Improving the preoperative assessment clinic
Edward, G.M.

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Chapter 7

The effects of implementing a new schedule at the Preoperative Assessment Clinic


Submitted for publication
Abstract

**Background:** Long waiting times mean a problem often encountered at the preoperative assessment clinic (PAC). To tackle this problem, we redesigned our appointment system, making the reserved consultation time dependent on patients’ American Society of Anesthesiologists’ (ASA) physical status. The aim of the present study was to determine the effects of implementing this new appointment system on waiting times and patient experiences with the PAC.

**Methods:** During three weeks, patient flow times were measured at the PAC. These were used to calculate the procedure time of the nurse and physician, and the patient’s waiting time. Patients who visited the PAC received the Patient Experiences with the Preoperative Assessment Clinic (PEPAC) questionnaire to measure their experiences. Waiting times and patients’ experiences before and after implementation of the new appointment system were compared.

**Results:** By making the reserved consultation time dependent on patients’ ASA physical status, mean total waiting time was reduced from 26 (SD 23) min to 16 (15) min. Thirty percent of the patients were late for their appointment. On average physicians were 21 (10) min late for their first appointment. The questionnaire was sent to 476 patients (response 68%). On a 0-100 scale, patients’ experiences with waiting improved from 49 (19) to 52 (18) and patients’ mean overall appraisal of the PAC increased from 78 (16) to 81 (14).

**Conclusions:** The new appointment system reduced the waiting time at the PAC and patient experiences were more positive after implementation of the new system. All efforts should be made to avoid unpunctuality from physicians and patients.
Long waiting times are an infamous problem of outpatient clinics and a problem also encountered at our preoperative assessment clinic (PAC). In a previous study, we set priorities to improve the quality of the PAC after obtaining patients’ feedback on the quality of the PAC and establishing the value patients and professionals attach to different aspects of care. The dimension waiting turned out to have the lowest standard of service and was in the greatest need for improvement.

Bailey and Welch pioneered the study of outpatient clinic scheduling and others followed with research in this area. Dexter gave a review of the science of clinic scheduling that can be applied to the PAC. He stated that an improperly designed appointment system, large standard deviation of consultation times, provider tardiness, lack of patient punctuality, and patient no-shows are the main reason for long patient waiting times at the PAC.

To address the problem of long waiting at the PAC, we simulated scenarios to reduce waiting times. Without simulation it is clear that increasing the reserved consultation time reduces waiting time. A simulation model was used to find the optimal consultation time, with limited waiting time for both the patient and the physician. We found that waiting time could be reduced by increasing the reserved consultation time and making it dependent on patients’ American Society of Anesthesiologists’ (ASA) physical status: instead of 15 min for all patients irrespective of their ASA physical status, 20 min for patients with ASA class I or II and 30 min for patients with ASA class III or IV. In the past, clinic sessions were not fully booked, because of the anticipated accumulation of waiting times. Increasing the reserved consultation time could be achieved while maintaining the same capacity, i.e. the number of consultations per day.

With this information, we redesigned the appointment system of the PAC. The aim of the present study was to determine the effects of implementing this new appointment system on both the patient flow and patient experiences with the PAC. We hypothesized that making the reserved consultation time dependent on patients’ ASA physical status would reduce waiting time and improve patient experiences regarding waiting at the PAC.
Methods

Appointment system: old versus new

Before the new appointment was implemented, the reserved appointment time was 15 min for all patients, irrespective of their ASA physical status. In addition, there were walk-in patients. No strict criteria were handled as to who could walk-in; and it was not known how many patients would walk-in on a daily basis. No time was reserved for walk-in patients; they were seen additionally, in between appointments. There were either two or three physicians working at the PAC per day. However, at the time of scheduling it was unknown how many physicians would be available and always two clinic sessions were scheduled. Physicians did not have their own clinic sessions, but saw patients of either clinic session on a first come first serve base.

A new appointment system was introduced in November 2007. In the new system, the reserved appointment time is 20 min for patients with ASA class I or II and 30 min for patients with ASA class III or IV. A specific health questionnaire, completed by patients prior to making an appointment, is used to make an estimation of patients’ ASA physical status. Special slots are reserved for walk-in patients. If no more walk-in slots are available, patients have to make an appointment for another day. Three clinic sessions are scheduled and the three physicians have their own clinic sessions; at the start of the session the physician knows which patients he or she will see.

Patient flow

All patients visiting the PAC of the Academic Medical Centre in Amsterdam during a three week period in December 2007 were included in the study. There were no exclusion criteria. After checking in with the counter clerk, patients were seen by a nurse; subsequently, the preoperative assessment was performed by an anaesthesiologist or an anaesthesia resident. Before the consultation with the nurse and the physician, patients might have to wait in the waiting room. Using synchronized clocks, the check-in time and start and end of the consultations with
the nurse and the physician were registered by the professional in question. This was done on a form attached to the patient’s medical notes. Patients’ age and ASA physical status were also registered.

The registered times were used to calculate the procedure time with the nurse and physician, and the waiting times. The total waiting time was defined as the sum of the waiting time before seeing the nurse and the physician. The waiting time before seeing the nurse was defined as the time between the appointment time and the start of the consultation with the nurse for patients who arrived before the appointment time; for patients who arrived after the appointment time, it was defined as the time between the check-in time and the start of the consultation with the nurse. The waiting time before seeing the physician was defined as the time between the end of the consultation with the nurse and the start of the consultation with the physician. If patients were seen by the physician before the appointment time, then the waiting time was defined as the time between the check-in time and the start of the consultation with the physician. Negative values were transformed to 0 min waiting time. As patients with a higher ASA physical status (III or IV) get a longer appointment time, we differentiated the procedure times per ASA class. We did not differentiate the waiting time per ASA class, as a patient’s waiting time is dependent on the procedure time of the preceding patients. The total waiting time was compared to the total waiting time at the PAC in 2005, when the mean (SD) total waiting time was 26 (23). We recalculated the waiting times using the same definitions as described above.

Patient survey

Within two days of their visit to the PAC, all patients received the Patient Experiences with the Preoperative Assessment Clinic (PEPAC) questionnaire, a questionnaire developed and validated to measure patients’ experiences with the PAC. A freepost return envelope was included. After one week, non-respondents were contacted to remind them of the questionnaire and ask for their participation; after an additional week a reminder letter was sent. Patients under the age of 16 were excluded from the patient survey, though they were included in the measurement of the patient flow times.
The PEPAC questionnaire consists of five dimension scales, measuring five care aspects: reception, waiting, the nurse, the anaesthetist, and remaining experiences. In addition, there is a separate scale to measure patient’s overall appraisal of the PAC. The mean dimension scores were calculated; a high score indicated good experiences with the aspects of care in a dimension.

Statistical analysis

Patient flow times were calculated using descriptive statistics. Comparisons of the procedure time for the physician between the ASA classes were performed by one-way ANOVA. Total waiting time before and after implementation of the new appointment system was compared though Student’s t-test.

Patient characteristics and missing values were determined using descriptive statistics. Comparisons of characteristics between respondents and non-respondents were performed for gender by Fisher’s exact test and for age by Student’s t-test. Patients' dimension scores were determined by the average of patients’ scores on the items in a dimension (range 0 - 100);\textsuperscript{15} with a high score indicating good experiences with the service of the PAC. We specifically looked at the items of the dimension waiting. Comparisons of patients' experiences before and after implementation of the new appointment system were performed by Student’s t-test.

Results

Patient flow

We included 614 patients: 294 ASA I, 240 ASA II, 78 ASA III, and 2 ASA IV patients. The mean (SD) procedure time was 7 (3) min for the nurse and 13 (6) min for the physician. The mean procedure time for the physician was significantly longer for patients with a higher ASA class ($P <0.001$): the mean procedure time was 11 (5) for ASA I, 14 (6) for ASA II, 18 (8) for ASA III, and 21 (5) for ASA IV patients. The mean total waiting time was 16 (15) min, which is a reduction of 38% compared to 2005, when the mean total waiting time was 26 (23) ($P <0.001$). The
mean waiting time before seeing the nurse was 4 (7) min; mean waiting time before seeing the physician was 13 (13) min. The majority of patients (62%) arrived early, with a mean of 17 (17) min. Ten patients were more than 60 min early, with a mean of 93 (21) min, explaining the large standard deviation. In 126 cases the consultation with the nurse was finished before the actual appointment time. In 50 cases the consultation with the physician started before the actual appointment time, with a mean of 18 (20) min. 30% of the patients were late for their appointment; 91% arrived within 30 min after the appointed time, with a mean of 10 (7) min. On average the physicians were 21 (10) min late starting the consultation of the first patient in a clinic session. In 12% of the cases, the patient was not seen by the appointed physician. With the health questionnaire 86% of ASA class I and II patients were identified correctly. However, only 35% of the patients with ASA class III and IV were identified correctly.

**Patient survey**

The PEPAC was sent to 476 patients; 324 (68%) questionnaires were returned duly completed. The male:female ratio was 44:56 and mean (range) of patient age was 55 (16-89) years. On average non-respondents were younger than respondents (55 versus 45 years; \( P < 0.001 \)); there was no difference with respect to gender.

Of the items in the dimension waiting, there was only an improvement in the item score for the items waiting time for the nurse and the anaesthetist (Table 1). A maximum waiting time of 10 min was deemed acceptable by 65% of the patients, 26 % thought a waiting time up to 15 min was acceptable. All dimension scores improved compared to the former situation; only for the nurse the score remained the same (Table 1). The mean (SD) dimension scores ranged from 52 (18) for waiting to 91 (12) for the nurse; the mean overall appraisal score was 81 (14) (Table 1).
<table>
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<th>95% CI difference</th>
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<td>Overall Appraisal</td>
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<td>81 (14)</td>
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* P<0.05  **P<0.01 in t-test for difference between means
Discussion

In this study we analyzed the effects of implementing a new appointment system on waiting times and patient experiences with the PAC. Our appointment system was redesigned, making the reserved consultation time dependent on patients’ ASA physical status. This resulted in a considerable reduction in the mean waiting time: from 26 (SD 23) min to 16 (15) min. Patients’ mean (SD) overall appraisal of the PAC increased from 78 (16) to 81 (14), after implementing new appointment system. Patients’ experiences with waiting improved from 49 (19) to 52 (18).

Limitations of the study

In this study, we compared waiting times and patients’ experiences before and after implementation of the new appointment system. An assumption is made that the reduction of the waiting time and the improvement of patients’ experiences are both the result of the new appointment system. However, other factors might have changed over time, which could influence the waiting time and patients’ experiences at the PAC. This is an uncertainty, which is inherent to the study design. However, comparing waiting times and patients’ experiences for two different appointment systems at the same point in time is not workable.

Discussion of the results

An improperly designed appointment systems is a main reason for long patient waiting times at the PAC. We aimed to reduce the waiting time at our PAC, by redesigning the appointment system. Patients are seen on appointment, as appointment-based schedules have a shorter average waiting time, because there is less variability in arrival times. Walk-in patients are assigned to special slots and are therefore also seen “on appointment”. There is a high variability of the consultation times at the PAC, with patients with higher ASA class requiring more time. Generally, a high variability of consultation times is a reason for waiting time to occur. We wanted a better match of the reserved consultation time and the actual consultation time, in order to reduce waiting times. With a simulation model
we found the *optimal* consultation time, with limited waiting time for both the patient and the physician, to be 20 min for patients with ASA class I or II and 30 min for patients with ASA class III or IV, instead of 15 min for all patients irrespective of their ASA physical status. Though the reserved consultation time increased for all patients, the number of consultations per day was enough to meet demand, as previously, clinic sessions were not fully booked because of the anticipated accumulation of waiting times. Now the complete clinic session is used for appointments, allowing the same amount of consultations as before, but with longer reserved consultation times.

To make an estimation of patients’ ASA physical status, patients had to complete a specific health questionnaire. However, this health questionnaire was not quite sensitive: 86% of ASA class I and II patients were identified correctly and only 35% of the patients with ASA class III and IV. Therefore, development of a more sensitive triage instrument would be interesting. An alternative might be to place the consultation with the nurse prior to making the appointment, allowing triage by the nurse. Further study is needed to elucidate this.

As described, with the new appointment system the mean (SD) waiting time was reduced from 26 (23) min to 16 (15) min. However, our aimed service level was a maximum waiting time of 10 minutes for 95% of all patients.\(^\text{13}\) This may be caused by the relatively high number of patients arriving late for their appointment (30%). It is also undesirable for patients to arrive too early, as this gives overcrowding in the waiting room.\(^\text{3}\) Patients should be seen in the order of appointment, not in the order of arrival. To avoid unpunctual patients to cause waiting time for subsequent patients, appointments should be cancelled if the patient is more than 5 minutes late. Waiting times are also very sensitive to care providers’ unpunctuality.\(^\text{8-10}\) On average the physicians were 21 (10) min late starting the consultation of the first patient in a clinic session. This causes waiting times to accumulate from the start of the clinic session. Interruptions during the clinic session also contribute to waiting time. Further reduction of the waiting times might be achieved by focusing on these points.

Though waiting times were reduced by 38%, the overall appraisal score and dimension score for waiting were only increased with several points as compared
to the old situation. This might be explained by the fact that most patients do not know what the waiting times were like before the new appointment system was implemented. 91% of the patients thought that a maximum acceptable waiting time was 15 min, while the mean waiting time was 16 (15) min. In addition, patients should be informed about the length and reason of the waiting time in order to raise satisfaction. This point was overlooked; this is reflected in the score of these items, which is below 45. This shows that patients’ feedback remains an important indicator for the quality of the PAC. We did not investigate the influence of the new appointment system on professionals’ experiences. Whether reducing waiting times improves their work experiences needs further study.

In conclusion, we found that the new appointment system, with the reserved consultation time made dependent on patients’ ASA physical status, gave a substantial reduction in the waiting times and also improved patient experiences with the PAC. In addition to this, all efforts should be made to ensure that physicians start punctually and that patients arrive on time. If, in spite of this, waiting times do occur, patients should be informed about the length and the reason of the waiting time.
References


