REVIEW ARTICLE

Design of Appointment Systems for Preanesthesia Evaluation Clinics to Minimize Patient Waiting Times: A Review of Computer Simulation and Patient Survey Studies

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The development of ambulatory surgery and same-day admit surgery has prompted the development of preanesthesia evaluation clinics. Outpatient clinic scheduling was studied extensively between 1950 and 1980 (1–6). This research is the foundation for routine practices in clinic scheduling. Some hospitals may have lost awareness as to why clinic scheduling is performed in the manner that it is (7). In this article, I review the science of clinic scheduling appropriate to appointment systems for anesthesia clinics.

Patients can wait for more than an hour to be seen at preanesthesia evaluation clinics (8,9). While waiting in clinics, patients can feel that they are being ignored and treated unfairly (10). When a patient is given a designated time for a clinic appointment, an expectation for timely service is created (11). Patients evaluate the quality of service in clinics (12). Patients judge physicians based mainly on service (13). Fifty six percent of the American public thinks that physicians do a poor job of "being on time for appointments" (14). This review of the literature focuses on identifying fundamental, scientific principles of clinic scheduling that account for long patient waiting times in anesthesia clinics.

Clinic scheduling is used to decrease mean patient waiting times. Some anesthesia clinics do not use appointments. An anesthesia clinic without appointments will have a longer average patient waiting time than the same clinic with appropriate appointments. This review article is clinically relevant to anesthesiologists working in preanesthesia evaluation clinics without appointments, because the best service that such anesthesiologists can provide to their patients will be worse (15,16) than that considered in this article.

Mean and Standard Deviation of Consultation Times

In anesthesia clinics, anesthesiologists, resident physicians, nurse anesthetists, physician assistants, or other providers review a patient's medical record, examine the patient, obtain additional medical history from the patient or the patient's physician(s), review anesthetic plans with the patient, write preoperative orders, and document these steps in the medical record. The consultation time refers to the time between when a provider starts reviewing a patient's medical record and when the provider can care for another patient. At the University of Iowa, the mean ± SD of consultation time equals 28 ± 17 min (n = 208). At the University of Florida, the consultation time equals 28 ± 23 min (n = 10,853) (9). The large standard deviations of consultation times are very important. If all consultations took exactly 28 min and patients arrived for appointments on the hour and half hour, then no patient would wait to be evaluated.

Appointment Intervals

A provider is scheduled to see a consecutive series of patients during a *clinic session* (e.g., 8:00 AM to 4:00 PM). Characteristically, patients attending a clinic session are given appointments at a succession of equally spaced times, the difference between one time and the next being called the *appointment interval* (2). The *appointment system* refers to the arithmetical rule that describes the way the appointments are scheduled. For example, computer simulation of anesthesia clinic scheduling may suggest that an appropriate appointment system would include scheduling patients with an appointment interval equal to 1.21 times the mean

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Accepted for publication July 6, 1999.

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0003-2999/99

consultation time. At the University of Iowa, the appointment interval would equal 34 min (1.21 × 28). If the anesthesia clinic starts at 8:00 AM, the second patient would be scheduled at 34 min after the start of the clinic and the third at 68 min after the start of the clinic. Patients would, characteristically, be told to arrive at times that are rounded (4) to the nearest 5 min. For example, the first patient would be told to come at 8:00 AM, the second patient at 8:35 AM, and the third at 9:10 AM.

Patient Waiting Times and Provider Idle Times

The patient *waiting time* refers to the time from when a patient arrives at the preanesthesia evaluation clinic to when his or her consultation begins (1,4). Waiting time starts when the patient arrives, even if they arrive before they were told to arrive. Because the first step of a consultation is the review of medical records, patients may perceive that they waited longer than their "waiting time." If the appointment interval is shorter than the mean consultation time, each successive patient in the clinic session will have a progressively longer expected waiting time. Each increase in the appointment interval will result in a shorter mean patient waiting time. However, the *provider idle time*, defined as the total time during the clinic session when the provider is not caring for a patient because no patients are waiting to be seen, will become larger. The ratio of appointment interval to mean consultation time quantifies the relative valuation placed by an anesthesia clinic on patients' waiting time versus providers' idle time (17–19).

Computer simulation studies of clinic scheduling recommend appointment intervals that are either effectively (4) equal to (1,2,4,19) or slightly greater (18,20) than the mean consultation time to optimally balance patient waiting time versus provider idle time. Other common practices in clinics to minimize provider idle time, such as telling patients to arrive a few minutes before an appointment (1,2,4,19) and/or having unequal appointment intervals for successive patients (19), are based on these principles. The simulation studies that used parameter values obtained from actual clinic settings achieved appointment systems wherein the mean patient waiting time is longer than the mean consultation time (1,2,4,19,20).

Observational studies of ambulatory clinics, using appointment intervals that are set to reflect their institutions' relative valuation of patient waiting time versus provider's idle time, report mean patient waiting times that exceed the mean consultation times. For example, among patients seen in two general internal medicine and geriatric clinics in Detroit, Michigan, the ratio of the mean patient waiting time to mean consultation time equaled 1.5 (11). Among patients cared for by a general practitioner in Tasmania, Australia, the ratio equaled 1.9 (21). Among patients evaluated by general practitioners in Lothian, United Kingdom, the ratio equaled 1.8 (22).

As described above in the section, Mean and Standard Deviation of Consultation Times, mean consultation times for preanesthesia evaluation are approximately 30 min. Consequently, if the relative valuations of patient waiting time versus provider idle time used by industrial (hospital) engineers and other clinical specialties are applied to anesthesia clinics, mean patient waiting times will exceed 30 min.

Surveys of patients' expectations for waiting have been performed in the United Kingdom. Patients at a orthodontic office in Birmingham considered a "reasonable" waiting time to equal 16.1 ± 7.9 min (23). The percentage of patients who perceived that they waited in excess of 15 min was a strong predictor of differences in patients' satisfaction among general medical practices in West Lothian (24). Among patients waiting in an outpatient surgery clinic in South Wales, half of the patients would not be satisfied if they waited 32 min or more (25). Among patients seeing general practitioners in Lothian, half of the patients waiting more than 30 min felt that they had waited too long (22).

Anesthesiologists' patients in the United States are probably no more willing to wait than clinic patients in the United Kingdom. Consequently, there is a fundamental dilemma in providing service to patients in an anesthesia clinic. If anesthesia clinics use appointment systems considered appropriate in other ambulatory medical clinics, more than half of our patients will be dissatisfied with the waiting time.

Recommendations for Preanesthesia Evaluation Clinics

In the next three sections of this article, three factors that can further increase mean patient waiting times and decrease patient satisfaction with waiting are discussed. A) Patients may not arrive promptly for their appointments (1,4). B) Providers may arrive late for the first patient in a clinic session (3,4,11). C) Patients may not have appointments (11).

In the fourth through sixth subsequent sections of this article, three strategies that may decrease mean patient waiting times and/or increase patient satisfaction with waiting are evaluated. A) The mean consultation time and its variability can be decreased (2,4,22). B) Substantial provider idle time can be accepted (1,2,4,7,19,20,22). C) A more pleasant office environment for waiting can be created (10,26,27).

Factor That Can Further Exacerbate Long Patient Waits: 1) Lack of Patient Punctuality

Patient punctuality is defined as the difference in time between when a patient arrives for an appointment and the scheduled time of the appointment (1). Patient punctuality is a positive number if the patient arrives late and a negative number if the patient arrives early. For example, if the median patient punctuality equals 0 min, then half the patients arrive late and half arrive early. The impact of improving patient punctuality on mean patient waiting time has been quantified. For a mean patient punctuality of 0 min and a mean consultation time of 30 min, a decrease in the standard deviation of patient punctuality from 1.5 to 1.0 h causes a ≃10-min decrease in the mean patient waiting time (4). Punctuality may be best when patients are not coming to the anesthesia clinic from a preceding appointment.

Factor That Can Further Exacerbate Long Patient Waits: 2) Provider Tardiness

Provider tardiness is defined as the difference between the time when the provider is scheduled to start consultation of the first patient in a clinic session and when the provider actually starts the consultation, provided the patient arrives punctually. If the provider starts working early, provider tardiness equals zero. In an observational study of clinics in eight hospitals in New York City, New York the rank correlation coefficient between a hospital's percentage of clinic sessions with less than a 1-h physician tardiness and the hospital's percentage of clinic sessions with less than a 1-h mean patient waiting time equaled 0.93 (3). In an observational study of patients seen in two general internal medicine and geriatric clinics in Detroit, Michigan, the rank correlation coefficient between physician tardiness and mean patient waiting time equaled 0.45 (11). The benefit of decreasing provider tardiness on mean patient waiting time has been quantified. For parameter values characteristic of an anesthesia clinic with one provider working 8 h, a decrease in provider tardiness from 30 to 0 min decreases mean patient waiting time by approximately 10 min (4). The deliberate scheduling of provider tardiness can be used to decrease provider idle time (1–3). However, given that in anesthesia clinics mean patient waiting times will be long (1–3), every effort should be made to assure provider tardiness equals zero.

Factor That Can Further Exacerbate Long Patient Waits: 3) Patients Without Appointments

We refer to a patient as being "added-on" if they need to be seen on the day that they are referred to the anesthesia clinic. Waiting patients want to know the expected duration of a wait (10). Consequently, these patients should not queue at the anesthesia clinic, but be given an appointment time. If an add-on patient cannot be seen during a scheduled clinic session, because all appointment times have been assigned to patients, the add-on patients should not be cared for by a provider immediately before or during a scheduled clinic session, so as to not increase other patients' waiting times (11). If an anesthesia clinic has a provider available who does not have a scheduled clinic session, they can care for the add-on patients. Otherwise, because a provider with a scheduled clinic session will also care for add-on patients, then a break should be planned between the end of the regularly scheduled clinic session and the start of the session for add-on patients.

Strategy To Decrease Patient Waiting Times: 1) Decrease the Mean and Standard Deviation of Consultation Times

Studies of consultation times in other specialties' clinics have found that provider practice style is a predictor of consultation time (5,22). For example, resident physicians may have longer mean consultation times than experienced anesthesiologists. Staffing an anesthesia clinic with providers who work quickly may be advantageous. If more than one provider can be present during a clinic session, an appointment system wherein each patient is seen by the first available provider will achieve a shorter mean patient waiting time than specifying *a priori* which provider will see which patient (1). However, if each session has only one provider, each provider should use appointment intervals corresponding to his or her mean consultation time (4,22). Calculation of each provider's optimal appointment interval is sensitive to the accuracy of the mean and standard deviation of his or her consultation times (4). To achieve suitably small standard errors for these values, the number of measurements should be at least several hundred (2).

A provider's mean consultation time and, consequently, standard deviation of consultation time can be decreased. Patients with missing external medical records have longer preanesthesia consultation times

	A	B	C	D	E	F	G	H	I
1									
2	Appointment interval		30						
3	SD punctuality		30						
4	Mean consultation time		28						
5	SD consultation time		17						
6	Calculated mean wait		0						
7	Total provider idle time		37						
8									
9	Scheduled arrival time	Patient punctuality	Actual arrival time	Consultation time	Provider starts to care for patient	Time care completed	Patient wait	Provider idle time	
10	0	0	0	28	0	28	0		
11	30	0	30	28	30	58	0	2	
12	60	0	60	28	60	88	0	2	
13	90	0	90	28	90	118	0	2	
14	120	0	120	28	120	148	0	2	
15	150	0	150	28	150	178	0	2	
16	180	0	180	28	180	208	0	2	
17	210	0	210	28	210	238	0	2	
18	240	0	240	28	240	268	0	2	
19	270	0	270	28	270	298	0	2	
20	300	0	300	28	300	328	0	2	
21	330	0	330	28	330	358	0	2	
22	360	0	360	28	360	388	0	2	
23	390	0	390	28	390	418	0	2	
24	420	0	420	28	420	448	0	2	
25	450	0	450	28	450	478	0	2	
26									

Figure 1. Spreadsheet simulation of a preanesthesia evaluation clinic appointment system. The spreadsheet (Excel 97, Microsoft, Redmond, WA) includes the package @Risk for Windows (Palisade Corporation, Newfield, NY). Figure 2 shows the corresponding equations. The figures show a simulation to calculate the mean patient waiting time and provider's idle time for one 8-h clinic session with one provider, an appointment interval of 30 min, a mean patient punctuality of 0 min, and a standard deviation of patient punctuality of 30 min. The mean and standard deviation of consultation time are from the Section Mean and Standard Deviation of Consultation Times. Appropriate parameter values will vary among anesthesia clinics. For example, clinics with only experienced anesthesiologists providing care or with only healthy patients may have briefer mean consultation times. The values used here are simply examples. Numerical entries displayed in rows 6 through 25 specify values achieved for one clinic session if patient punctuality always equaled the mean punctuality and if consultation times always equaled the mean consultation time. When the simulation is run, punctuality and consultation times are variable. Using a sufficient number of simulations (>5000 clinic sessions) to calculate the two end points to within 1%, the calculated mean patient waiting time equals 41 min, and provider idle time equals 81 min.

than patients without missing information (28). Strategies to decrease the mean consultation time in the anesthesia clinic should focus on assuring provider access to clinical information at the time of the appointment, such as surgical dictations, radiograph reports, laboratory reports, and consultant reports (11,28,29). At institutions without a computer-based (28) patient record, coordinated efforts can successfully assure that a patient's internal paper medical record will be available (29). Charts should be screened for necessary information before the patient's appointment (28). The mean consultation time has not been found to be decreased by the use of a computerized preanesthesia evaluation record (9).

Strategy To Decrease Patient Waiting Times: 2) Accept a Substantial Provider Idle Time

There are three functionally equivalent (20) approaches to sacrifice provider productivity (increase provider idle time) to decrease mean patient waiting time: A) schedule clinic sessions with small numbers of consecutive patients followed by a break, B) deliberately expect many "no-show" patients, or C) use appointment intervals that are longer than the mean consultation time. During the idle time, providers could, for example, be performing the screening of charts as considered in the preceding paragraph.

A. Create Provider Idle Time by Scheduling Clinic Sessions with Small Numbers of Consecutive Patients Followed by a Break

Planned breaks provide a mechanism for the provider to catch-up in seeing patients. Observational studies of clinics (22) and computer simulations (1,4,20) using parameter values obtained from clinics show that the mean patient waiting time increases with the duration of the clinic, expressed either in terms of number of appointments or duration (1,4,20). Each successive patient in a clinic session has a longer expected waiting time (2,22).

An anesthesia clinic could plan, for example, a 1-h break between morning and afternoon sessions (22). The provider would finish seeing the last patient in the morning clinic session, and would be idle until the time

	A	B	C	D	E	F	G	H	I
1									
2	Appointment interval	30							
3	SD punctuality	30							
4	Mean consultation time	28							
5	SD consultation time	17							
6	Calculated mean wait	"=AVERAGE(G10:G25)							
7	Total provider idle time	"=SUM(H11:H25)							
8									
9	Scheduled arrival time	Patient punctuality	Actual arrival time	Consultation time	Provider starts to care for patient	Time care completed	Patient wait	Provider idle time	
10	0	"=RiskNormal(0,B3)	"=A10+B10	"=RiskLognorm(B4,B5)	"=IF(C10>0,C10,0)	"=E10+D10	"=E10-C10		
11	"=A10+B2	"=RiskNormal(0,B3)	"=A11+B11	"=RiskLognorm(B4,B5)	"=IF(F10>C11,F10,C11)	"=E11+D11	"=E11-C11	"=E11-F10	
12	"=A11+B2	"=RiskNormal(0,B3)	"=A12+B12	"=RiskLognorm(B4,B5)	"=IF(F11>C12,F11,C12)	"=E12+D12	"=E12-C12	"=E12-F11	
13	"=A12+B2	"=RiskNormal(0,B3)	"=A13+B13	"=RiskLognorm(B4,B5)	"=IF(F12>C13,F12,C13)	"=E13+D13	"=E13-C13	"=E13-F12	
14	"=A13+B2	"=RiskNormal(0,B3)	"=A14+B14	"=RiskLognorm(B4,B5)	"=IF(F13>C14,F13,C14)	"=E14+D14	"=E14-C14	"=E14-F13	
15	"=A14+B2	"=RiskNormal(0,B3)	"=A15+B15	"=RiskLognorm(B4,B5)	"=IF(F14>C15,F14,C15)	"=E15+D15	"=E15-C15	"=E15-F14	
16	"=A15+B2	"=RiskNormal(0,B3)	"=A16+B16	"=RiskLognorm(B4,B5)	"=IF(F15>C16,F15,C16)	"=E16+D16	"=E16-C16	"=E16-F15	
17	"=A16+B2	"=RiskNormal(0,B3)	"=A17+B17	"=RiskLognorm(B4,B5)	"=IF(F16>C17,F16,C17)	"=E17+D17	"=E17-C17	"=E17-F16	
18	"=A17+B2	"=RiskNormal(0,B3)	"=A18+B18	"=RiskLognorm(B4,B5)	"=IF(F17>C18,F17,C18)	"=E18+D18	"=E18-C18	"=E18-F17	
19	"=A18+B2	"=RiskNormal(0,B3)	"=A19+B19	"=RiskLognorm(B4,B5)	"=IF(F18>C19,F18,C19)	"=E19+D19	"=E19-C19	"=E19-F18	
20	"=A19+B2	"=RiskNormal(0,B3)	"=A20+B20	"=RiskLognorm(B4,B5)	"=IF(F19>C20,F19,C20)	"=E20+D20	"=E20-C20	"=E20-F19	
21	"=A20+B2	"=RiskNormal(0,B3)	"=A21+B21	"=RiskLognorm(B4,B5)	"=IF(F20>C21,F20,C21)	"=E21+D21	"=E21-C21	"=E21-F20	
22	"=A21+B2	"=RiskNormal(0,B3)	"=A22+B22	"=RiskLognorm(B4,B5)	"=IF(F21>C22,F21,C22)	"=E22+D22	"=E22-C22	"=E22-F21	
23	"=A22+B2	"=RiskNormal(0,B3)	"=A23+B23	"=RiskLognorm(B4,B5)	"=IF(F22>C23,F22,C23)	"=E23+D23	"=E23-C23	"=E23-F22	
24	"=A23+B2	"=RiskNormal(0,B3)	"=A24+B24	"=RiskLognorm(B4,B5)	"=IF(F23>C24,F23,C24)	"=E24+D24	"=E24-C24	"=E24-F23	
25	"=A24+B2	"=RiskNormal(0,B3)	"=A25+B25	"=RiskLognorm(B4,B5)	"=IF(F24>C25,F24,C25)	"=E25+D25	"=E25-C25	"=E25-F24	
26									

Figure 2. Equations for the spreadsheet simulation explained in Figure 1. The spreadsheet (Excel 97, Microsoft, Redmond, WA) simulation uses the package @Risk for Windows (Palisade Corporation, Newfield, NY). Figure 2 gives every equation needed to run the simulations using these packages. All parameter values needed to run the simulations are given in column C, rows 2–7 of Figures 1 and 3. Consultation times of patients at the University of Iowa are log normal (ExpertFit, Averill M. Law & Associates, Tucson, AZ), as confirmed by using the distribution function difference plot, density/histogram over plot, and Anderson-Darling test ($P > 0.25$).

of the start of the afternoon session. A scheduled 1-h break would not imply that the provider would take a 1-h break each day. The provider should not be late for the start of the afternoon session.

To choose an appropriate duration for a provider break, consultation times and patient punctuality should be measured and used in computer simulations (17). An example of this process for an anesthesia clinic is given in Figures 1–3. All material in this review article from new computer simulations are listed with reference to Figures 1, 2, or 3. A 1-h planned break between a provider's morning and afternoon sessions would decrease mean patient waiting time from 41 to 30 min, albeit by increasing provider idle time from 81 (utilization 83%) to 123 min (utilization 74%) (Figures 1–3).

B. Create Provider Idle Time by Deliberately Expecting Many "No-Show" Patients

Patient complexity (5) (i.e., ASA physical status) (28) predicts consultation time. Some anesthesiologists may choose to have patients with no preexisting medical problems undergoing relatively minor surgery not be seen in the preanesthesia evaluation clinic. Ideally, the decision that a patient does not need an appointment in the anesthesia clinic would be made before the appointment is made (7). However, at many institutions, the ideal is impractical because the medical assessment to make this decision is performed on the day the patient would be seen in the anesthesia clinic. Because the patient has an appointment but is not evaluated in the anesthesia clinic, this practice has the same impact on the anesthesia clinic as if the patient were a no-show. Screening patients upon arrival at the anesthesia clinic for their appointment by a registered nurse to determine whether they need to be seen preoperatively by the provider has a similar effect. If the choice of an appointment time is made without consideration of patient complexity, patients who do not need to be seen in the anesthesia clinic will have appointment times distributed randomly throughout the clinic session (4). The chance that a patient will be a no-show will be equally likely throughout the day. These patients' appointment times will therefore serve as provider idle time. Characteristically, to decrease the impact of no-shows on provider idle time, the appointment interval would be shortened proportionately by the percentage of patients who are forecasted to be no-shows (1,4). Instead, with the objective of decreasing mean patient waiting time at the expense of a greater provider idle time, computer simulation can be used to choose a smaller decrease in the appointment interval. Reiterating, though, this strategy serves only to achieve a slight benefit from an unfortunate situation; ideally, the decision that a patient does not need an

	A	B	C	D	E	F	G	H	I
1									
2	Appointment interval		30						
3	SD punctuality		30						
4	Mean consultation time		28						
5	SD consultation time		17						
6	Calculated mean wait		0						
7	Total provider idle time		92						
8									
9	Scheduled arrival time	Patient punctuality	Actual arrival time	Consultation time	Provider starts to care for patient	Time care completed	Patient wait	Provider idle time	
10	0	0	0	28	0	28	0		
11	30	0	30	28	30	58	0	2	
12	60	0	60	28	60	88	0	2	
13	90	0	90	28	90	118	0	2	
14	120	0	120	28	120	148	0	2	
15	150	0	150	28	150	178	0	2	
16	180	0	180	28	180	208	0	2	
17	270	0	270	28	270	298	0	62	
18	300	0	300	28	300	328	0	2	
19	330	0	330	28	330	358	0	2	
20	360	0	360	28	360	388	0	2	
21	390	0	390	28	390	418	0	2	
22	420	0	420	28	420	448	0	2	
23	450	0	450	28	450	478	0	2	
24									

Figure 3. Computer simulation of a 1-h planned break between morning and afternoon clinic sessions by one provider. Explanations for entries are given in Figures 1 and 2. Comparing Figure 1 to Figure 3, the 1-h break is added in cell A17. Running the simulation for >5000 clinic sessions, the calculated mean patient waiting time equals 30 min and mean provider idle time is 123 min.

appointment in the anesthesia clinic would be made before the appointment is made.

C. Create Provider Idle Time by Using Longer Appointment Intervals

If the mean consultation time is 30 min and patients are scheduled at intervals of 45 min, then the mean patient waiting time will be minimal, although at the expense of substantial provider idle time. Anesthesiologists can choose an appointment interval for their clinic by using computer simulation and their relative valuation of patient waiting time versus provider idle time. For example, by increasing the appointment interval of the example given in Figures 1 and 2 from 30 to 35 min, the simulated mean patient waiting time is decreased from 41 to 28 min, while provider idle time is increased from 81 (utilization 83%) to 120 min (utilization 75%). To achieve the maximum decrease in the mean patient waiting time for a given increase in provider idle time, appointment intervals should be of unequal duration; equations to calculate these optimal appointment intervals are given in Reference 19. The calculation of optimal appointment intervals for anesthesia clinics with more than one provider caring for each patient (e.g., a registered nurse before and after an anesthesiologist) is complicated and requires the use of computer simulation and specialized optimization techniques.

Strategies That May Increase Patient Satisfaction with Waiting: 3) Provide Activities for Patients as They Wait

Simple practices can assuage the apparent lack of respect or concern evident to patients in being forced to wait in a clinic (26). Apologize for the delay (27). Provide an accurate estimate of the waiting time (10). Offer the patient the option of leaving and returning later for another appointment (26). Provide an estimate of the minimum time the patient will need to wait, to provide the patient with flexibility (e.g., to get lunch) (10). Provide ample reading material, drinks, snacks, a quiet

waiting area, and a television area (23). Acknowledge periodically that the patient has not been forgotten (27). Ensure that staff who are audible or visible appear to be busy caring for other patients (27).

At some preanesthesia evaluation clinics, the patients can be busy doing other patient care activities while they are waiting for the start of consultation and/or while waiting for the provider to review their medical records. For example, phlebotomy, physiotherapy instruction, and/or preoperative education can, at some institutions, be performed before the patient has been evaluated.

Summary

Anesthesiologists can use the science of clinic scheduling (1,4,6,27) to design appointment systems for preanesthesia evaluation clinics. The principal reasons reported for inappropriately [or arguably (26) unethically (30)] long patient waiting times are provider tardiness, lack of patient punctuality, patient no-shows, and improperly designed appointment systems (4). However, the fundamental reason why anesthesia clinics have such long patient waiting times is because of their relatively long mean (and consequently standard deviation) of consultation times. If commonly applied valuations of provider idle time to patient waiting time are used in anesthesia clinics, appointment intervals will be sufficiently brief that the mean patient waiting time will be at least the mean consultation time or half an hour. Patients will be dissatisfied with this level of service (22–25). Therefore, efforts to decrease the mean patient waiting time in anesthesia clinics should focus foremost on minimizing the mean consultation time and its variability, which can most likely be achieved by assuring that providers have rapid access to relevant clinical information, including external medical records, surgical dictations, etc (11,28,29).

Anesthesiologists managing anesthesia clinics may find it valuable to apply other interventions to decrease patient waiting times. Scheduling of preanesthesia evaluation and surgical clinics should be coordinated to assure patient punctuality (1,4). Providers should be on time for the start of their sessions (1–4,11). If an add-on patient cannot be seen during a scheduled clinic session, because all appointment times have been assigned to other patients, the add-on patient should be seen by a different provider or at the end of the regularly scheduled clinic session. Mean consultation times should be measured accurately for each provider. Substantial provider idle time should be expected. Appropriate values for breaks, appointment intervals, and percentage no-shows should be determined by computer simulation, using parameters appropriate for each provider and anesthesia clinic. Finally, traditional efforts at making waiting for a consultation tolerable should be made.

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