International Journal of Research in Medical Sciences
Sardana SR et al. Int J Res Med Sci. 2017 Oct;5(10):4538-4544
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012

DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20174592

Original Research Article

Analysis of waiting time for elective surgical procedures in neurosurgery department at a tertiary care teaching hospital in NCT, India

Sapna Ramani Sardana[1]*, Shakti Kumar Gupta[1], D. K. Sharma[1], Aarti Vij[1], S. S. Kale[2]

[1]Department of Hospital Administration, All India Institute of Medical Sciences, New Delhi, India
[2]Department of Neurosurgery, All India Institute of Medical Sciences, New Delhi, India

Received: 05 August 2017
Accepted: 02 September 2017

***Correspondence:**
Dr. Sapna Ramani Sardana,
E-mail: sapnaramani@gmail.com

ABSTRACT

Background: Reported increases in waiting times for publicly-funded elective surgeries have intensified the need to decrease wait by healthcare providers and hence the study.
Methods: Descriptive study done in neurosurgery department, to ascertain waiting times for its elective surgeries, included a retrospective analysis of admitted post-surgical patients and a prospective study using interviews with relevant stakeholders to do a process mapping.
Results: Median time from decision of surgery to actual date of surgery was found to be 110.5 days. It was calculated that for optimum utilization of present available OTs, 19 extra beds are required and to address the existing load of patients waiting for their respective surgeries there is a need of 63 additional beds with 2 additional OTs functioning per day.
Conclusions: The most common cause of waiting time was unavailability of vacant beds due to mismatch in demand-supply. The reason for postponement of surgery after admission was found to be lack of availability of theatre time followed by patient not being fit for surgery. Shortage of operating time was due to delayed start of operation theatre time. The study recommends improving admission process, restricting OPD time, standardized patient prioritization depending on relevant clinical criteria.

Keywords: Elective surgery**,** Neurosurgery, Waiting time

INTRODUCTION

Globally, timely access to health care services has been a primary concern in the health care management. Medical outcomes and patient satisfaction are to a great extent dependent on timely access and availability of services.[1] Timely accesses to services in healthcare are dependent on infrastructure, services, equipment and optimal use of these resources to meet the patient goals. In resource, constrained situation appropriate techniques of hospital management are to be utilized by administrators to provide timely access and availability of treatment. In many publicly funded systems, the combination of capacity constraints and limited or no user charges generates an excess demand. Patients are added to a waiting list and are asked to wait.[2]

The concept of timely access is lost in the process. The study was done in neurosurgery department of a tertiary care institute in the National capital territory of India. The purpose of this study was to quantify the wait times for elective Neurosurgeries so that steps can be taken to reduce the same to maximum extent possible.

METHODS

It was important to understand the existing system of appointment for neurosurgical procedures and various factors that affects the appointment given for surgery. Since there was no patient registry for surgical cases in the hospital, a backtracking of patient records was done to calculate the waiting time for different elective procedures and identify predictors of wait time for admission. Due to demand supply mismatch, it was imperative to quantify the bed and operation theatre deficit vis a vis number of patients waiting for surgery. The study was carried out from April 2014 to December 2014. It was observational and descriptive in nature.

A prospective study was done to map the existing process of giving probable date of admission for surgery and the processes for scheduling the cases for surgery by direct observation and by unstructured interview with relevant stakeholders, such as consultants, resident doctors and patients, were done to gain an insight into administrative and operational processes. Post-operative major elective surgeries were included and emergency and minor surgeries were excluded. A retrospective analysis of the case records of admitted post-surgical patients was done to capture the wait time from the decision of surgery to actual date of surgery. Following dates were recorded from patient records.

- Date of decision of surgery
- Probable dates of admission given
- Actual date of admission
- Actual date of surgery
- Types of procedure which the patient had undergone
- Number of times the patient had been refused admission on his scheduled date
- Reasons for delay in surgery, if mentioned.

To ascertain a sample size, a pilot study of 30 subjects was taken randomly. The mean waiting time came to be 20 weeks with a standard deviation of 22 weeks. The standard deviation more than the mean was because some of the patients were operated before the probable date given for surgery due to multiple reasons enumerated later in the study. Sample size was calculated using the formula.

$n = (z^2 1\text{-}\alpha/2\ \sigma^2)/d2$

Where n= sample size, $Z^2 1\text{-}\alpha/2$= confidence interval, lσ= standard deviation, d=desired precision.

The sample size calculated was 116 and sample of 156 patients was taken for the study. To quantify the OT time deficit OT utilization was studied for 2 weeks. The number of patients waiting surgery in a year was obtained from the manual records maintained by doctors. Average length of stay (ALOS) was calculated from the admission/discharge records in that year.

RESULTS

Process mapping done with prospective study

The department has 94 general and 16 private beds with 7 Operation Theatres working 5.5 days per week. The department has 2 units with total 18 consultants. All the patients visiting OPD after the decision of surgery are categorized as ASAFC (as soon as formalities complete) and urgent ASAFC. This categorization is purely consultant based; there are no standardized criteria for it. Usually the senior most Resident doctor of both the Units gets the responsibility of admitting the patients as per the number of discharges. His responsibilities are to give probable dates for admission for elective cases and reassess old patients as per their clinical condition and the urgency of the procedure. They maintain a running diary where patients are given a probable date on the basis of available dates. In both the Units, 4 patients are dated for every calendar date including weekends. Being a teaching institute, it is his responsibility to keep a mix of all kinds of cases for surgery for the purpose of academic training. Those patients who couldn't be accommodated and require urgent surgery are sometimes asked to visit on a daily basis in hope of admission.

In the OTs, on an average one long case or two short cases are posted in every OT. As per the list of admitted patients awaiting surgery, nearly 8-12 cases are operated per day as per the decision of the faculty who is posted for scheduling the cases for surgery. Out of these who require immediate surgery and can be accommodated in the stipulated time are taken.

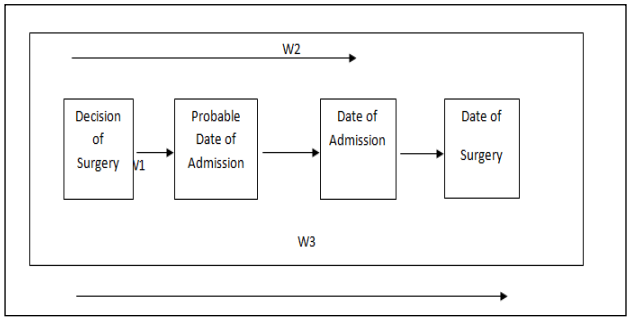

Figure 1: Total waiting time from the decision date to actual date of surgery.

Retrospective study was done to calculate the waiting time and to find reasons for any early or delayed surgeries. To understand this, total waiting time was divided as in Figure 1:

- W1- waiting time from decision to probable date given for surgery
- W2- waiting time from decision to actual date of admission
- W3- Total waiting time from decision to actual date of surgery.

In present study, Table 1 different waiting time were found to be 84.5 days (W1), 103.5 days (W2) and 110.5 days (W3). There was a difference of 26 days between actual dates of surgery than the probable date given for surgery (W3-W1).

Table 1: Waiting time of elective neurosurgery.

	Waiting Time from decision to Probable date (days) (W1)	Waiting time from decision to actual date of admission (days) (W2)	Waiting time from decision to actu date of surgery (days) (W3)
Mean	121.63±128.58	165.75±190.63	173.94±191.34
Median	84.5	103.5	110.5

Table 2: Elective neurosurgery waiting time based on type of disease.

Type of Surgery	Number	%	Median waiting days	IQR
Cranial tumour	83	53.20%	88	43-132
Spinal congenital	19	12.20%	236	134-361
Spinal trauma/degenerative	18	11.50%	129.5	93-216
Spinal tumour	14	9.00%	150.5	111-387
Cranial congenital	9	5.80%	87	71-267
Cranial vascular	7	4.50%	69	22-169
Cranial trauma/degenerative	4	2.60%	65	16-184
Cranial inflammatory	1	0.60%	411	411
Cranial infective	1	0.60%	219	219
Total	156	100%	110.5	52.5-217.5

Different Surgical procedures had different waiting time, Table 2. It can be seen maximum waiting time was found in cranial inflammatory (411 days) followed by spinal congenital problems with 236 days waiting time with minimum found in cranial trauma/degenerative cases with 65 days. The major chunk of total elective surgeries is taken by cranial tumours which equals to about 53.2% with 88 days waiting time.

Table 3: Number of early/on-time/delayed admissions from the decision of surgery to probable date of admission.

	Probable date of admission- actual date of admission			Total
	Early	On time	Delay	
Neurosurgery	31 (19.9%)	8 (5.1%)	117 (75%)	156

Table 4: Reasons for admission before probable date of surgery (early admission).

Reasons-early adm	No. of patients
At doctors' discretion:	
If the pts condition deteriorated	23 (74%)
Patient called by doctors as bed was vacant	
Patient who was influential or had recommendations	
Certain cases for education purpose	
Patients insistence (daily visit) in hope for early date	7 (23%)
Employees of the hospital or patient who opted for private ward	1 (3%)
Total	31 (100%)

It was found not all patients were admitted on the probable date given, Table 3, some were admitted early and some later. Only 8% patients were admitted on time, 31 % cases were admitted early i.e. before the probable date and 75% cases were given delayed admission.

Reasons for Early admissions: see Table 4. Maximum early admissions were because of discretion of the doctors (74%) whether it was due to really inappropriate estimation of patient's urgency prioritization, or whether people were taken on priority because of political or social pressure on consultants or whether was due to genuine deterioration of patient's condition; it could not be ascertained from records. At times, the only reason mentioned was patient's condition deteriorating.

Reasons for delay in admission: See Table 5. Majorly the reason was non-availability of bed (84%).

Table 5: Reasons for delay in admission from the probable date of admission.

Reason adm delay	Neurosurgery	
No bed vacant: due to		
Some emergency admissions or		
Unexpected delay in discharge of patient than expected		
Certain high priority case because of patients' condition getting deteriorated	98 (84%)	P = 0.0001
Other Reasons:		
Holidays due to festivals etc.		
Patient's personal preferences for delayed admissions.	8	
Patient could not arrange money or logistics.		
Patient could not come on time or date as advised.		
Reason not mentioned (3)	11	
Total	117 (100%)	

There were patients waiting for surgery after admission. The waiting time from admission date to actual date of surgery (W3-W2): Table 6. The median waiting time was found to be 6.5 days.

Table 6: Waiting time between admission date to actual date of surgery (post admission delay in surgery).

No. of patients	Mean±SD	Min-Max	Median	IQR
156	8.19±6.93	0 - 38	6.5	3.5-11

Reasons for delayed Surgery after admission are enumerated in Table 7. Maximally reason for delay in surgery was found to be OT time not available (52%).

Capacity building: With above data, we found the major cause of waiting time is unavailability of beds and OTs. To finish the present waiting there is a requirement of more OTs and beds.

On an average 1.73 cases are operated per OT. ALOS is 13.6 days. Total numbers of patients dated for surgery are 4632 as per the records; with the available bed strength of 110 beds and 7 OTs only 2952 patients can be operated. Due to paucity of beds only 2952 patients only can be operated in a year, to optimally utilize the available OTs 19 more beds are required and to finish the present waiting 2 more OTs per day are required along with 63 extra beds. Table 8 and Table 9.

Table 7: Reasons for delay in surgery post admission.

Reason surgery delay	No. of patients
Patient not fit for surgery	3 (14%)
OT time not available	11 (52%)
Consultant not available	1 (5%)
Cross consultation and clearances for surgery from concerned specialty	2 (10%)
Public holidays	3 (14%)
Pending investigations	1 (5%)
Total	21 (100%)

Table 8: Number of beds required to cater the patients waiting for surgery.

Beds days available for 110 beds (94 general+16 private)	40150 bed days (110*365)
No of patients which can be accommodated with ALOS 13.6 days in 40150 bed days	2952 (40150/13.6)
No. of patients waiting for surgery in a year	4632
No of patients that could not be admitted due to unavailability of beds.	1680(4632-2952)
For 1680 patients' beds required	63 beds [(1680*13.6) bed days/365 days]

It was found in the study that neurosurgery OTs are 73 % utilized for elective GA cases. 2 constraints which were noted were longer duration of surgery and secondly, no case is taken by anaesthesia after 1430 hours for induction. The possible solution identified was an early start of first case for surgery by around 8:30 AM which in

turn will give time for early induction by anaesthesia and better utilization of OTs.

Table 9: Number of OTs required to cater the patients waiting for surgery.

No. of cases operated in 1 OT	1.73
No. of OTs available in a week	38.5/week (7 OTs* 5.5 working days/day)
Total No of OT days available in a year	2002/year (52 weeks a year * 38.5)
Number of patients that can be operated in 2002 OTs in a year	3463 (2002 OT * 1.73).
No. of Patients that can be admitted for surgery with the available beds (110)	2952
No. of patients need to be admitted to optimally operate the available OTs	511 (3463-2952)
To admit 511 patients, bed required will be	19 beds [(511*13.6) bed days/365days]
OTs required for 4952 patients waiting for surgery in a year	9 OTs per day (4632 patients/ 1.73 cases every OT/ 52 week/ 5.5 working days per week)
Extra OTS required	2 more per day (9-7)

Table 10: Number of beds and OTs required if OT's are better utilized.

OT utilization	73%	100%	90%	80%
No of cases done on an average OT day	1.73	2.37	2.13	1.89
No of cases requiring surgery in a year	4632	4632	4632	4632
No of Beds	110	110	110	110
No of cases which can be accommodated with present number of beds	2952	2952	2952	2952
No of total beds required to finish waiting	129	177	160	142
No of extra beds required	19	67	50	32
No of OTs required to accommodate waiting patients per week	9.3	6.8	7.6	8.5

Table 10 shows the extra beds and OTs required if OTs were efficiently utilized at 100%, 90% and 80%.

DISCUSSION

In this study, the commonest cause of waiting time for elective surgery was unavailability of beds. This demand supply mismatch has been identified as a common phenomenon in many countries like UK, Australia, Canada etc.[3-5]

The most common reasons for postponement of surgery after admission were found to be lack of theatre time (52%), followed by patient being not fit for surgery (14%). Similar results were found in other studies such as, the study conducted at the King Edward Medical University / Mayo Hospital, Lahore cancellation rate of surgery was found to be 7.47%, the commonest cause being insufficient theatre time (35.75%).[6] Similarly Arshad et al at Ayub Medical College Abbottabad, found their cancellation rate to be 25%, largest proportion being due to insufficient theatre time (36%) followed by medical reasons (31.6%) and shortage of beds (16.2%).[7] In a study at the Queen Elizabeth Hospital, Barbados, West Indies, the overall cancellation incidence in the study was 24%.[8] Improper pre-operative preparation has been quoted as a major reason for cancellations. However, the highest number of cancellations was due to unavailability of beds in the recovery room.

Shortage of operating time was another important factor of cancellation of elective surgery in this study. This can be explained by the fact that a lot of theatre time is wasted due to late starts. The theatre in neurosurgery started at 9:15 am and the cut off anesthesia time is 2.30-3:00 p.m. which means next case in not induced beyond 3:00 PM. Some patients had early admission than the probable date of admission which could be due to reasons such as patient landing up in emergency condition because of long wait had to be considered for surgery earlier this in turn led to further delay or due to some out of the turn entries causes further long waits, leading to inequitable distribution of timely care.

CONCLUSION

To reduce waiting time improvements are required at two levels: One which is external and requires political will and government funds to improve the healthcare system at a large and other which is internal and at the hospital level where there is a need to look into the processes and policies to improve and reduce waiting time by efficiently utilizing the scarce resources.

With the increasing demand of quality and specialized healthcare there is a need of proper hierarchal system to be followed where there is proper referral of patient. Those surgeries which do not require expertise of highest order could be shifted to government hospitals of lower order or to those private hospitals which have government collaborations or stakes. This will automatically reduce patients to some extent. Certain recommendations to improve the system internally:

Improved Admission process

By allowing admission of only those patients who have completed their pre-requisite investigations and formalities.

Restricted outpatient department time

It was observed that doctors in the OPD sit for long hours trying to cater to as many patients as possible; this leads to huge number of patients to be seen which ultimately lead to wait times. There should be optimum patient registration so that all patients who are seen can be attended to in stipulated time. Though what is the optimum number needs to be further explored.

Standardized patient prioritization

Literature review states that, most of the countries have a clinical urgency categorization for elective surgeries; e.g. in Australia patients awaiting elective surgeries are divided into the 3 categories such as:

- Category 1: 30 days. Patient's health has the potential to deteriorate quickly
- Category 2: 90 days. Patient's health not likely to deteriorate quickly
- Category 3: Procedures that are clinically indicated within 365 days

Also, priority scoring systems such as those developed in Canada and New Zealand are needed to make the clinical and social consequences of rationing clearer margin to patients, surgeons and policy makers. That should help equity as well as resource allocation decisions at the macro and micro levels. Patient prioritization should be one of the key strategies to effectively manage waiting lists for medical care. In the study hospital, patient prioritization is not standardized. Certain developments are needed to improve access and appropriateness to surgery, which may include:

- Development of consensus guidelines to help determine thresholds for some key surgical interventions
- Better definition of characteristics that might predict deterioration during the waiting period and surgical outcomes
- Determination of safe and acceptable waiting times for specific surgical procedures
- Development of evidence-based waiting time targets or benchmarks for specific procedures.

Hospital management information system (HMIS)

A surgical wait list registry of the patients requiring surgery should be maintained urgency category wise and standard score of illness based on the severity will help give a date automatically as per the categorization, the priority criteria and the available slot. Whenever a patient is enrolled for surgery he could be tracked as per his urgency and informed accordingly. It will also help the policy makers to know the waiting number of patients on a real-time basis. HMIS will also help to audit the delay in admissions and delay in surgeries post admission, thus providing data for decision makers to take appropriate action.

Increasing the theatre time

The possibility of having 2 eight hourly shifts in a day or premium charged elective surgeries post working hours or on holidays can be explored.

Activity based funding

For countries that have been paying their hospitals by global budgets and their surgeons by salaries, they are likely to be able to increase their surgery rates and bring down waiting times by introducing an element of activity-related payment for hospitals and surgeons. This possibility should be explored with the political bodies and all stakeholders. Further study is required to rationalize the availability of ICU beds, OTs, general beds and number of consultants including anesthetists to understand the optimum patient load which can be handled in an optimum waiting time within permissible limits of the existing infrastructure.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Prentice JC, Pizer SD. Delayed access to health care and mortality. Heal Res Educ Trust. 2006;42(2):64-2.
2. Riganti A, Siciliani L, Fiorio C. The effect of waiting times on demand and supply for elective surgery: evidence from Italy. Available at https://editorialexpress.com/cgi-bin/conference/download.cgi?db_name=SIEP2016&paper_id=176.
3. BCMA's Council. Waiting Too Long: Reducing and Better Managing Wait Times in BC. 2006:82. Available at https://www.doctorsofbc.ca/sites/default/files/waiting_too_long.pdf.

4. The Australian Institute of Health and Welfare. National definitions for elective surgery urgency categories. 2012:79.
5. Noseworthy DTW. Western Canada Waiting List Project From Chaos to Order : Making Sense of Waiting Lists in Canada Western Canada Waiting List Project From Chaos to Order : Making Sense of Waiting Lists in Canada Final Report. 2001.
6. Afzal F, Asad N, Ali K. Causes of postponement of elective surgery. Biomedica. 2010;26:148-51.
7. Zafar A, Mufti TS, Griffin S, Ahmed S, Ansari JA. Cancelled elective general surgical operations in Ayub teaching hospital. J Ayub Med Coll Abbottabad. 2007;19(3):64-6.
8. Jonnalagadda R, Walrond ER, Hariharan S, Walrond M, Prasad C. Evaluation of the reasons for cancellations and delays of surgical procedures in a developing country. Int J Clin Practice. 2005;59:716-20.
9. Kumar R, Sarma RK. Operation room utilization at AIIMS, a prospective study. J Acad Hosp Adm. 2003;15:1-6.

Cite this article as: Sardana SR, Gupta SK, Sharma DK, Vij A, Kale SS. Analysis of waiting time for elective surgical procedures in neurosurgery department at a tertiary care teaching hospital in NCT, India. Int J Res Med Sci 2017;5:4538-44.