Original Article

An Audit of Cancellation of Elective Surgery in Paediatric Patients at Chris Hani Baragwanath Academic Hospital

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Abstract

Background: Cancellation of elective surgery is one of the quality indicators of theatre operation worldwide. The cancellation of elective surgery in paediatric patients is a worldwide problem with the rates ranging from 0.21% to 44%. This study aimed to determine the rates and describe the reasons for cancellation of elective surgeries in paediatric patients at Chris Hani Baragwanath Academic Hospital (CHBAH). **Materials and Methods:** A retrospective study was conducted using theatre records from 1st January to 31st December 2019. The numbers and reasons for elective paediatric surgeries were reviewed. Data were collected using the structured collection sheet and entered into Microsoft Excel. Statistical Package for the Social Sciences was also used to further analyse the data. Results were expressed as percentages in a graph and table forms. **Results:** In the year 2019, a total of 3399 elective paediatric procedures were scheduled in 14 specialities at CHBAH. Of these, 634 (19%) were cancelled due to various reasons. The highest number of cases cancelled were from paediatric surgery and neonates (n = 204, 31%), followed by ear nose and throat (n = 99, 24%), burns (n = 80, 20%) and paediatric orthopaedics (n = 79, 16%). The most common reason for cancellation of elective surgery in paediatric patients at CHBAH was found to be time constraint (34%). The reasons for cancellation in our study were mostly due to avoidable factors at 68% and non-avoidable at 32%. **Conclusion:** The rate of cancellation in our study was high. Majority of the causes for cancellation were avoidable.

Keywords: Cancellation, elective surgery, paediatric, theatre efficiency

Introduction

The elective surgery postponement is a common problem worldwide that causes numerous detrimental effects on patients and their families, hospital finance and staff.[1-13] The wide variation in the reasons for cancellation between hospitals is multifactorial.[7,14]

In South Africa's health institutions, few studies have been published reporting the rates and reasons for cancellation of elective surgery. Currently, there have been no investigations done on the rate and reasons for cancellation in paediatric elective surgery at Chris Hani Baragwanath Academic Hospital (CHBAH). A study to determine the rates and describe the reasons for cancellation of elective surgeries in paediatric patients at CHBAH was performed.

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Materials and Methods

A retrospective study was conducted in the theatre complex of the CHBAH affiliated to the Department of Anaesthesiology at the University of the Witwatersrand. Chris Hani Baragwanath Hospital has 29 theatres of which 17 may be used for paediatric elective procedures. The paediatric theatre records from 01 January 2019 to 31 December 2019 in the following theatres and suites: Paediatric surgery and neonates, paediatric orthopaedics (paeds ortho), ophthalmology, orthopaedic spine (ortho spine), neurosurgery, hands, burns, ear nose and throat (ENT), maxillofacial, cardiac catheterisation

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laboratory (cardiac cath lab), bronchoscopy, urology, plastics and audiology were reviewed. Records from magnetic resonance imaging (MRI), computed tomography (CT) scan and angiography suites were excluded because the reasons for cancellation were not documented. Elective paediatric procedures included all cases appearing on the booked list signed by the consultant anaesthesiologist and theatre matron before 14:00 the day prior to the scheduled surgery. A patient appearing on this list will be considered cancelled if the operation does not take place on the scheduled date.

The number of cases booked, done and cancelled were reviewed for each speciality. The reasons for cancellation were placed into categories (patient-related, work-up related, medical condition related, resource-related, surgery-related, anesthesia-related, facility-related and other). The above information was collected using a structured data collection sheet. Data were captured in Microsoft Excel and results were expressed as a graph and tables. Statistical Package for the Social Sciences was used to further analyse the data. The likelihood of time constraints for different surgical specialties against a reference group (paeds surgery and neonates) was estimated by odd's ratio and confidence interval using Chi-squared analysis. A $P < 0.05$ was statistically significant.

The categories of reasons for cancellation were described as avoidable and non-avoidable. Avoidable factors were the reasons judged as potentially avoidable because some intervention or protocol could be implemented to try decrease cancellations and these factors were resource related, patient related, surgery related, work up related and other. Non-avoidable factors were the reasons where no intervention or protocol could be implemented to try reduce cancellations and these included facility related, medical related and change of guardian's mind in patient-related factors. The study was approved by the Human Research Ethics Committee (Medical) and the Post-graduate Studies Committee of the University of Witwatersrand.

Results

In the year 2019, a total of 3399 elective paediatric procedures were scheduled in 14 specialities at CHBAH. Of these, 634 (19%) were cancelled due to various reasons. The highest number of cases cancelled were from paediatric surgery and neonates (n = 204, 31%), followed by ENT (n = 99, 24%), burns (n = 80, 20%) and paediatric orthopaedics (n = 79, 16%). The lowest number of cancelled cases came from urology (n = 3, 17%) and hands (n = 3, 3%). The number of cases booked, done, cancelled and the cancellation rate by surgical speciality is described in Table 1. The graphic form of cancellation rates by speciality is described in Figure 1.

Reasons for cancellation placed in categories are described in Table 2. Resource-related category had the highest cancellation rate at 34%. The reasons for cancellation by surgical speciality

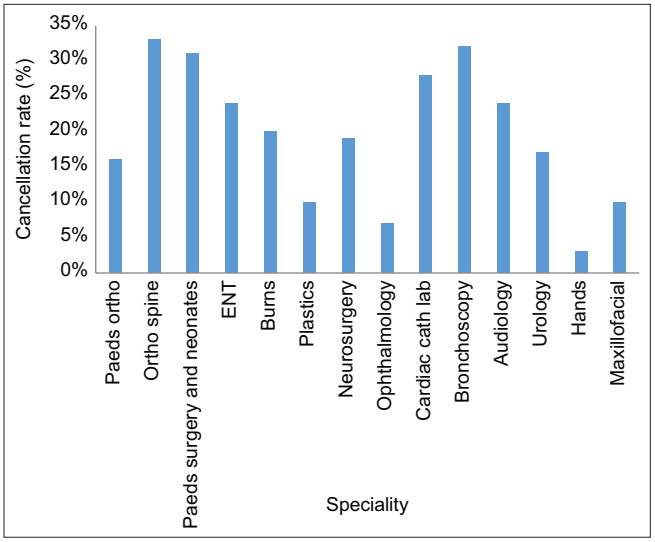

Figure 1: Cancellation rates in specialities. ENT: Ear nose and throat

Table 1: Number of cases booked, done and cancelled in each speciality

Speciality	Number of cases booked	Number of cases done	Number of cases cancelled	Cancellation rate (%)
Ortho spine	12	8	4	33
Bronchoscopy	41	28	13	32
Paeds surgery and neonate	649	445	204	31
Cardiac cath lab	156	112	44	28
Audiology	45	34	11	24
ENT	412	313	99	24
Burns	471	391	80	20
Neurosurgery	160	129	31	19
Urology	18	15	3	17
Paeds ortho	492	413	79	16
Maxillofacial	49	44	5	10
Plastics	157	142	15	10
Ophthalmology	619	576	43	7
Hands	118	115	3	3
Total	3399	2765	634	19

ENT: Ear nose and throat

Table 2: Reasons for cancellations

Categories	Cancellation reasons	Cancellation numbers	Subtotal, *n* (%)
Resource related	Time constraint	215	215 (34)
Patient related	Patient did not arrive	103	139 (22)
	Consent issues	13	
	Guardian change of mind	6	
	Nil per os pre-operative instruction not followed	17	
Facility related	No post-operative placement	68	111 (18)
	No water or electricity	23	
	Equipment failure or availability	20	
Medical condition related	Unfit for surgery	89	94 (15)
	Change of medical condition	5	
Other	Back up case	13	35 (6)
	Done in other theatre	18	
	Not in the ward	4	
Surgery related	Surgery unnecessary	21	28 (4)
	Surgeon unavailable	7	
Work up related	Incomplete or not acted upon	12	12 (2)

Table 3: Reasons for cancellation by each speciality

Speciality	Number of cases cancelled	Patient related, *n* (%)	Work up related, *n* (%)	Medical condition related, *n* (%)	Surgery related, *n* (%)	Facility related, *n* (%)	Resources related, *n* (%)	Other, *n* (%)
Paeds surgery and neonates	204	48 (24)	9 (4)	16 (8)	9 (4)	35 (17)	77 (38)	10 (5)
ENT	99	14 (14)	1 (1)	9 (9)	2 (2)	39 (39)	28 (28)	6 (6)
Burns	80	11 (14)	1 (1)	25 (31)	9 (11)	4 (5)	24 (30)	6 (8)
Paeds ortho	79	2 (3)	0	2 (3)	1 (1)	23 (29)	47 (60)	4 (5)
Cardiac cath lab	44	23 (52)	0	16 (36)	0	0	4 (9)	1 (23)
Ophthalmology	43	16 (37)	1 (2)	13 (30)	4 (9)	1 (2)	8 (19)	0
Neurosurgery	31	2 (7)	1 (3)	4 (13)	0	0	23 (74)	1 (3)
Plastics	15	2 (13)	0	2 (13)	3 (20)	3 (20)	2 (13)	3 (20)
Bronchoscopy	13	12 (92)	0	0	0	0	0	1 (7)
Audiology	11	7 (64)	0	3 (27)	0	0	0	1 (9)
Maxillofacial	5	1 (20)	0	2 (40)	0	1 (20)	1 (20)	0
Ortho spine	4	0	0	0	0	4 (100)	0	0
Hands	3	0	0	3 (100)	0	0	0	0
Urology	3	1 (33)	0	0	0	1 (33)	1 (33)	0

ENT: Ear nose and throat

are presented in Table 3. The most common reason for cancellation in each speciality is highlighted in the bold text.

The most common reason for cancellation of elective surgery in paediatric patients at CHBAH was found to be time constraint. Using the paediatric surgery and neonates as a reference (it had the highest number of cases booked and cancelled), the likelihood of time constraints contributing to case cancellation by surgical speciality is described in the Table 4. Only the surgical specialities with the cases cancelled due to time constraint are included in Table 4.

Discussion

The cancellation rate at CHBAH was much higher at 19% compare to other studies (Kaddoum *et al*. [4.4%], Chiu *et al*. [7.6%], Bathla *et al*. [7.6%] and Okeke *et al*. [9.1%]) and more than three times the recommendation value of <5%.[1,2,4,5,15,16] Even though our overall cancellation rate was high, it was still lower than some African and other South African studies such as Lankoande *et al*.,[17] Desta *et al*.,[11] Bhuiyan *et al*.,[18] and Asmal *et al*.[15] (36.9%, 31.6%, 44.5% and 26.2%, respectively).

The highest number of cases cancelled were from paediatric surgery and neonates (n = 204), even though the cancellation rate was not the highest (31%). The dominant reason for cancellation in this discipline was time constraint at 38%, and this was probably due to overbooking and under estimation of duration of the surgery. The paediatric surgery and neonatal lists are one of the lists that book both inpatient and outpatients (no differentiation done during data collection). The parents or family are contacted telephonically prior to booking but there may be problems encountered such as no response,

Table 4: The likelihood of time constraints (odds ratio and 95% confidence interval) by surgical speciality

Surgical speciality	Cases booked	Number of cancelled cases, *n* (%)	OR (95% CI)	*P**
Paeds surgery and neonates	649	77 (11.9)	1 (reference)	
Paeds ortho	492	47 (9.6)	0.78 (0.53-1.15)	1
ENT	412	28 (6.8)	0.54 (0.34-0.85)	0.0525
Burns	471	24 (5.1)	0.4 (0.25-0.64)	0.0005
Neurosurgery	160	23 (14.4)	1.25 (0.76-2.06)	1
Ophthalmology	619	8 (1.3)	0.1 (0.05-0.2)	<0005
Cardiac cath lab	156	4 (2.6)	0.2 (0.07-0.54)	0.0007
Plastics	157	2 (1.3)	0.1 (0.02-0.39)	<0005
Maxillofacial	49	1 (2.0)	0.15 (0.02-1.14)	0.1086
Urology	18	1 (5.6)	0.44 (0.06-3.33)	1

*Bonferroni-corrected for 9 multiple comparisons with reference speciality (paeds surgery and neonates). ENT: Ear nose and throat, OR: Odds ratio, CI: Confidence interval

transport issues or short notice and this could have contributed to overbooking. Okeke *et al*.[16] found general surgery to have the highest number of cancelled cases and patient-related factors were the main contributing reasons for cancellation.

Ortho spine and bronchoscopy had the highest cancellation rates (33% and 32%, respectively) even though the actual number of cases cancelled were low (n = 4 and n = 13, respectively). Therefore, the higher the number of cases booked did not correlate with the highest cancellation rate. Our study also showed the lowest cancellation rates (3% and 7%) from hands and ophthalmology specialities. This was possibly due to compliant patients, concerns about vision loss and appropriate preoperative counselling about the need and urgency for surgery. In the study by Boudreau and Gibson,[9] ophthalmology also had the lowest number of cancellations, but specific reasons were not stated.

The main reason for cancellation was time constraint, which falls into resource-related category. Compared to paeds surgery and neonate, the odds of no available operating time were significantly less in ENT, burns, ophthalmology, plastics and the cardiac catheterisation list. The mostly likely reasons probably related to the booking of the realistic lists and in burns theatre, most booked patients are considered as emergencies and therefore every patient gets done. The long duration of operation in neurosurgery may have contributed to the increased cancellations. Chiu *et al*.[5] reported a significantly lower chance of no available operating time in orthopaedics, otolaryngology, neurosurgery, gynaecology, ophthalmology and dentistry compare to general surgery.

Time constraint was a problem across all specialities at 34% with different contributing factors. This was comparable to 41% and 30% reported by Asmal *et al*.[15] and Bekele *et al*.,[19] respectively. The factors contributed to patients being cancelled due to time constraints in paediatric surgery and neonate were not universal across all specialities because ophthalmology had a significantly large number of cases booked (619) and only 43 (7%) were cancelled. Other factors such as patients not prepared for theatre, slow turn over time, delayed starting time, unavailability of linen, staff and equipment could have impacted on time constraints as a reason for cancellation.

Our cancellation rate due to patients not arriving for theatre was 16% and it was the second commonest reason for cancellation. Bronchoscopy, audiology, cardiac cath laboratory and ophthalmology were the main specialities where a significant number of patients did not arrive for the procedure because most patients in these specialities are outpatients. In the study by Pratap *et al*.,[10] the cancellation of patients due to no show of patients accounted for 21% of cancellations, which was the second commonest reason in this study. Multiple factors could have an impact on patients not arriving for surgery such as financial challenges, time off work, miscommunication and seeking alternative care.

Communication between the hospital and the guardian or parents seems to be a serious issue contributing to cancellation of elective surgery in paediatric patients. There is no formal communication programme or protocol in place for all elective surgeries at CHBAH that may facilitate the effective pre-operative communication amongst every part involved in planning the surgery. Multidisciplinary team meeting is the only form of communication that is available for complicated planned surgery, and most cancellations are for elective outpatients presenting for minor surgeries. According to Lee *et al*.,[6] an implementation of pre-operative call log reduced the cancellation from 16.8% to 8.8% during the 3 months' study.

In the medical condition-related category, unfit for surgery was the prominent issue which accounted for 14% of cancellations. Al Talalwah *et al*.[8] reported a 42.9% cancellation due to patients not fit for surgery, which was more than doubled compare to our study. In our study, unfit for surgery encompassed the presence of an acute upper respiratory tract infection (URTI), septic patients, deterioration of condition and any new or correctable medical condition that could significantly affect perioperative outcome. The presence of URTI seemed to be a frequent reason for cancellation in the medical condition-related category and the specialities that reported this problem the most were ophthalmology, cardiac cath lab, paediatric surgery and neonates. Other discipline may have had a similar problem, but due to poor documentation, this problem was not revealed. Many patients in the burns theatre were cancelled as a result of being unfit for surgery, this is likely due to patients being septic, critically ill and anaemic not due to URTI.

Bathla *et al*.[1] found the most common reason for cancellation was the presence of URTI at 30.6%. In the study by Tait *et al*.,[3] 34.6% of elective paediatric patients were cancelled due to the presence of URTI. Comparing to our study, Bathla *et al*.[1] and Tait *et al*.[3] had rates more than doubled our cancellation rate due to URTI. Although it did not appear to be the main reason for cancellation of the elective paediatric patients in our study

possibly due to poor documentation, the presence of URTI is worth looking into because of its association with perioperative respiratory complication and anaesthetic team mostly likely to be involved in the decision to cancel the patient.[20]

Unavailability of post-operative placement accounted for 10.7% of the cancellation of elective paediatric surgeries at CHBAH. Desta *et al*.[11] reported on 5.5% cancellation from unavailability of intensive care unit (ICU) bed, which is less than our study. The specialities that were mostly affected by this problem were ENT and orthospine. All cases (100%) that were cancelled in ortho spine were due to unavailability of an ICU bed. CHBAH is a tertiary institution where complicated ENT and spine cases requiring speciality and post-operative monitoring are done, with a limited number of ICU beds and high volume of patients, provision of such services is significantly affected. This is a problem that affect both elective and emergency cases because if there is an emergency case requiring ICU admission it would take precedent over elective case, therefore the post-op placement are only confirm on the morning of surgery for elective cases. Hospital management and the department of health need to be informed of this problem and a plan for provision of more post-operative placement must be made, considering the capacity of the patients catered for by CHBAH.

The reasons for cancellation in our study were due to avoidable factors at 68% and non-avoidable at 32%. This warrants reasons to investigate intensively about cancellation of elective surgery in paediatrics and implement strategies to deal with these unnecessary cancellations due to avoidable factors. The greatest number of avoidable factors were due to time constraint, patient not arriving for surgery, surgery unnecessary and other. There is approximately 70% place for improving theatre efficiency by tackling avoidable factors. Unfit for surgery and unavailability of post-operative placement contributed the most in non-avoidable factors. In the studies by Kaddoum *et al*.,[4] Ezike *et al*.[12] and Bekele *et al*.,[19] most cancellations were also deemed avoidable.

A new method or strategy for recording information about elective surgeries is necessary to be able to have more detailed and adequate audits. The detailed audit should include starting and finishing times, inpatient versus outpatients, any delay (from the time of initial booking by the attending physician to time of cancellation) and specific detailed reason for cancellation. The study by Asmal *et al*.[15] showed that time constraint was due to time misuse rather than absolute lack of time. By tackling the time constraint issue, the overall theatre efficiency may improve significantly. A pre-operative communication protocol, call log or assessment clinics would be of significant help in reducing the cancellation of elective surgery in paediatric patients, especially for patients booked as outpatients because the presence of URTI or any correctable medical condition could be identified and treated accordingly before the booking, and appropriate health education could be done.[6]

Limitations

The study was done retrospectively which could have impacted on the results because information is gathered from previous records. The records could be insufficient, not detailed and scanty, this affects the audit results. Some disciplines such as MRI, angiography and CT scan were not included in the study due to unavailability of records. Thus, other factors may have been missed that contribute to the cancellation of elective surgery in paediatric patients at CHBAH.

Conclusion

The rate of cancellation in our study was high. Time constraint was the major reason for cancellation. Majority of the causes for cancellation were avoidable. Multiple preventable factors contributed to the high rate; therefore, a more detailed investigation and implementation of improvement strategies to tackle these factors is warranted.

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Conflicts of interest

There are no conflicts of interest.

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