Original Article

Time spent by patients in a pre-anaesthetic clinic and the factors affecting it: An audit from a tertiary care teaching hospital

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ABSTRACT

Background and Aims: Patient satisfaction from a pre-anaesthetic clinic (PAC) visit is greatly influenced by time spent there. We aimed to determine time spent in a PAC without an appointment system and the factors affecting the same. **Methods:** Four hundred and eight patients coming to PAC were tracked using a time-motion study model. Time spent in waiting and consultation was recorded. Independent variables potentially affecting time spent were documented. Patients were grouped based on independent variables, and the groups were compared for significant differences using appropriate statistical tests. Workload pending on physicians was calculated on an hourly basis by counting number of patients waiting and number of physicians in PAC. **Results:** Non-parametric statistical tests were used for analysis because the data were not normally distributed. The median and inter-quartile range for waiting time, consultation time and total time were 60 (30–90) minutes, 17 (12–26) minutes and 79 (53–111) minutes, respectively. There was considerable variation in all three. Waiting time was significantly lower in patients posted for same-day surgery or those arriving on a stretcher or wheelchair. Consultation time was correlated with American Society of Anesthesiologists physical status and grade of surgery. Most patients arrived in the morning rather than at equal intervals. Waiting time and workload were therefore maximum in the midmorning and dropped rapidly in the afternoon. **Conclusion:** Large variability in waiting time is linked to lack of an appointment system, and to patients being seen out of turn.

Key words: Appointments and schedules, health facility administration, pre-operative care, process assessment (health care), program evaluation, quality control, time management

INTRODUCTION

In a pre-anaesthetic clinic (PAC), as in any clinical service, patient satisfaction is important. This may be influenced by many factors. The main factor adversely affecting patient satisfaction is time spent in the clinic.[1] Total time spent in PAC can be split into two parts: waiting time and consultation time, which have been defined.[2] There is a paucity of data on this topic from developing nations, and most of this data comes from patient satisfaction surveys.[3,4] Our aim was to measure the time spent by patients in PAC, the factors affecting it and periods of increased workload; to try and suggest ways to improve our services.

METHODS

The project proposal was cleared by the Institutional Review Board. The Board also waived patient consent requirement. No consideration, financial or otherwise, was requested or offered for this study. STROBE (Strengthening the Reporting of Observational

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Studies in Epidemiology) recommendations[5] were followed in writing this manuscript.

In a large tertiary hospital in South India, the PAC caters to about 450 patients (both inpatients and outpatients) per week belonging to most surgical specialities. However, patients coming for obstetrics and gynaecology, ambulatory anaesthesia, paediatric general surgery and paediatric urology are seen elsewhere due to logistic and administrative reasons. Patients needing emergency surgery are also not seen as they are assessed in the operating theatre itself.

PAC functions from Monday to Saturday. It opens at 08:00 am and closes at 04:30 pm or after the last patient is seen, whichever is later. Individual physicians take breaks at separate times, thus ensuring that PAC is functional throughout the working hours. The PAC lacks an appointment system, and patients can walk in at any time. Thus, the workload is unevenly spread during the day. The patients are seen by either consultants or trainees, who sit in a common examination room while patients wait in the waiting room. The patients' charts are placed in the examination room in a single pile (with the newest arrivals at the bottom), by a clerk who sits in the waiting room. A physician who has completed assessing a patient picks another chart from the top of the pile. However, there are several exceptions to this first-come-first-served rule. The decision to see patients out of turn for various reasons is made by the consultant in PAC. Each patient is seen by one physician only. If the trainee has a doubt, it is resolved by discussion with the consultant. The physicians staffing PAC come on rotation and are different every day.

For this cross-sectional audit, an external observer-based time-motion study model was chosen.[6] All patients registering in PAC for the first time for a new surgery over 1 week were eligible for tracking (enumerative sampling). Any patient being seen on a revisit was excluded. At this institution, individual surgical specialities have elective theatres on the same day every week. Thus, the entire elective surgical population visiting PAC can be represented adequately by collecting data over 1 week.

A trial run of data collection was conducted one working day before the actual data collection period to look for flaws or blind-spots in the methodology. Following this, data collection was performed on 4th to 9th July, 2016, by the principal investigator (PI), who sat in the patient waiting area of the PAC. The data collection flowchart and the dependent and independent variables are given in Figure 1. Time was recorded from the PI's computer.

The dependent variables were waiting time, consultation time, total time and workload per physician. In addition to basic demographic details, various independent variables which were thought likely to alter the waiting time and/or consultation time were recorded. The planned surgical procedure was classified into three groups (minor, moderate and major) following Donati's modification of the Johns Hopkins surgical criteria.[7] Patients who were pregnant, having significant pain, visible distress or mental disability were considered vulnerable for the purpose of this study.

A potential source of bias in data collection is the Hawthorne effect, namely, the alteration in task performance due to an awareness of being observed.[8] While this cannot be totally eliminated, we think our methodology minimises it because the PI sat in the waiting area with the patients and tracked their activities rather than sitting inside the physicians' room and/or tracking the physicians' activities.

All statistics were performed using SPSS 17.0 (SPSS Statistics for Windows, version 17.0 [SPSS Inc., Chicago, Ill., USA]). The three measurements of time were analysed by calculating measures of central tendency and dispersion. As the data were not normally distributed, appropriate non-parametric tests were used. The dependent variables were grouped based on the independent variables, and the groups were compared for significant differences at α of 0.05. The effect size for Mann–Whitney test was calculated as ($r = z/[\sqrt{N}]$), where r is interpreted similar to Cohen's *r*, *Z* is the *Z* score calculated to generate *P* value, and N is the total sample size for that comparison.[9,10] Correlation was determined where appropriate. Where dependent variables were missing, those patients were completely excluded from analysis. Where independent variables were missing, they were excluded from the relevant between-group comparisons.

RESULTS

During the week in question, 463 patients came to PAC, of which 42 were excluded as they had come for a review following a previous evaluation for the same

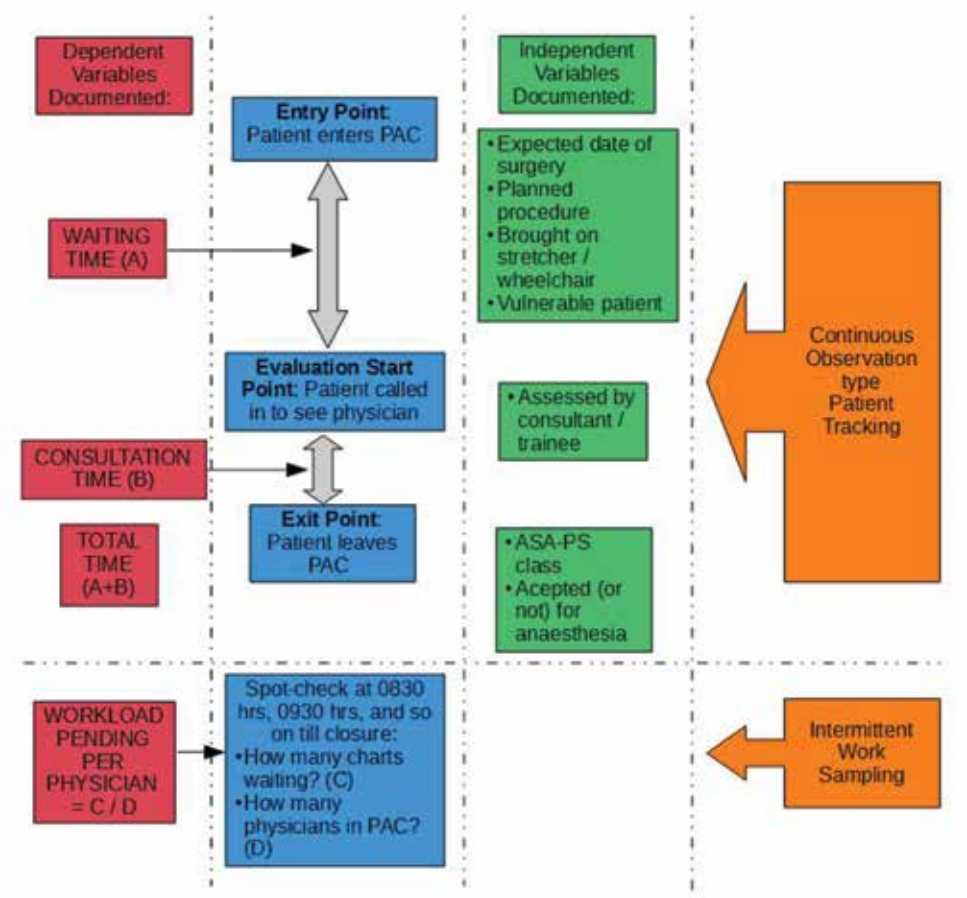

Figure 1: Methodology flowchart. From left to right, the first column (red boxes) shows dependent variables measured, the second column (blue) shows patient flow and hourly spot check, the third column (green) shows independent variables noted at each point and the right-most column (orange) shows time-motion study subtypes utilised for measurement. ASA-PS: American Society of Anesthesiologists' Physical Status classification

surgery (revisit). Out of the remaining 421 patients, 13 patients whose entry point was noted were absent when called in by the physician and were excluded from analysis. Data were collected and analysed for the remaining 408 patients.

The median age was 42 years, the youngest being <1-year-old and the oldest being 84 years. There was a male preponderance in our data set (63% vs. 37%). Nearly half of the patients had come for general surgery and orthopaedic procedures, whereas the rest were of miscellaneous surgical specialities. The distribution of independent variables is given in Table 1. Measures of central tendency and dispersion for the dependent variables [Table 2] reveal a large standard deviation.

Dividing patients into three groups based on expected date of surgery (same day, next day or later), the Kruskal–Wallis test showed a significant difference in waiting time between the groups (Kruskal–Wallis H [2] = 16.09, $P < 0.001$). *Post hoc* Mann–Whitney tests were performed to compare the groups in pairs, and Bonferroni correction applied such that α for each comparison was 0.0167 (0.05 divided by 3 for three comparisons). Waiting time for same-day surgery (median 21 min, interquartile range [IQR] 19–45.5, $n = 17$) was significantly different from that for next-day surgery (median 58 min, IQR 28–83, $n = 196$) (Mann–Whitney U-test = 885.5, $P < 0.001$, $r = -0.22$) as well as from waiting time for later surgery (median 68 min, IQR 35–99, $n = 191$) (Mann–Whitney U-test = 741.5, $P < 0.001$, $r = -0.26$). However, the waiting times for next-day surgery and later surgery groups were statistically similar (Mann–Whitney U-test = 16,587.5, $P = 0.053$, $r = -0.098$).

Only four patients fit our description of being vulnerable. No statistical analysis was attempted in this group due to the small number in this grouping.

For patients brought on a wheelchair or stretcher, Table 3 shows that while waiting time was significantly less, consultation time was significantly higher, resulting in total times that were similar to the rest of

Table 1: Distribution of independent variables (*n*=408)

Variable	*n* (%)
Expected date of surgery	
Same day	17 (4.2)
Next day	196 (48)
Later/unknown	191 (46.8)
Missing	4 (1)
Modified Johns Hopkins surgical criteria[7]	
Minor (Grade I)	143 (35)
Moderate (Grade II)	193 (47.3)
Major (Grade III)	72 (17.6)
Brought on wheelchair/stretcher	
Wheelchair	80 (19.6)
Stretcher	7 (1.7)
Missing	2 (0.5)
Vulnerable patients	
Agitated/upset	1 (0.2)
Significant pain	3 (0.7)
Mental disability	0
Pregnancy	0
Missing	2 (0.5)
Assessed by consultant/trainee physician	
Consultant	178 (43.6)
Registrar	230 (56.4)
ASA-PS classification[11]	
I	195 (47.8)
II	173 (42.4)
III	40 (9.8)
Accepted by PAC?	
Yes	343 (84.1)
No	64 (15.7)
Missing	1 (0.2)

ASA-PS – American Society of Anesthesiologists' Physical Status; PAC – Pre-anaesthetic clinic

Table 2: Summary of dependent variables (*n*=408)

Time in minutes	Mean	SD	SE	Median	IQR
Waiting time	63.52	39.31	1.95	60	30-90
Consultation time	19.85	11.04	0.55	17	12-26
Total time	83.39	38.57	1.91	79	53-111

SD – Standard deviation; SE – Standard error; IQR – Interquartile range

Table 3: Comparison of patients brought on stretcher/wheelchair with the rest (*n*=406)

Time in minutes	Stretcher/wheelchair*		*P*†	*r* (effect size)
	No (*n*=319)	Yes (*n*=87)		
Waiting time	66 (33-94)	48 (17-79)	<0.001	−0.17
Consultation time	15 (11-22)	25 (18-35)	<0.001	−0.34
Total time	82 (53-113)	70 (54-98)	0.165	−0.07

*Median (IQR), †Two-tailed significance from Mann–Whitney test. IQR – Interquartile range

the patients. As only seven patients were brought on stretchers, a separate analysis was not done for this sub-group.

On comparing consultation time based on the planned surgical procedure, the patients were divided into three surgical grades, namely, minor (median 14 min, IQR 9–20, $n = 143$), moderate (median 17 min, IQR 13–26, $n = 193$), and major (median 25 min, IQR 16–32, $n = 72$) surgery. The Kruskal–Wallis test followed by *post hoc* paired comparisons (Mann–Whitney, keeping α at 0.0167) showed significant differences between all three groups. Spearman's rank correlation coefficient (ρ [rho]) was calculated and revealed a weak-positive but statistically significant correlation (ρ 0.327, $P < 0.001$) between surgical grade and consultation time.

We compared patients assessed by a consultant or a trainee. Those seen by consultants (median 18.5 min, IQR 13.75–26.25, $n = 178$) had longer median consultation time than those seen by trainees (median 16 min, IQR 10.75–26, $n = 230$). The difference was statistically significant but with a small effect size (Mann–Whitney U-test = 17289, $P = 0.007$, $r = -0.13$).

Based on the American Society of Anesthesiologists' Physical Status (ASA-PS) classification of the tracked patients, median consultation time for the groups were as follows: ASA-PS I: 12 min (IQR 9–17, $n = 195$); ASA-PS II: 20 min (IQR 16–28, $n = 173$) and ASA-PS III: 35 min (IQR 29–41.75, $n = 40$). The three groups were shown to be significantly different from each other by the same tests as used above for the variables expected date of surgery and planned surgical procedure. Spearman's coefficient revealed a strongly-positive and statistically significant correlation (ρ 0.62, $P < 0.001$) between ASA-PS classification and consultation time.

Looking at whether the patients were accepted or not for anaesthesia, consultation times of those not accepted (median 24 min, IQR 18–35, $n = 64$) were 50% longer than for those who were accepted (median 16 min, IQR 11–24, $n = 343$), and the difference was significant (Mann–Whitney U-test = 5921, $P < 0.001$, $r = -0.29$).

After dividing the day into hour-long intervals, the waiting time for those who entered PAC in each hour, and consultation time for those whose consultation started in each hour, were plotted on a graph, along with the number of patients entering PAC in each hour [Figure 2]. While the number of patients entering PAC was maximum in the morning and dropped through the day, the consultation time was fairly stable through the day. This creates a bottleneck in the morning. Thus, the median waiting time approached 45 min in the 1st hour, climbed rapidly to 90 min by

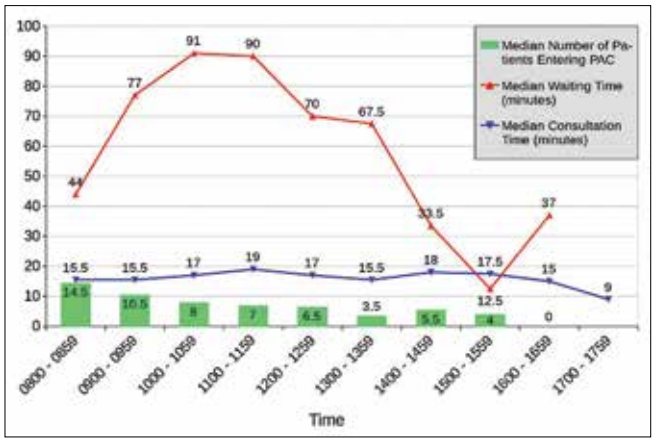

Figure 2: Line and bar graph comparing median number of patients entering pre-anaesthetic clinic, median waiting time and median consultation time measured at hourly intervals

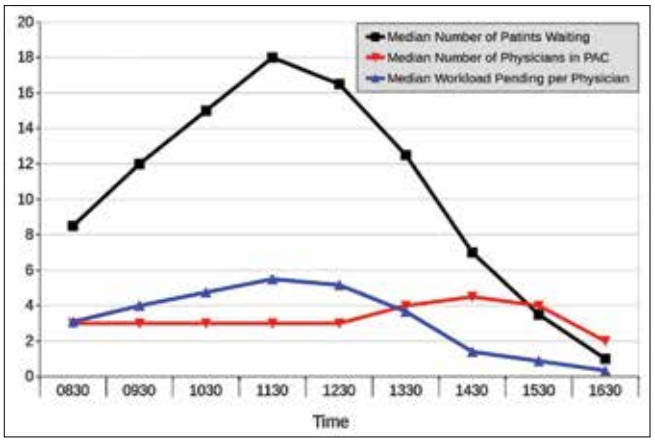

Figure 3: Line graph of pre-anaesthetic clinic workload pending determined by hourly work-sampling technique

midmorning, and then gradually dropped during the afternoon.

Data from intermittent work sampling [Figure 3] show similar results. During peak hours, there are almost 18 patients waiting in PAC. The number of physicians increases briefly in the afternoon hours and contributes to the drop in pending workload.

DISCUSSION

Based on our time-motion study where 408 patients were tracked, we found that the median waiting time was roughly 60 min, the consultation time was under 20 min and the total time spent in PAC by patients was around 80 min. While reduced waiting time was associated with being planned for same-day surgery and being brought to PAC on a wheelchair or stretcher, consultation time was weakly correlated with surgical grade and strongly correlated with the ASA-PS classification. Workload pending on PAC (as well as waiting time) was highest in the late morning hours and noon and was probably related to most patients arriving in the morning hours.

The male preponderance in our patient population is probably because patients undergoing obstetric and gynaecological surgery are seen elsewhere as mentioned earlier. The increased consultation time for patients brought on wheelchairs or stretchers can be explained by the higher proportion of ASA-PS III patients in this group than in the rest (31% vs. 4%). Consultants taking longer than trainees to assess patients is counter-intuitive[12] but can be explained by the fact that consultants have other managerial responsibilities (such as clarifying doubts for trainees and communicating with surgeons) which are not captured separately by our patient-tracking methodology. It may also be that consultants examine patients in more detail due to their greater experience or knowledge. Longer consultation time for patients not accepted for anaesthesia may be because they need more detailed assessment of comorbidities before a decision is made to defer surgery and refer to a specialist for optimisation and because trainees need to confirm such a decision with the consultant.

Our measurements of waiting time and consultation time are in line with previously published data.[2,13] The small standard error [Table 2] gives us confidence that the sample mean is a reasonable expression of the population mean. Our data provide further evidence for Dexter's assertion that long waiting times can be primarily attributed to the lack of an appointment schedule and the large variation in consultation time.[14,15] The variability in waiting time may be caused by accepting patients out of turn (decreasing waiting time for some while increasing it for others). Exceptions to the first-come-first-served rule are strongly suggested in our data in the case of patients coming for same-day surgery, and those brought to PAC on wheelchairs or stretchers.

The considerable variability in consultation time is a reflection of the heterogeneity of our patient population. The correlation between consultation time and ASA-PS has been previously documented.[2,12] ASA-PS III patients have a median consultation time almost thrice that of ASA-PS I patients in our data. Estimates of consultation time taken and the average number of patients of each ASA-PS class coming to PAC can be useful in budgeting or allotting time slots for PAC appointments.

From Figures 2 and 3, the problems resulting from the absence of a scheduling system should be apparent. An appointment schedule would significantly flatten the peak in waiting time and physician workload seen before noon in our data, by spreading the arrivals more evenly instead of having the majority arrive in the morning.[2,15] Other advantages of scheduling appointments would be reduced crowding of the waiting area, and reduced stress on physicians which could lead to more optimal assessment of patients. Where appointments are not scheduled, patients may also be asked to return at a later date if the workload is too high. This can reduce patient satisfaction and lead to conflict.

However, several PACs function without appointment schedules. This can be attributed to several reasons. Foremost among these is the pressure to reduce overall waiting time for patients that is the time from being seen in the surgical clinic to the surgery being performed. Booking an appointment for PAC could potentially delay the surgery. It also leads to increase in the number of visits needed to the hospital before surgery. These could detract from overall patient satisfaction with the entire hospital experience.

Other approaches can be suggested to improve patient satisfaction that do not include scheduling appointments.[2] First, good communication is the key to a good relationship and has a significant positive impact on patient satisfaction.[1] Based on our data, we know the estimated waiting time for patients arriving each hour. If this information was passed on to the patients, many would at least feel better, if not utilise the time in other tasks. Second, staffing can be adjusted according to the demands of the work. Taking our data as an example, allotting extra physicians to PAC in the morning hours can make a noticeable impact on the waiting time. Third, waiting time can be utilised to measure vital signs, height and weight by allocating an appropriate person for the same. Basic history-taking may also be considered (potentially reducing consultation time). Fourth, patient education can be provided through information sheets and instructional videos (for instance, about surgery and anaesthesia, health and wellness, etc.,) in the waiting area. Finally, providing magazines, newspapers and television in the waiting area can help patients pass the time.

Our audit has a few limitations. First, though our findings are based on a fairly diverse patient population, patients for ambulatory procedures are seen at another site as mentioned earlier. As more and more ambulatory procedures are being performed, and mostly on ASA-PS I patients, our data may overestimate consultation time due to the increased proportion of ASA-PS II and III patients. Second, the Hawthorne effect cannot be completely discounted. Its influence on consultation time is unpredictable. Physicians may speed up evaluation or slow down to do a more thorough evaluation. Finally, while patient-tracking accurately captures the physical experience of the patient, it does not directly measure patient satisfaction. It also does not measure time spent by physicians on activities other than patient assessment which are nonetheless important.

Given the paucity of quantitative data on this topic from India and other developing countries, we encourage further studies in this area. A comparison of PACs with and without an appointment system could be enlightening. So could correlating data on waiting time and consultation time with patient satisfaction surveys.

CONCLUSION

The average patient seems to spend well over an hour in PAC. All attempts should be made to make this time both shorter and more comfortable. Most patients arrived in the morning rather than at equal intervals, resulting in long waiting times and increased workload in the morning. This knowledge should be used to appropriately alter the staffing in PAC or create an appointment system where feasible.

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Conflicts of interest

There are no conflicts of interest.

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