An Efficient and Effective Teaching Model for Ambulatory Education

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ABSTRACT

Teaching and learning in the ambulatory setting have been described as inefficient, variable, and unpredictable. A model of ambulatory teaching that was piloted in three settings (1973–1981 in a university-affiliated outpatient clinic in Portland, Oregon, 1996–2000 in a community outpatient clinic, and 2000–2001 in an outpatient clinic serving Dartmouth Medical School's teaching hospital) that combines a system of education and a system of patient care is presented. Fully integrating learners into the office practice using creative scheduling, pre-rotation learning, and learner competence certification enabled the learners to provide care in roles traditionally fulfilled by physicians and nurses. Practice redesign made learners active members of the patient care team by involving them in such tasks as patient intake, histories and physicals, patient education, and monitoring of patient progress between visits. So that learners can be active members of the patient care team on the first day of clinic, pre-training is provided by the clerkship or residency so that they are able to competently provide care in the time available. To assure effective education, teaching and learning times are explicitly scheduled by parallel booking of patients for the learner and the preceptor at the same time. In the pilot settings this teaching model maintained or improved preceptor productivity and on-time efficiency compared with these outcomes of traditional scheduling. The time spent alone with patients, in direct observation by preceptors, and for scheduled case discussion was appreciated by learners. Increased satisfaction was enjoyed by learners, teachers, clinic staff, and patients. Barriers to implementation include too few examining rooms, inability to manipulate patient appointment schedules, and learners' not being present in a teaching clinic all the time.

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Ambulatory teaching has been a part of most medical schools' clinical curricula since the 1980s. Before that time, ambulatory experiences in clerkships and residencies were unusual, with most clinical teaching of medical students and residents occurring in the inpatient setting. Effective teaching on hospital rounds is well described.[1,2] As medical practice evolved toward the outpatient setting, more schools moved clinical teaching into outpatient clinics, and awareness that ambulatory teaching was problematic grew.[3,4] Several studies[5–8] have revealed that teaching in outpatient clinics diminishes preceptors' productivity. In a 1995 review of the literature on teaching and learning in ambulatory settings,[9] Irby reported that medical students' and residents' teaching and learning in the ambulatory setting was suboptimal, "characterized by variability, unpredictability, immediacy, and lack of continuity." He found that (1) learners see little diversity of patient problems and provide little continuity of care, (2) learners discuss few cases with attending physicians, and attending physicians examine even fewer cases, and (3) case discussions are short, with little teaching and almost no feedback. Since 1995, a number of ambulatory teaching strategies have been described[10–12]; however, a teaching model that fully integrates the learner into the practice and the process of care has not been developed.

In this article, we describe our experience, in three set-

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tings, with an ambulatory teaching model that appears to be both efficient and effective and that addresses the problems identified by Irby.[9] The attending physician sees every patient whom the learner sees, and time for learning, teaching, and feedback are explicitly scheduled and reliably occur.

First, we describe the general ambulatory teaching model and the strategies necessary to implement it in practice. Second, using examples, we demonstrate how it was applied to teaching learners of different skill levels in three settings. Third, we present pilot data from one site showing benefits in teaching, learning, participants' satisfaction, and quality of care provided. Finally, we discuss simple operating guidelines gleaned from our experience, identify facilitating features and barriers to implementation, and comment on the broader implications this model has for medical education in the ambulatory setting.

AMBULATORY TEACHING ENVIRONMENT

Until now, the system of care and the system of education in the ambulatory setting have been separate, and the learner has been added on as an afterthought to the system of care. A learner in an outpatient clinic has been a "fifth wheel" who slowed down the care process and interfered with the usual flow of patients. Generally, it is agreed that a medical student learner is not an asset to an ambulatory clinic practice. Pressure to improve the productivity and efficiency of ambulatory care is present everywhere. Practice consultants regularly advise reducing or eliminating education in the interest of productivity. The challenge is to develop a teaching model where the learner would be an asset to the practice and would provide value-added in patient care.

We conceptualize the ambulatory clinic operations as a microsystem, which we define as "a small group of interdependent people in health care delivery who work together on a regular basis to provide care to a discrete population of patients."[13] The microsystem includes the patient, and hence is not equal to the usual health care team, which does not routinely include the patient. The clinical microsystem fits into the larger system of health care delivery, which could be a community care clinic, a multispecialty group practice, a health maintenance organization, or an academic medical center. In turn, that system is part of the even larger system of the environment of health care, which includes the medical marketplace, prevalent social policy, and community resources and norms. Within the clinical microsystem there are two smaller systems: one is the individual care provider/patient system, and within it is the system of self-care that includes the patient and sources of information leading to the patient's choices for his or her care.

In order for the learner to be an asset to the (broad) system of care, we focused on ways the learner could be a member of the microsystem, i.e., an interdependent member of the front-line patient care team, which includes the patient. We explicitly integrated the learner into the microsystem in order to make a system of education and of patient care: this combined system of care and education becomes a single system.

INTEGRATING THE LEARNER INTO THE MICROSYSTEM OF CARE

Full integration of a learner into the microsystem of care in a clinic poses a number of challenges. To accomplish this end at the pilot sites, three strategies were necessary: (1) learners needed to take an active patient care role and provide value-added to the system of care, (2) learners needed to undergo pre-learning before the first day of clinic so they could be efficient and competent members of the microsystem, and (3) the traditional patient schedule needed to be modified to explicitly schedule learning and teaching time.

The role assigned to the learner in a microsystem depends on the processes of care within the microsystem, the level of the learner, and the learning objectives of the educational program placing the learner in the microsystem. The learner, if properly pre-trained, can take on roles previously played by other members of the microsystem, thereby freeing them up to take on new roles or expand old roles. The learner can also take on new roles within the microsystem to enhance service. Learner roles within the microsystem can include:

- Patient intake
- Performance of appropriate focused history and physical examination
- Patient education about self-care
- Patient and family education about disease and therapy
- Patient education about prevention
- Organization/coordination of community services
- Organization/coordination of interdisciplinary care
- Monitoring of patient status between clinic visits
- Pre-appointment identification of patient expectations and problems
- Patient enrollment in disease management programs and registries to assess established outcome measures

Performance expectations can be prescribed through the creation of "scripts"[14,15] that delineate the expectations and the action to be taken in performing a role such as patient intake (see List 1) and are provided to the learner prior to beginning the clinic rotation. For learners with less experience, a dialogue script can be made available as a learning tool. In addition, practice with patient-simulation manikins or with standardized patients can be provided to assure learn-

ers are sufficiently competent to provide good care and keep on schedule before they start in the clinic.

Establishing a useful role for the learner who is interacting with the patient is a necessary part of redesigning the clinical/educational microsystem, both to provide an effective learning experience and to fully integrate the learner into the system of patient care. One effective method for accomplishing this integration is to have the learner take a history and examine the patient on his or her own and then present the findings to the preceptor. Case presentation in front of the patient saves time wasted presenting in the hall outside the examination room and enables the preceptor to ask the patient whether she or he agrees and has anything to add. An explicit script of presentation expectations can be provided, just as it is for patient intake. See List 2 for an example of such a script.

Usually it takes a learner several weeks during a clinical rotation to acquire enough knowledge, skills, and familiarity with the practice to perform as a productive member of the clinical microsystem and not slow down the clinic's operations. This gradual attainment of competency and efficiency by a learner can be disruptive and discouraging to the patient care providers. For a learner to provide value-added service to the microsystem, the learner needs to be competent to function as a microsystem member on his or her first day in clinic. Learners need specific training before they begin work in the clinic. Such training can occur during the days before a new rotation starts, or the start time in clinic can be postponed several days and pre-training provided on the first day or two of a new rotation. Thorough microsystem orientation of the learner from the patients' perspective is also necessary and should include learners' accompanying a clinic patient from arrival in the waiting room to departure from the clinic.

List 1

Example of Patient-intake Script in the Gynecology Clinic

1. Review patient list for upcoming clinic with preceptor deciding which patients student will see
2. Review patient charts for upcoming clinic
3. Prepare patient lab slip and cytology slip stamping with patient card; if patient is over 50, stamp a hemoccult mailer packet also
4. Place tab on chart pages containing last Pap report and last office visit progress note
5. Stamp new progress note page with annual exam visit stamp
6. Set up exam room with clean sheet, speculum, gloves, Pap materials
7. After receptionist marks "H" next to patient name on physician day sheet, take chart and walk patient from waiting room to exam room
8. Introduce self to patient and ask the patient for her permission for you to participate in her care
9. Obtain height, weight, and BP and record on yellow tab "patient profile" sheet and also fill in all present medications and all known drug allergies
10. Obtain historical info needed to fill out annual exam visit stamp
11. Solicit patient's consent for further role in visit

List 2

Script of Learner Presentation Expectations in Gynecology Clinic

If patient has agreed to your participation in her care:

1. Continue visit with history and physical up to breast exam
2. Find the preceptor and nurse chaperon so that they are in the exam room for the remainder of the physical exam
3. Present the patient to the preceptor in front of the patient in the exam room; include in your presentation the information in the annual exam stamp
4. Be sure to include in your presentation any prior clinical interactions your preceptor has had with this patient, e.g., " Dr. Y (the preceptor) delivered three of (the patient) Mrs. X's babies, the last 20 years ago, and performed a hysterectomy for excessive bleeding five years ago."
5. Also include reason for patient's present visit
6. Include in your presentation pertinent patient history, physical exam findings, and relevant diagnostic tests

To assure that the learner receives adequate educational exposure to each patient and that there is ample time for the attending physician to see the patient, teaching time is explicitly scheduled. Teaching time is not left to chance.[16] For learners to effectively learn, time is scheduled for them to independently assess patients. We used a modification of the "wave schedule" described by Ferenchick et al.,[15] in which patients are booked in parallel. The patients are double booked, with one patient scheduled for the learner while at the same time another patient is scheduled for the preceptor to see on his or her own. Scheduled teaching time with the patient present follows. The amount of time allotted is dependent on the skill level of the learner and the amount of time the preceptor needs to feel confident that he or she can maintain patient rapport and still provide optimal care.

This model was implemented in three settings with learners of varying skill and training. Specifically,

- In an internal medicine geriatrics practice in a Lebanon, New Hampshire, community care center outpatient clinic from 1996 to 2000, first- and second-year medical students were taught a course in physical diagnosis.
- In Dartmouth Medical School's academic medical center in an ambulatory gynecology clinic from 1999 until 2001,

fourth-year medical students carried out their women's health clerkship.
- In a university-affiliated hospital outpatient rheumatology clinic from 1973 to 1981 in Portland, Oregon, internal medicine residents carried out their rheumatology rotation.

Experience in each of these models is described below, with particular attention to the productivity of physicians with and without students.

Example I: Geriatrics Practice with Second-year Medical Students

Two medical students were assigned to one internist with a geriatrics practice for two years. The students saw patients one half day every other week in order to gain skills in physical diagnosis. Two exam rooms were used. Each hour one student (student A) saw a new patient alone in one room while a second student (student B) and the preceptor saw follow-up patients. Upon completion of the history and physical by student A, both students and the attending physician met in the preceptor's office to discuss the new patient and offer feedback to student A on his or her case presentation. Then both students and the attending physician entered the exam room to review student A's history and physical with the patient, observe student A doing parts of the physical exam, watch the preceptor finish the history and physical, and discuss the differential diagnosis and management. This was followed by students A and B changing places (i.e., student B sees a new patient alone while student A sees follow-up patients with the preceptor) and repeating the same schema (see Table 1). When a patient previously seen as a new patient by a student returned to clinic for follow-up, care was taken to assign the returning patient to the same student who had seen that patient on his or her first visit. Of note, during a four-hour block the receptionist for the practice scheduled two new-patient exams instead of only the one new-patient exam that could have been scheduled when the geriatrician was not precepting students. The second one-hour new-patient appointment rather than more follow-up patient visits worked to provide both students with a new-patient work-up and thereby provide effective educational experience to two students in the clinical/educational microsystem. The clinic half-day's two new-patient visits and four follow-up visits were equivalent to a normal patient-scheduling load when the preceptor was seeing geriatric patients and not teaching.

Table 1

Patients' and Students' Schedules for Clinical/Educational Experience in an Ambulatory Geriatrics Practice*

Room 1	Room 2
8:00–9:00 Student A sees first new patient	8:00–8:30 Student B and preceptor see first follow-up patient 8:30–9:00 Student B and preceptor see second follow-up patient
9:00–10:00 Teaching time about first new patient by preceptor with students A and B	9:00 Empty 9:30 Empty
10:00 Student A and preceptor see third follow-up patient 10:30 Student A and preceptor see fourth follow-up patient	10:00–11:00 Student B sees second new patient
11:00 Empty 11:30 Empty	11:00–12:00 Teaching time about second new patient by preceptor with students A and B
12:00 Lunch break	12:00 Lunch break

*The students were second-year medical students learning physical diagnosis skills.

Example II: Ambulatory Gynecology Clinic with Fourth-year Medical Students

One student was assigned to an obstetrician/gynecologist in an academic practice. The student saw patients for one half day three times per week in this practice for four weeks. Two exam rooms were used, and the patients were double-booked, followed by an equal amount of time held open for teaching. The student saw a patient at the same time that the preceptor saw another patient. The student was trained to bring the patient in from the waiting room, ask permission to participate in her care, put the patient in an exam room, do preliminary intake tasks usually done by a nurse, and perform a history and physical appropriate for the patient's chief complaint. At the same time, the preceptor saw another patient. When finished, he joined the student with the student's patient. The student presented findings to the preceptor in the presence of the patient, after which the preceptor asked the patient whether she agreed or had anything to add. After the preceptor finished any necessary further history taking, the student did an observed physical examination (which the preceptor verified) and then was asked to formulate an assessment and treatment plan. The preceptor finished the patient visit. While the preceptor dictated the clinic note, the student assumed a patient educator role and answered the patient's questions. Typical patient education topics included instructions for birth control pills, os-

Table 2

Patients' and Students' Schedules for Clinical/Educational Experience in an Ambulatory Gynecology Clinic*

Room 1	Room 2
8:00 Student sees patient 1	8:00 Preceptor sees patient 2
8:30 Preceptor teaches student about patient 1	8:30 Empty
9:00 Student sees patient 3	9:00 Preceptor sees patient 4
9:30 Preceptor teaches student about patient 3	9:30 Empty
10:00 Student sees patient 5	10:00 Preceptor sees patient 6
10:30 Preceptor teaches student about patient 5	10:30 Empty
11:00 Student sees patient 7	11:00 Preceptor sees patient 8
11:30 Preceptor teaches student about patient 7	11:30 Empty
12:00 Lunch break	12:00 Lunch break

*The students were fourth-year medical students carrying out their women's health clerkship.

teoporosis prevention guidelines, and smoking cessation counseling. Once again, a revised schedule (Table 2) was critical to the success of the smooth operation of this clinical/educational microsystem. The number of patients (eight) seen with the revised schedule was the same number the preceptor—if not teaching—would have seen in a four-hour clinic.

Example III: Rheumatology Clinic with Two Internal Medicine Residents

Two internal medicine residents were assigned to an internist with a rheumatology practice for a month-long rotation. Two—ideally, three—exam rooms were needed. One resident was scheduled to see a new patient at the same time that the other resident saw returning follow-up patients with the attending physician. Care was taken to assign return patients to the residents who had seen them for their initial visits. After an hour, all the housestaff learners met with the preceptor in the examining room of the first new patient for 30 minutes to review the case presentation, assessment, and proposed treatment plan. The preceptor repeated pertinent history and physical examination and critiqued the resident's work-up and plan. The team's clinical reasoning was discussed in front of the patient, and the preceptor completed the encounter. For the next hour, the other resident, who had been seeing follow-up patients, saw a second new patient, and the first resident saw return follow-up patients with the attending physician. After an hour, the housestaff learners and the preceptor meet for 30 minutes with the second new patient to hear the case presentation, assessment, and proposed treatment plan. The preceptor completed the patient encounter. This pattern was repeated throughout the clinic day (see Table 3). Two new patients and eight (15-minute) follow-up patients were seen by the preceptor during a half-day teaching clinic. Compared with her normal schedule when not teaching, this clinical/educational microsystem patient schedule contains four more (15-minute) follow-up patients seen in a three hour clinic than the preceptor would have seen when not teaching.

IMPROVEMENTS BEFORE AND AFTER IMPLEMENTING THE MODEL

In 1999, the author (MR-S) who had developed the basic teaching model in her own practice, recruited an obstetrician–gynecologist to test whether the model was applicable in another discipline and whether observable benefit could be documented. First, the baseline teaching in the ob–gyn clinic was observed. This baseline experience had one student working side-by-side with a preceptor with no prelearning or scheduling changes. Waiting times, clinic overrun times, student learning time, and faculty teaching times were measured. Then, serving as a facilitator and coach, the author worked with the obstetrician–gynecologist and office staff to implement the clinical/educational model in the four-week women's health clerkship for fourth-year medical students. Twenty students were taught using the new teaching model. The findings after the intervention are summarized below:

- The average waiting time for patients was less than 5 minutes (baseline: 20 minutes), a decrease of 15 minutes.
- Clinic half-day overruns of scheduled four-hour sessions were 15 minutes (baseline: 45 minutes), a decrease of 30 minutes.
- The number of patients seen alone for more than 10 minutes by a student during a half-day clinic was four (baseline: 1.5 minutes), an increase of 2.5 patients.
- The average time a student spent alone with a patient was 25 minutes (baseline: 7 minutes), an increase of 18 minutes.
- Teaching time per patient by a preceptor was 25 minutes (baseline: 10 minutes), an increase of 15 minutes.

Review of the clinic schedules demonstrated that the preceptor maintained the same clinical productivity teaching as when not teaching. In addition, satisfaction improved

Table 3

Patients' and Students' Schedules for Clinical/Educational Experience in an Ambulatory Rheumatology Clinic*

Room 1	Room 2
9:00–10:00 Resident A sees first new patient	9:00 Resident B and preceptor see first follow-up patient 9:15 Resident B and preceptor see second follow-up patient 9:30 Resident B and preceptor see third follow-up patient 9:45 Resident B and preceptor see fourth follow-up patient
10:00–10:30 Teaching about first new patient by preceptor with residents A and B	10:00 Empty 10:15 Empty
10:30 Resident A and preceptor see fifth follow-up patient 10:45 Resident A and preceptor see sixth follow-up patient	10:30–11:30 Resident B sees second new patient
11:00 Resident A and preceptor see seventh follow-up patient 11:15 Resident A and preceptor see eighth follow-up patient	
11:30 Empty 11:45 Empty	11:30–12:00 Teaching about second new patient by preceptor with residents A and B
12:00 Lunch break	12:00 Lunch break

*The learners were internal medicine residents carrying out their rheumatology rotation.

among patients, staff, students, clinic administration, and the preceptor. It is important to note that preceptors on other later rotations perceived that students taught with the new ambulatory teaching model showed improved clinical competencies in women's health compared with students who had not been taught in such a manner.

LESSONS LEARNED

Upon reflection about the three case studies just described, a number of features of the clinic practice facilitated success in teaching using this model. Long-standing microsystems (patient care teams that include the patient) that recognized their interdependence and had support from the larger system found it easier to integrate a learner into a new system of care. Commitment to medical education, understanding the process of patient care and the process of learning, prior experience with quality improvement projects, flexible attitudes, and willingness to change all promoted adaptation to this model. Full collaboration of all members of the microsystem (receptionist, secretary, nurse, physician, learner, patient, clinic administrator) in designing learners' roles as well as training and assessing competency of learners was necessary for the change from a patient care microsystem to a clinical/educational microsystem to occur. Microsystem members had to have their jobs made easier by the addition of the learner for the teaching model to work successfully and to survive over time and not revert back to learners' being add-ons. If learners were not consistently assigned throughout the calendar year to a clinical/educational microsystem, it was more difficult to fully integrate the learner into the microsystem because the learner's role had to be assumed by someone else when no learner was present, or scheduling had to revert back to the old system.

Barriers to implementation of this teaching model included patient care not being provided by a functioning microsystem (e.g., floating nurses and shared receptionists such that a patient care-providing unit did not exist) and lack of buy-in by microsystem members. Patients unwilling to be seen by learners (rarely a problem once learners were trained to do patient intake), inadequate learner competency or efficiency (not a problem unless pre-clinic training sessions were missed), and rapid learner turnover made model implementation more difficult. Lack of two or more examining rooms per teaching preceptor and inability to manipulate the master appointment schedule have prevented implementation of this model so far.

CONCLUSIONS

Using the ambulatory teaching model described here, learners can be an asset to clinical practice. By taking on active roles within the clinical microsystem, the learner can be fully integrated into the system of care and bring value-added to the patient care provided by a teaching clinic. Scheduling can serve both education (by providing scheduled learning and teaching time) and patient care. The major implication for ambulatory medical education is that learning needs to be front-loaded to provide the microsystem of care with clinically competent learners able to efficiently contribute to patient care. In order to further evaluate this highly efficient teaching model, a more robust randomized trial needs to be conducted in multiple sites.

REFERENCES

1. Skeff KM. Evaluation of a method for improving teaching performance of attending physicians. Am J Med. 1983;75:465–70.

2. Irby DM. Clinical teaching and the clinical teacher. J Med Educ. 1986; 61:35–45.
3. Krackov SK, Packman CH, Regan-Smith MG, Birskovich L, Seward SJ, Baker SD. Perspectives on ambulatory programs: barriers and implementation strategies. Teach Learn Med. 1993;5:243–50.
4. Stagnaro-Green A, Packman C, Baker E, Elnicki DM. Ambulatory education: expanding undergraduate experience in medical education. A CDIM commentary. Am J Med. 1995;99:111–15.
5. Garg ML, Boero JF, Christiansen RG, Booher CG. Primary care teaching physician' losses of productivity and revenue at three ambulatory care centers. Acad Med. 1991;66:348–53.
6. Gamble JG, Lee R. Investigating whether education of residents in a group practice increases the length of the outpatient visit. Acad Med. 1991;66:492–3.
7. Vinson DC, Padden C. The effects of teaching medical students on private practitioners' workloads. Acad Med. 1994;69:237–8.
8. Kearl GW, Mainous AG III. Physicians' productivity and teaching responsibilities. Acad Med. 1993;68:166–7.
9. Irby DM. Teaching and learning in ambulatory care settings: a thematic review of the literature. Acad Med. 1995;70:898–931.
10. Lesky LG, Hershman WY. Practical approaches to a major educational challenge: training students in the ambulatory setting. Arch Intern Med. 1995;155:897–904.
11. Fields SA, Usatine R, Steiner E. Teaching medical students in the ambulatory setting: strategies for success. JAMA. 2000;283:2362–4.
12. Greenberg L. Award winning clinical teachers teach: literature-based ambulatory teaching methods. Arch Pediatr Adolesc Med. 2001;155: 98.
13. Nelson EC, Batalden PB, Mohr JJ, Plume SK. Building a quality future. Frontiers of Health Services Management. 1998;15:3–32.
14. Irby DM. How attending physicians make instructional decisions when conducting teaching rounds. Acad Med. 1992;67:630–8.
15. Ferenchick G, Simpson D, Blackman J, DaRosa D, Dunnington, G. Strategies for efficient and effective teaching in the ambulatory care setting. Acad Med. 1997;72:277–80.
16. Skeff KM, Bowen JL, Irby DM. Protecting time for teaching in the ambulatory care setting. Acad Med. 1997;72:694–7.