7	4.4
No news	14	8.8
Hospital related	66	41.5
- Incomplete file	18	11.4
- No secretary	9	5.7
- Operating Theatre unavailable	13	8.2
- Emergency	20	12.5
- No Indication for Surgery	5	3.1
- Surgeon not available	1	0.6

The inevitable cancellations were the defect of the operating room equipment and the non-availability of the surgeon. Among these types of cancellations, we retain the unpredictable cancellations 50.2% and predictable 49.8%, whose axis of improvement put in place can replace and improve them.

Discussion

The cancellation rate of anesthesia for outpatient surgery is one of the most relevant indicators for evaluating the organization of this type of care. If we have to evaluate the cancellation, we have to evaluate its causes. Causes related to the patient, or the hospital. For hospital-related causes, medical or organizational causes.

During the two years of the study, 159 surgical procedures were not performed on a total of 1162 planned ambulatory procedures, a cancellation rate of 13.7%. This figure represents the overall cancellation rate, however this rate improved, and decreased from 20.4% during the first year of study to 3.5% during the second year of study, with significant change ($p<0.001$). Our overall cancellation rate is comparable to that of the Pohlman study [1], where the authors evaluated the cancellation for outpatient pediatric urological surgery, and found a 13.3% cancellation rate, manageable by improving preoperative parenting education. It is also similar to that of the French study conducted by Cousin et al [2], where the rate of cancellation was cited as 13%. Macarthur [3] conducted a study published in 1995 over a period of three months involving 1042 patients eligible for outpatient anesthesia, and found a 10.2% cancellation; a figure close to the rate found in our study.

However, Boudreau et al [4] found a cancellation rate of 6% from 3,123 patients over a 6-month period in 2008 and another 6-month period in 2010. Similarly, Hanaa et al [5], conducted a study of 16,559 patients in a 250-bed pediatric hospital over a period of 12 months (July 2004 to June 2005) and found that 7.2% of patients were cancelled.

Our overall rate is better than that of Anatol et al [6] in the Caribbean, who conducted a study of 3048 surgical procedures over a three-year period (January 2002 to December 2004) in paediatric surgery departments in Trinidad and Tobago where the cancellation rate was very high, at 30.1%.

Ahmed carried out a prospective study at the Aga Khan University Hospital in Pakistan, covering an adult and paediatric series for a period of two months [7]. Of 1258 patients, 6.7% were cancelled for various reasons. Our rate is also different from those of developing countries ranging from 3.6% in Jordan [8] to 7.2% in Australia [5].

Ebirim [9] conducted a study on an adult and child series at a university hospital in Port Harcourt, Enugu, Nigeria, from 1015

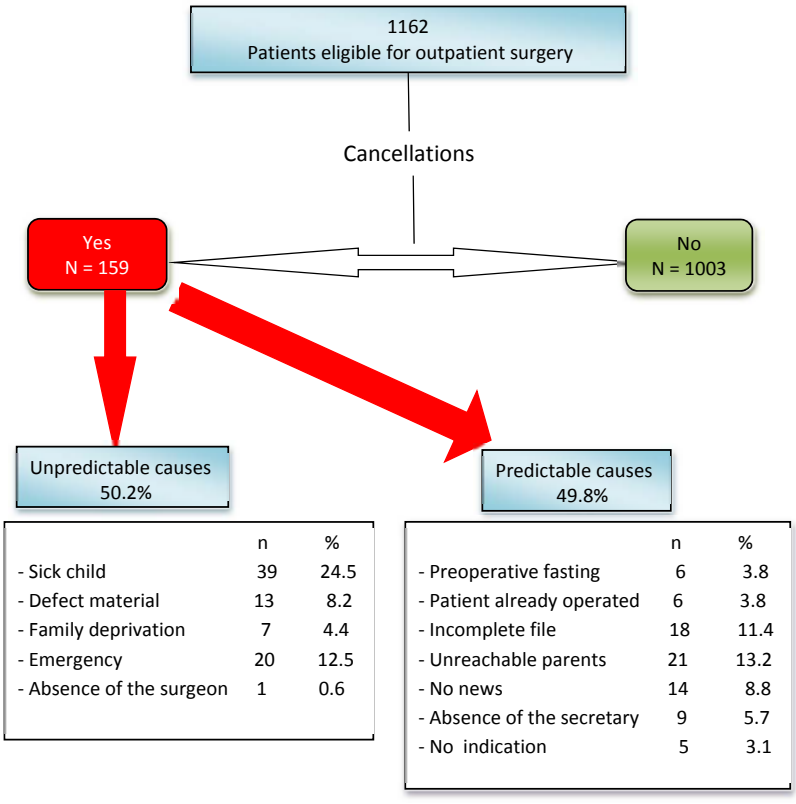

Figure 3 Distribution of Cancellations, Predictable, Unpredictable.

patients from February to June 2011. It determines the cancellation rate and causes of cancellation, and found a rate of 28%.

We consider that the overall cancellation rate in our series is increased in comparison with those of European countries which vary from 1.97% in France to 6.5% in Spain [10,11]. Our cancellation rate has improved significantly (3.5%) in the second year of study, moving closer to that of even developed countries.

The analysis of cancellations of programmed surgical procedures found a prevalence of 61.8% with urological surgery and a minimum of 3.9% for plastic surgery. This variability in the cancellation rate by surgical specialty is related to the predominance of urological surgical procedures compared with those of plastic surgery. This is because of the high frequency of these two types of specialty in our series (Figure 1). Our results are not comparable to those of the Boudreau study [4] where urogenital and orthopedic surgery accounted for only 15%, since the cancellation was more related to ENT surgery.

In our study, we noted an average age of 5 years with a high proportion in children under six years of age who were cancelled. Younger patients are more prone to infections of the upper airways with less tolerance of pre-operative fasting periods. Anatol [6] found similar results, with 46.3% of the cancellations related to ages between 1 and 5 years.

In our study, 20% of patients classified ASA 3 were cancelled, versus 14% of patients classified ASA 1. This is probably due to their state of health on the day of the intervention.

The analysis of the reasons for cancellation of the interventions shows that the most frequently found cause is the cancellation related to the patient. The causes are varied: in particular the disease of the child, ADARPEF published diagnostic criteria to standardize the practices [12, 13]. It is accepted by all intensive care anaesthetists that failure to induce general anesthesia in a child with an upper respiratory tract infection or a cold is an effective means of limiting respiratory complications, namely laryngeal spasm, bronchospasm and other complications. The causes related to the patient and their parents are also represented by: parents unreachable on the phone the day before, patient already operated upon, no news of patients, family impediment, practical incidents related to transport, anxiety, change of mind. In total, 49.8% of the total cancellations bring together various predictable and preventable causes.

The second reason for cancellation is related to the establishment. In the majority of cases patients were challenged by the anesthesiologists, others by the surgeon. 41.5% of the patients postponed were cancelled for causes related to the establishment (Table 2), of organizational order, logistics of which the most important, the unforeseen last-minute admission of a particularly neonatal emergency, the incomplete file of the patient, the non-availability of the operating theatre (breakdown of sterile block, operating light failure or hardware problem).

The analysis of the avoidability of predictable or non-predictable cancellations shows that with 49.8%, there is a potential to implement an improvement strategy. All expert opinions converge on the idea that a significant number of cancellations can be avoided, by setting up a program consisting of protocol draft, reporting in the event of cancellation and studying the economic impact of cancellation and delay. Thanks to the program improvement, the rate fell from 20.4% to 3.5% of cases. Cancelling a child from surgery can be stressful and expensive [14]. Postponement of a child has serious consequences with impact on the family and an anaesthetic and surgical team under utilised. Thanks to the motivation of the entire medico-surgical team of the Pediatric Surgery Department of the CHU of Sidi-Bel-Abbès, an improvement strategy was put in place to reduce the number of last-minute cancellations. For this, several tracks have been possible depending on the predictability and unpredictability of the cancellation.

Predictable causes, whether they are related to the patient or the hospital, can be avoided, as opposed to unpredictable causes. This distribution was used by the Montreal Children's Hospital to improve their high cancellation rate (10%), and they found solutions to improve ambulatory care.

a Predictable Causes:

In ambulatory anesthesia, the operating rooms work with a steady and regular patient flow to function effectively. Last minute late cancellations interrupt the flow and decrease the flow of the operating room, so there is a waste of resources. To influence this type of waste, predictable causes are preventable by setting up a strategy.

- Patient fasting : In our series, we reported 3.7% cancellation for non-compliance with preoperative fasting. Our result is similar to other series, Tait [14], which is 3.5%, de Haana [5] which is 3.5% and that of the Jordanian study of Mesmar [8] which is 2.6%.

  Thanks to the information system put in place on the risks of non-compliance with pre-operative fasting accepted by all of the team, the latter was respected during the second year of study (Table 3). The information on compliance with the preoperative fast was given in an oral and written manner delivered by the surgeon, the anesthesiologists and the medical secretary in the call the day before the operation. During the second year of study, we reported no cases of non-compliance with preoperative fasting.

- Incomplete file: The cancellation rate due to a lack of records, in particular anesthetic or disrupted budget, was 11.4% (Table 2)

Our result is comparable to that of Ebirim et al, which was 10.9% [9] but not to the American study of Boudreau [4] which was 3%.

At the end of the study, we had only one case of cancellation due to lack of files, and this was due to the organization of the programming of the patients. The patient was placed on the list of operating program and is called only if he has a record and has been checked by the anesthetist. If the balance is disrupted, the patient is called to take charge of this anomaly and correct it (Table 3).

- *Unexpected emergency admission:* The most common perception of the hospital that elective surgery is cancelled because urgent surgery prevails or lack of beds. An emergency admission disrupts the operational program, and is unpredictable. At the beginning of the study, an ambulatory patient was cancelled if there was an emergency. On the other hand, the cancellation of a patient is avoidable, afterwards, we have implemented a strategy to respect the operational program even if an emergency is realized in addition. It will do more work for the team, but it does not happen every day

- *Patient absent:* The patient and his parents did not show up on the day of the procedure. In the case where the parents were unreachable, we took two mobile phone numbers from the parents, or from the home or a third party (Table 4). In the absence of a secretary, it is the doctor who calls his patients and confirms their programming and their attendance the next day at the service level. The preoperative telephone call allowed our study to reduce the cancellation rate as is the case with some institutions that have implemented the preoperative telephone call [14]. In the United States, Patel and Hannalah [15], established a preoperative phone call, which reduced the cancellation rate by 50%.

  To solve the problem of absence of the patient the day of

Table 3 Evolution of the cancellation rate according to the causes.

	First year		Second year	
	n	%	n	%
Patient related causes	**83**	**89.2**	**10**	**10.8**
Child sick	33	84.6	6	15.4
Not fasted	6	100	0	0
Uncontactable	21	100	0	0
Already operated upon	6	100	0	0
Family impediment	5	71.4	2	28.6
No news	12	85.7	2	14.3
Hospital related	**61**	**92.4**	**5**	**7.6**
Incomplete file	17	94.4	1	5.6
No secretary	9	100	0	0
Operating Theatre unavailable	13	100	0	0
Emergency	16	80	4	20
No Indication for Surgery	5	100	0	0
Surgeon not available	1	100	0	0

surgery, in the case where the patient is not aware of the date for surgery, Haana [5], finds the use of pre-admission to be useful. Pre-admission is practiced in all hospitals in France to avoid absences of patients by forgetting. The patient makes his pre-admission several days before the day of the procedure just after the anaesthesia consultation. In addition to all the solutions implemented, a waiting list strategy is followed at the level of our service, which has been undertaken by several authors [16]. We carry two or three patients on the waiting list of the operating program. These patients would be informed, aware of the issues, and accept the postponement of their child (Table 4). During the call the day before, parents are told that their child is on the waiting list, and they will only be operated on if there are patients who are canceled or otherwise absent on the day of the procedure. The patient on the waiting list arrives on the morning of the procedure, he does not visit anesthesia and will be examined by the anesthetist resuscitator doctor if there is a cancellation and the procedure can be carried out, otherwise it is explained they will be on the list of the next program.

b Unpredictable causes:

These are the causes either related to the patient or the hospital,

- *Sick child:* This was the most common cause of cancellation usually involving upper respiratory tract infections, especially in winter, or gastroenteritis.

According to Bryson [17], recent upper respiratory infection predisposes to a greater risk of respiratory complications such as laryngospasm, bronchospasm, desaturation and respiratory pauses [18,19]. This rate is not similar to that of Ahmed [7] which is 5.4%, and that of Anatol [6], which is 26.8%. Boudreau 4 [45] observed a 49% cancellation rate per cause of childhood illness.

Macarthur [3] found a 49% rate of respiratory tract infection, this high result is due to the fact that the study was conducted during three winter months during which children are often sick. In Quebec [20], 10% of their patients were cancelled because they were ill on the day of the procedure. In case of inadequate preparation of the patient for the intervention, they asked the parents to call the hospital at the beginning of the acute illness. This strategy is followed in France, parents call the hospital if their child is sick. This experience is followed at the Mott University Children's Hospital in Michigan, which suggests educating parents to call the hospital if the child has a problem [14].

Some authors advocate assessment of the severity of the symptoms between a child with a cold that an experienced anesthetist doctor can safely induce, and a child who presents with an asthma attack.

- *No operating room availability:* this is a problem we found in 12.7% of patients that were cancelled. Generally, it is either steribloc problem, or operating light, autoclave, equipment, which are out of order. In this case the solution is not local. This failure could last up to several days, and patients scheduled for the day of the disruption are cancelled. Our result is not comparable to that of the Anatol study [6] which is 22.9%. On the other hand, it is much higher than that of the Boudreau study where the cancellation per operating room cause is 0.5% [21].
- *Child missing or late:* in 17% of cases the child did not show up, either due to family impediment (4.4%) or traffic or weather problems. This rate is comparable to the Anatol study [6].

The preoperative telephone call the day before the procedure and the waiting list have made it possible to overcome this problem unless the patient is at the end of the program and arrives a little late (Table 4).

In our study, we did not find any causes of cancellations for lack of hospital beds despite the limited number of beds (26 beds), for the simple reason that the discharge of patients in hospital is done every day and in admissions function, which is different from the Australian study, where Hanaa [5] found 2.3% of patients were canceled due to lack of hospital beds.

The economic impact of last minute cancellations is not evaluated in our country because for the moment it is neither the doctor nor the patient who pays the bill of care. On the other hand, the psychological and emotional impact that the cancellation can have on the child and his family is important.

Tait [14], sent questionnaires to parents of cancelled children, 54% of parents are disappointed with this cancellation, 16% frustrated and 3.3% of parents angry. All expert opinions converge on the idea that a significant number of cancellations can be avoided, by setting up a program, which consists of the drafting of protocols, reporting in case of cancellation, and studying the economic impact of cancellation and delay. This model will help the hospital understand the far-reaching effects of these cancellations and help focus the improvement effort in a way to contain costs and reduce waiting lists.

In the United Kingdom, the National Health Service has established a tool for monitoring the cancellation including outpatient surgery in 2002 [5]. The program to improve ambulatory care to reduce the cancellation rate, cancellations, allowed us to have much lower cancellation rates. The rate increased from 20.4% to 3.5% of cases, which is consistent with data from the literature [2].

It is important to emphasize in this work, the operating rooms are not dedicated to the outpatient which is a reflection of the efficiency of the pediatric surgery department of the CHU of Sidi-Bel-Abbès, thanks to the good will and the qualification of the medical and paramedical team of the service.

Conclusion

While it is obvious that there is no simple, quick or quick-fix solution to accelerate access to surgical care, there are still well-established strategies that have proven themselves in the near future. all institutions that have adopted them. The strategies listed above added to institution-specific initiatives, as well as a strong desire to make the necessary changes, are the keys to success (Table 4).

Table 4 Cancellation Improvement Programme.

Causes of cancellation	Before	After	Program implemented
Predictable causes			
Preoperative fasting NS:Tait(3.5%)[14] Haana austr(3%)[5] Mesmar(2,6)[8]	6,5%	0%	Optimization of information on preoperative fasting Deferring the passage to the block in case of non-fasting.
Incomplete file NS:BoudreauUSA(3,5%)[4] Ebirim niger10,9%)[9]	18,7%	9,1%	Verification of files the day before
Unexpected admission of a surgical emergency			The program is respected and the urgency is made more
Patient absent (already operated) S Anatol[6] **Unreachable parents** **No secretary**	4,2% 14,7% 6,3%	0% 0% 0%	waiting list two phone numbers are registered the doctor making the call
No predictable causes			
Sick child	33/39 (84.6%)	6/39 (15.4%)	Parents report the problem during yesterday's call: Quebec (MCH 122) and France Admitting some cold patients with the acquisition of an anesthesiologist's experience

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