Chapter 15
Ambulatory Curriculum Design and Delivery for Internal Medicine Residents

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Introduction

The Accreditation Council for Graduate Medical Education (ACGME) issued significant requirement changes in 2009 for one-third of residency training to occur in the ambulatory setting [1]. The Alliance for Academic Internal Medicine (AAIM) and ACGME have advocated for decreasing the conflict between inpatient and outpatient experiences [1, 2]. These changes emphasize the need for the graduate medical education (GME) system to revitalize residents' ambulatory education.

Reform of ambulatory training in internal medicine is twofold. First, it requires improving the system infrastructure of the clinic itself, and secondly it mandates enhancing the educational experience of residents within the clinic [3]. Part of that movement includes a longitudinal ambulatory curricular design that enhances the resident continuity clinic experience and provides residents with a foundation for learning ambulatory medicine. Most ambulatory medical education is structured into three curricula designs—ambulatory block rotations typically embedded through x + y scheduling, longitudinal continuity clinics, and ambulatory long

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blocks. Ambulatory blocks arranged in an x + y model provide a 1–2-week concentrated clinic experience in various ambulatory disciplines. Longitudinal continuity clinics allow the opportunity to manage a panel of patients on a weekly basis over the entire training period. The innovative ambulatory long blocks entrench residents in a 6–12-month ambulatory clinic immersion. More details on these ambulatory curricular designs are on chapter "Traditional and Block Scheduling Challenges and Solutions for Internal Medicine Residents." Many resident continuity clinics provide some type of on-site instructional modality, usually as a preclinical conference or an ambulatory case-based discussion to disseminate a core curricular thread of high-yield ambulatory topics [3]. Residency clinic directors and program leadership have a responsibility to ensure a well-rounded longitudinal ambulatory experience focused around achievable learning objectives.

Learning Objectives

1. Gain knowledge of the three major ambulatory curricular designs—ambulatory block rotations, longitudinal continuity clinics, and ambulatory long blocks.
2. Learn the key principles and instructional modalities effective in ambulatory curricula.
3. Provide a step-by-step guide and sample toolkits to develop and implement a robust ambulatory curriculum at one's home institution.

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Educational Principles and Steps in Ambulatory Medicine Curriculum Design

Valuable resources exist to guide faculty in the development of medical education curriculum. Three well-cited books include *Curriculum Development for Medical Education: A Six-Step Approach* by Thomas et al. [4], *Community-based Teaching: A Guide to Developing Education Programs for Medical Students and Residents in the Practitioner's Office* by the American College of Physicians [5], and *The Toolkit Series: A Textbook for Internal Medicine Education Programs* by the Alliance for Academic Internal Medicine [6]. Online resources are also available in three major categories to assist educators in curriculum development—resources from medical accrediting organizations [i.e., Association of American Medical Colleges, American Board of Internal Medicine (ABIM), Accreditation Council for Graduate Medical Education (ACGME)], topic-specific resources, and general medical education journals [7, 8].

A robust ambulatory medicine curriculum relies on a number of key principles and essential steps in educational curriculum planning as detailed below and in section "Conclusion."

Curriculum Steering Committee for Educational Planning and Problem Identification

One faculty individual should be identified to oversee the ambulatory curriculum development process. Alternatively, the role can be shared by a couple of individuals, e.g., associate program director and clinic director. This person(s) is responsible for the day-to-day logistical planning of the curriculum, including scheduling of the curriculum in residents' continuity clinics, recruiting relevant presenters, and ensuring collection and aggregation of curriculum evaluation. A curriculum steering committee of key ambulatory stakeholders should also be established to provide input and identify deficits or problems in the ambulatory curriculum. This committee focusing on improving ambulatory education will continually review and update the curricular content at least annually. This committee is distinct from the Program Evaluation Committee of the residency program. Key stakeholders should include the residency clinic directors, clinic preceptors, ambulatory chief resident, and residency program director. The latter two individuals make certain that the clinic curriculum aligns with ACGME requirements and is well-integrated into the residency program.

General and Targeted Educational Needs Assessment

The needs assessment process is an important step to inform relevant curricular content and design. This step must involve not only a general analysis of the institution's educational and programmatic needs but also a targeted assessment of learners' needs [4, 8]. This requires alignment of the program's curriculum to ACGME/ABIM mandates and expert recommendations from major medical education organizations. Both general and targeted needs assessment can be done through various methods including, but not limited to stakeholder surveys, town hall meetings, focus group discussions, individualized faculty or resident interviews, In-Training Exam (ITE) performance on ambulatory topics, direct observation of stakeholders' skills, and audits of current stakeholders' performance. Additional curriculum needs assessments must conclude with a review of the literature for related ambulatory education curriculum and a collection of all the available resources. Appendices 1 and 2 provide samples of general and targeted needs assessment templates for ambulatory curriculum development.

Goals and Objectives for Continuity Clinics in Relationship to ACGME Competencies

The ACGME requires all training programs to develop specific goals and objectives for their ambulatory clinic curriculum. Goals are set in SMART format—specific, measurable, attainable, relevant, and timely [9, 10] (Table 1). Specific learning objectives make goals more concrete, prioritize curricular content, allow for direct evaluation, and tailor the individual clinic learning [8].

Goals and objectives for any ambulatory clinic curriculum must reflect the six domains of the ACGME milestones competencies [11]—patient care, medical knowledge, practice-based learning and improvement, interpersonal skills and communication, professionalism, and system-based practice (sample, Appendix 3). These educational goals and objectives should be reviewed with residents and preceptors on at least a semiannual basis. Residency program directors must verify residents' clinical competence and performance trajectory in the six milestones core competencies within ambulatory education. The websites of both AAIM (*http://www.im.org/p/cm/ld/fid=464*) and ACGME (*http://www.acgme.org/What-We-Do/Accreditation/Milestones/Overview*) publish milestones guidebooks and developmental toolkits in competency-based medical education for any program to adapt accordingly.

Table 1 Types of learning objectives. Adapted from: Johns Hopkins School of Medicine (2016) [12]

Types of objectives	Definition	Sample learning objective for the professionalism competency
Learner-focused	Cognitive (knowledge-based) Affective (attitude based) Psychomotor (skills-based, behavioral-based)	By end of rotation, residents will be able to list five different personal, psychological, and/or physical limitations that may affect professional performance By end of rotation, residents will have rated more highly their empathy and compassion toward their primary care patients with chronic pain issues By end of rotation, residents will be able to demonstrate competency in providing support (physical, psychological, social, and spiritual) for dying patients and their families
Process-focused	Curriculum implementation measures	By end of rotation, residents will review three mini-CEX sessions with faculty preceptor for feedback on professional interaction with patients
Outcomes-focused	Patient-related outcomes Healthcare outcomes Career choices	Three months after rotation, a higher percentage of residents' primary care patients will report increase satisfaction in their interaction with their resident physician

Educational Strategies: Structured Core Curricular Content and Delivery Strategies

A core curricular thread comprised of supplemental teaching modalities is a fundamental component of any ambulatory medicine curriculum. This helps to consolidate ambulatory concepts with learning in the clinical setting, promote self-directed learning beyond patient cases seen, and solidify clinical practice with evidence-based medicine [13–18]. A robust ambulatory curriculum should incorporate a balance of experiential training from direct patient care (e.g., acute care, chronic disease management, office-based procedures), formal educational instruction (e.g., teaching conferences, case-based small group sessions, web-based modules), and resident-driven learning strategies (e.g., problem-based learning, team-based learning, QI mini-projects, resident-led workshops, flipped classroom model).

Clear, achievable learning objectives should be established for each teaching pedagogy and its curricular contents updated at least annually. Emphasis must be placed on critical reasoning and active adult learning in small group settings; ambulatory curriculum has shifted away from traditional lecture-based teaching to problem-based learning [19–21]. Core curricular contents can be delivered in a variety of effective pedagogical venues including, but not limited to, ambulatory conference series, ambulatory medicine morning report, ambulatory medicine journal clubs, online learning modules, and patient simulation exercises.

Implementation with Bidirectional Evaluation and Feedback

Implementation of any ambulatory curriculum must first address barriers and identify resources and appropriate support. A rigorous evaluation system must then be established to routinely gauge its educational programming and primary stakeholders (i.e., residents, clinic staff, and faculty preceptors). Curricular metrics reflect outcomes-focused learning objectives and assess the level of milestones-specific competencies acquired by residents in the longitudinal care of their primary care patients [8]. Internal evaluation of the ambulatory curriculum should be done at least semiannually to ensure timely improvements to the overall program.

Bidirectional evaluations of both residents and faculty preceptors are an integral component of any ambulatory curriculum. Resident ambulatory evaluation data can originate from a variety of sources including, but not limited to, direct observation of patient encounters, mini-Clinical Evaluation Exercise (mini-CEX), Objective Structured Clinical Examination (OSCE), chart-simulated recall, and multisource feedback. These formative evaluations of residents are continuous throughout the academic year. The faculty clinic preceptor should complete a semiannual evaluation every 6 months on residents' performance in ambulatory milestones competencies to align with the Clinical Competency Committee (CCC) report to ACGME. To ensure reciprocity, faculty evaluation data should ideally be collected primarily

from residents' and peers' confidential feedback of teaching performance. ACGME Common Program Requirements stipulate at minimum a yearly evaluation of faculty performance and include "a review of the faculty's clinical teaching abilities, commitment to the educational program, clinical knowledge, professionalism, and scholarly activities" [1] (see chapter "Clinic Evaluations and Milestones").

Ambulatory Faculty Development Needs

Any ambulatory curriculum capitalizes on the clinical and teaching skills of the ambulatory faculty but will require a well-structured plan for ambulatory faculty development to ensure successful curriculum implementation. Faculty development programs are important to train clinic faculty on a variety of ambulatory teaching skills and instructional pedagogies. Ambulatory faculty must be able to skillfully diagnose patients' complaints while assessing and teaching to their learner's needs. To do so, faculty preceptors should be trained in effective ambulatory teaching models such as the One-Minute Preceptor and SNAPPS (Summarize, Narrow, Analyze, Probe, Plan, and Select) [22–25]. These validated models help to extract the highest-yield ambulatory concepts for learners in the busy ambulatory setting. See chapter "Medical Students in Clinic" for further details. The Education Committee of the American College of Physicians has even advocated for a "core faculty" group comprised of seasoned clinician educators who are "provided sufficient time, financial remuneration, academic status, and institutional recognition for teaching, evaluating, supervising and mentoring trainees" [26] (See for more details chapter "Supervising and Supporting Faculty" and chapter "Faculty Recruitment and Retention").

Ambulatory Curriculum Delivery

Core Curricular Content

Clinical experience alone is limited in its ability to cover the breadth of knowledge in the outpatient setting given time constraints and differing patient experiences. Ambulatory didactics are needed to solidify ambulatory concepts beyond specific patient encounters and incorporate evidence-based medicine for high-quality care and lifelong learning [13, 14].

The standard curriculum must cover core ambulatory contents that will empower residents to practice outpatient medicine in any setting, whether in primary care or subspecialty medicine [27]. Ambulatory content can be further individualized to the clinical experiences of the specific academic institutions. Preventive medicine is a key component of primary care, and residents should be taught guideline-based and

evidence-based preventative care measures. Curricula should further include such topics as billing and coding, panel management, team-based care, patient-physician communication, chronic disease management, electronic health record management, quality improvement/patient safety, and high-value care [28–30]. Depending on institutional needs and interests, programs may consider specialized topics addressing chronic pain and addiction medicine, social determinants of health, immigrant or refugee health, geriatrics, transgender health, or LGBT care. Maintaining a 12-month to 36-month core curricular thread of ambulatory topics will ensure a rigorous and balanced educational exposure (Appendix 6).

Teaching Methods and Instructional Strategies: Formal Instruction

Small Group Sessions

Small group sessions in the ambulatory setting can be a valuable tool to enhance outpatient learning. The small group allows for learner engagement, interactive didactics, and a forum to cover many broad clinical topics not commonly present in the clinic. Small groups can be utilized within the construct of a larger curriculum, e.g., Yale Office-Based Medicine Curriculum [31], or can be learner-directed [32] in the clinic. Small groups can focus on specific skills teaching [33] or work to improve subjective skills such as patient interviewing [34]. These small group sessions are particularly useful if there is a specific gap in education recognized by the program.

Ambulatory Morning Report

Morning report is a classic educational model that can be adapted to the ambulatory setting. Traditionally, morning report consists of case-based education where learners and teachers interact in a dynamic process to discuss patient care [35, 36]. However, there is no formal definition, and no effective format is noted in the literature [35]. In the ambulatory setting, morning report is an excellent venue to introduce common outpatient medical problems and share experiences among a larger group of residents [37]. A few studies noted that the topics presented in ambulatory morning reports are more general and more practical than inpatient topics [37, 38].

For those residency programs with an established inpatient morning report, adapting this educational modality to the clinic is simple. The key aspect is faculty and resident buy-in to ensure that the sessions are interactive and supported by faculty presence. Interactive discussions during morning report would then take place with chief resident or attending input. Despite being called “morning” report, there is no specific best time and/or frequency for morning report, as long as attendance can be assured [35]. Ambulatory morning report has been used to teach evidence-based medicine [39], morbidity and mortality [40], and more [35].

Evidence-Based Learning

Evidence-based medicine (EBM) uses current best scientific evidence to guide patient care decisions for management. Evidence-based learning consists of a four-step process [41]:

1. Formulate a clear clinical question from a patient problem.
2. Search the literature for relevant clinical articles.
3. Critically appraise the evidence for its validity and usefulness.
4. Implement useful findings in clinical practice.

With the advent of the six milestones competency domains, the ACGME requires programs to train residents not only in clinical skills and medical knowledge but also in quality, patient safety, EBM, and cost-effective care [42]. Residency programs must address residents' barriers to practicing EBM including limited time; lack of experience in EBM; influences from other team members, e.g., faculty role models; and self-perceived inferior positional status and low likelihood to influence change at their institution [43]. To surmount these barriers, ambulatory curricula require EBM teaching to promote residents' practice-based learning skills and lifelong learning.

Ambulatory Journal Club

Journal clubs are a popular modality to teach physicians how to critically appraise the medical literature and stay current with new evidence. Journal club discussions that are small group, structured, and facilitated by faculty can lead to an increase in resident knowledge of critical appraisal and clinical epidemiology [44–46]. Systematic reviews found that overall, journal clubs can enhance residents' knowledge of epidemiology, biostatistics, reading habits, and references to the medical literature [47]. Further studies are still needed to determine if journal clubs improve clinical behavior. Nonetheless, ambulatory journal club is a vital instructional modality in any ambulatory curriculum to promote academic rigor and EBM practice among residents and faculty [28].

PICO Reports

Critical to practicing EBM is asking the right clinical question. Questions should be as specific as possible, including distinct patient characteristics, the clinical intervention being considered, and the desired outcome [41]. The PICO format helps to design such clinical questions to include the patient or problem, the intervention, the comparison group (usually the standard of care or main alternative), and the outcome [48]. The PICO report provides a template for clinicians to build a specific clinical question and a search strategy to determine the main concepts of the article and answer the question posed. It prompts residents to research a specific clinical question during an actual patient care encounter. This format can be extrapolated to house staff presentations as a way to complement ambulatory journal clubs.

Residents can present the relevant article(s) and apply them appropriately in the clinical decision-making process.

Structured Clinical Observations

Mini-Clinical Evaluation Exercises (Mini-CEX)

The mini-CEX, as defined by the ABIM, consists of 10–20 min of direct assessment by a clinical faculty member. This allows for a quick view into a resident's competence in certain area of practice. The mini-CEX is not intended to be a comprehensive assessment of a full patient encounter but rather serves as a focused assessment of a resident's competence in a key encounter element (e.g., history gathering, physical examination skills, counseling). The ABIM website encourages the faculty to perform at least one mini-CEX per clinical rotation. After such an interaction, the faculty should then provide timely and specific feedback [51]. The literature reports the far-reach of this method of teaching and objective observation into the international platform and on a variety of contexts in clinical teaching settings.

The mini-CEX format has demonstrated reproducible and reliable results [52]. One main benefit is its ability to provide immediate feedback to the learner. Educators have reported this as valuable, given the lack of time to complete administrative and clinical tasks as well as teach and provide feedback [49, 50]. Mini-CEXs also provide an aspect of realism to the encounter that can be lost in other educational models such as an OSCE [50]. Since residents interact with patients on a daily basis, it is relatively simple to carve time-out within the academic year for this type of instructional modality.

Some pitfalls of the mini-CEX tool include the need for faculty development and rater training [49, 50]. Depending on the type of model implemented and the level of faculty expertise, a significant amount of faculty training maybe required to limit the variation and increase the value of the feedback/rating gathered. This pitfall can be reduced by choosing high-yield areas of evaluation (i.e., breaking bad news, communication skills) since they are already linked to other curricular goals [49]. Time is another concern of the mini-CEX tool. Several studies note that faculty time commitment can range between 19 and 31 min including feedback time [53, 54].

The ABIM website provides a generic template for the development and implementation of a mini-CEX tool into a residency program (Table 2) [51]. The form can be modified to the needs of a residency program, and a modified version of the form is located in the AAIM curriculum toolkit. One can denote on this form the level of satisfaction with the mini-CEX experience, which is useful for faculty development. Programs can also develop their own forms based on the clinical skills involved. Further research should focus on linking specific evaluations to the ACGME milestones.

Table 2 Steps in the development and implementation of a mini-CEX for a residency program

1st: Convene a group of faculty educators vested in mini-CEX development and participation
2nd: Identify a list of competencies and skills that are conducive to mini-CEX assessment and important to be evaluated in the residency program
3rd: Decide on the minimum competency requirements needed to be achieved for each resident contingent to his/her training level
4th: Determine the role of the mini-CEX, i.e., educational only vs. formative feedback vs. both
5th: Determine the number of mini-CEX assessments needed for each PGY level
6th: Develop a mini-CEX assessment form appropriate to your program See ABIM website for a sample direct observation mini-CEX template
7th: Disseminate the mini-CEX form to clinical sites which are easily accessible and well known to all faculty and learners
8th: Be sure to assess residents routinely and regularly throughout the academic year
9th: Be sure to document every mini-CEX assessment encounter
10th: Provide immediate, specific feedback to the resident during the mini-CEX encounter
11th: Designate one faculty at each clinical site to take responsibility for disseminating and collecting mini-CEX forms
12th: Analyze all mini-CEX results in a timely manner based on curricular goals

Adapted from: *Liao K, Pu S, Liu M, Yang C, Kuo H. Development and implementation of a mini-Clinical Evaluation Exercise (mini-CEX) program to assess the clinical competencies of internal medicine residents: from faculty development to curriculum evaluation. BMC Med Educ 2013;13*(31)

Patient Simulation Exercises

Most residency programs use patient simulation exercises to teach emergent clinical scenarios such as “rapid response” and/or cardiopulmonary arrest (“Code Blue”) situations as well as to teach specific procedural skills such as central line placement. In the ambulatory setting, some programs use procedural simulation modalities to teach outpatient skills such as arthrocentesis and abdominal paracentesis. Simulations ensure that residents receive high-yield experiences such as mock exercises related to patient safety and improve on their practical skills which may be difficult to do during an 80-h workweek. Simulation can be adapted to a variety of clinical situations, whether it be management of a specific medical issue (e.g., back pain in the clinic) or crisis management (e.g., patient becomes acutely ill or medically unstable in the clinic) [55]. One advantage of the simulation modality is its removal of risk associated with learning a procedure on an actual patient [55]. It allows deliberate practice to occur with immediate feedback available [56]. However, further research in utilizing this type of educational model in ambulatory internal medicine is needed.

Teaching Methods and Instructional Strategies: Resident-Directed Learning

Team-Based Learning

Initially developed by Larry Michaelsen [57, 58], team-based learning (TBL) is an adult learning pedagogy that uses small group instruction, problem solving, and a knowledge application process for residents to be active participants in their learning. There is a specific sequence of events, starting with an individual pre-class preparation and then individual and group testing based on the pre-class reading called the Readiness Assurance Process, followed by a team-based application exercise and feedback. TBL has been successful in undergraduate medical education [59] with increasing use in graduate medical education, especially in the ambulatory setting. At Northwell Health, the faculty converted all their ambulatory didactics to a modified TBL pedagogy. They found the use of TBL resulted in increased resident engagement, improved facilitated group learning, and preference by residents and faculty for TBL pedagogy over traditional didactic lectures [60]. A recent meta-analysis of seven unique TBL curricula in a variety of GME programs noted higher levels of learner engagement and positive or neutral responses by learners of the TBL pedagogy. However, many faculty reported increased time investment for developing TBL curricula. Despite visible knowledge gains, it is unclear how TBL compares to traditional instructional models in terms of content retention and faculty time investment [61].

Problem-Based Learning

Problem-based learning (PBL) has been used in interdisciplinary medical education for the last 40 years [62]. It is an active, learner-centered educational strategy focused around a specific problem, whether it is a clinical-, a scientific-, or a community-based problem. Residents use the problem as a starting point to guide their individual learning needs [62]. Unlike TBL, learners are presented with a problem with no pre-work or preparation. They work either individually or in small groups through the scenario and identify unfamiliar terms or concepts. The group determines underlying mechanisms and formulates potential explanations for the problem scenario. The group identifies learning issues associated with the clinical encounter and related to the learning objectives identified by faculty. Following this stage is a period for individual study for accessing a range of educational resources. The group then reconvenes to share what they have learned and apply the learning to the problem scenario. This stage may uncover new learning points that require further individualized study. The final stage is to generalize the learning to the knowledge, skills, or attitudes of other relevant scenarios [62]. PBL has been studied extensively in the undergraduate medical literature, and unfortunately, review of

the literature suggests no substantial evidence that PBL improves clinical performance or increases medical knowledge base; however, students and faculty find greater satisfaction in learning and teaching in this format [63].

Flipped Classroom

Similar to TBL and PBL, a flipped classroom is a learner-centered instructional strategy that reverses the traditional educational arrangement by delivering instructional content outside the classroom. This information can be in the form of audio, video, text, or images. It requires the learner to be an active participant in acquiring knowledge and in using it for evaluation of self-performance and peer feedback. It redefines in-class activities to include an application activity, traditionally considered "homework," to engage learners in the educational content. Residents are able to utilize this knowledge in interactive formats, such as traditional PBL or TBL, or involve simulation activities, role-play, patient encounters, or debates [64]. Teachers take on the role of facilitator by organizing interactive experiences, challenging students to think creatively, and providing expert insight and feedback. This interaction is less didactic and more personalized to the learners [65]. This pedagogy has also been adapted in residency programs of other medical subspecialties [66] and health professional schools with success [65]. The flipped classroom modality leverages technology to meet the needs of learners and allows learners access to the much-needed material for knowledge mastery.

Web-Based Learning

Educational tools that utilize web-based learning (e-learning) are useful to augment any ambulatory curriculum, especially in the age of millennial learners. E-learning modules help with work hour constraints and present general information regardless of the expertise of the assigned attendings. Web-based module formats are effective at teaching a variety of topics to learners, with improved knowledge [67, 68] and communication skills [69]. Many educational models use e-learning as an adjunct to established ambulatory curricula. The major advantages of web-based learning include the portability of knowledge through a universal web access point and its adaptability to many levels of learners. This instructional modality does not add to the attending workload and can be sustained with limited maintenance [70]. The literature has cited residents' preference for web-based learning as well. One study showed greater resident satisfaction with web-based learning compared to print materials [71]. Multiple models of e-learning exist in the literature including education in end-of-life and palliative care [70], nephrology at the point of care [72], education about DKA [73], dermatology [74], and cultural competency [75]. Many modules also focus on specific topics available to health systems and universities.

These include the Institute for Healthcare Improvement's Open School [76], Centers to Advance Palliative Care Modules [77], and American Academy of Dermatology Basic Dermatology Curriculum [78]. With available technical support, residency programs can create their own e-learning tools that directly complement established education in the clinic.

Quality Improvement Instruction and Application

Quality improvement (QI) and patient safety (PS) education have become important in ambulatory education as programs develop curricula for their residents to meet specific ACGME milestones in QI skills. Training residents in QI not only helps to meet milestones but also gives residents experiential learning in QI/PS issues encountered in independent practice. It is important to integrate QI projects into the resident continuity clinic experience, not only to develop basic skills in quality improvement and panel management, but resident-driven QI projects can help residents become more invested in their continuity clinics [79, 80]. For more information on developing a QI curriculum, please refer to chapter "Quality Improvement Projects and Indicators" on quality improvement.

Ambulatory Curriculum Design and Venue

Ambulatory medicine education is often delivered to residents by two major curricular designs—longitudinal continuity clinics [81–83] and ambulatory block rotations which include the x + y burst model [13, 17, 84–87]. Most recently, ambulatory long blocks have emerged as an innovative third design to sustain the continuity of the ambulatory clinical experience [88–90]. Clinical experiential training remains the crux of these curricular designs. Embedded within these curricular designs are various instructional venues to allow for dedicated time blocks for formal ambulatory teaching with no patient care assignments. These include academic half-days, pre-clinic or post-clinic conferences, and daily protected didactics, i.e., ambulatory morning reports and noon conferences. These supplementary educational venues consolidate the experiential learning, extend the curriculum beyond clinical cases, and connect clinical practice with evidence-based medicine [13, 14]. Consult chapter "Traditional and Block Scheduling Challenges and Solutions for Internal Medicine Residents" for more information on the various residency schedules.

Developing an Ambulatory Curriculum in One's Own Academic Clinic

Step-by-Step Guide of Essential Elements in Developing an Ambulatory Curriculum

For a successful ambulatory curriculum, the authors recommend that clinic directors assemble a team dedicated to identifying the ambulatory educational needs for the program and the residents, develop goals and objectives for continuity clinics, create and implement a core curriculum, and, finally, establish a forum for feedback, assessment, and faculty development (Fig. 1).

Existing Ambulatory Curricula

Existing ambulatory curricula can be purchased to facilitate the development process of an ambulatory curriculum. The two most popular curricula are the Internal Medicine Ambulatory Care Curriculum offered through Johns Hopkins and the Yale Office-Based Medicine Curriculum. The Internal Medicine Ambulatory Care Curriculum through the Physician Education and Assessment Center (PEAC) at Johns Hopkins consists of 43 modules relevant to outpatient medicine. Topics are in a case-based format with a pretest and posttest to assess resident knowledge. Each module has links to relevant journal articles, abstracts, images, and videos [91]. This curriculum can help complement the core residency ambulatory content and fulfill any clinical knowledge gaps at any institution. Over 180 residency programs have subscribed to this curriculum. Alternatively, the Yale Office-Based Medicine Curriculum exists to help house staff assess and manage common ambulatory problems through an evidence-based syllabus. It covers 3 years of ambulatory training with over 144 clinical cases with case-related questions. There are two formal guides: a house staff guide composed of the case, clinical questions, and key references and a faculty guide composed of teaching points with answers. The Yale Office-Based Medicine Curriculum is used by over 190 internal medicine and family medicine residency programs [31]. Both of these curricula have an annual subscription fee for institutions to purchase for use in their residency program.

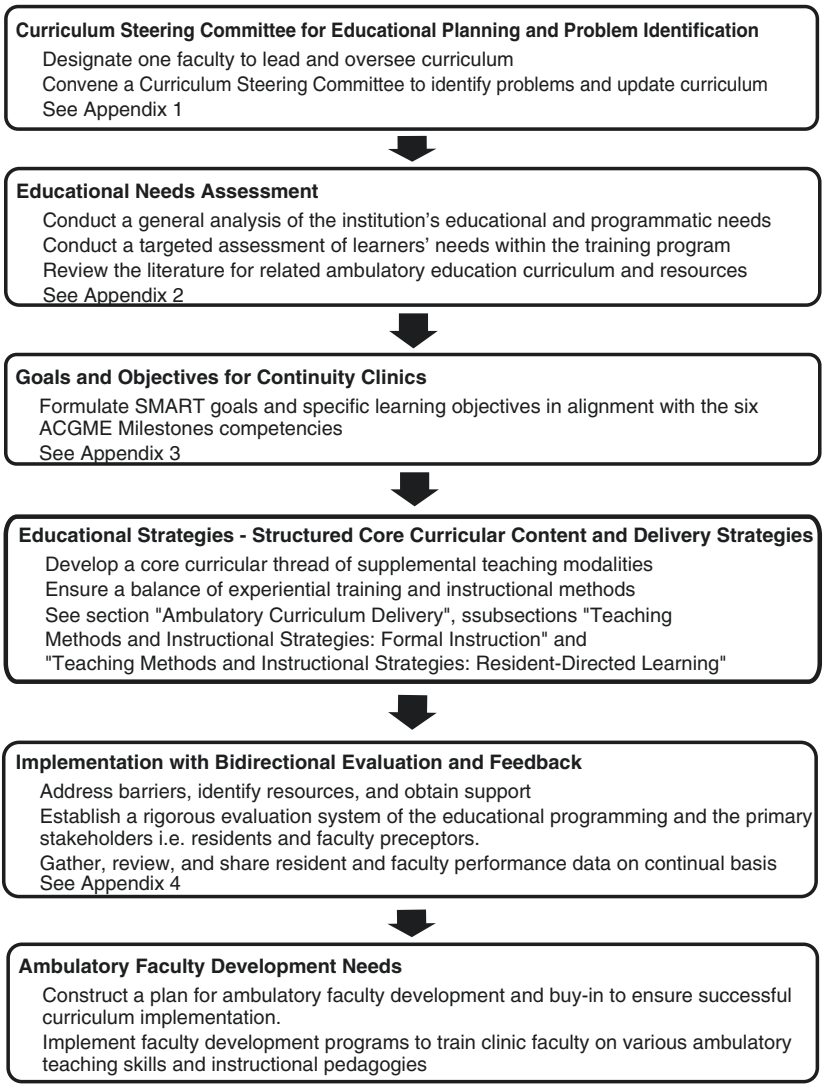

Fig. 1 Step-by-step guide in developing an ambulatory curriculum. ***Adapted from:*** *Kern DE, Thomas PA, Hughes MT: Curriculum Development for Medical Education – A Six-Step Approach, 2nd edition. Baltimore: The Johns Hopkins Univ. Press. 2009*

Conclusion

Since ambulatory education makes up one-third of residency training, the experiential component of outpatient training must be supplemented by a structured core curricular thread. This curricular thread is guided by the needs of both the learners

and institutions, has achievable learning objectives specific to ACGME competencies, and covers basic outpatient skills such as electronic health record management, chronic disease management, and team-based care. Most trainees after residency or fellowship will practice in the outpatient setting and require these core skills for success. Assorted instructional strategies from formal instruction to resident-directed learning modalities can help address the diverse learning styles of learners and unique teaching techniques used by faculty.

Appendix 1: A General Needs Assessment of Ambulatory Medicine Curriculum

Problem identification—What is the current approach? Barriers to implementation?	Ideal approach?	Goals and objectives	Resources needed for implementation?

Appendix 2: Targeted Needs Assessment of Learners

Key learners	Impact of curriculum	Relevant info needed from learners	Methods for learner needs assessment	Resources needed for implementation

Appendix 3: Example Goals and Objectives

Internal Medicine Residency Training Program
Resident Continuity Clinics
Resident Clinic Director: _____

Rotation description: The continuity clinic rotation teaches residents to care for a longitudinal panel of primary care patients over their 3-year residency. In their primary care continuity clinics, residents will manage patients with a mix of acute care issues and chronic medical conditions, including but not limited to diabetes, hypertension, coronary artery disease, and COPD. Residents will also perform office-based procedures under the supervision of a clinic attending.

Principal Educational Goals by Relevant Competency

The principal educational goals for residents on this rotation are indicated for each of the six ACGME competencies in the tables below. The first column of the table lists the goals; the second column maps the goals to the reporting milestones competencies; the third column lists the most relevant learning activities for that goal; and the fourth column indicates the correlating evaluation methods for that goal.

PGY-1/2/3 (Goals Are for All Levels Unless Indicated)

Principal educational goals	Milestones competency	Learning activities	Evaluation methods
A. *Patient care*			
Ability to take a complete medical history and perform a careful and accurate physical examination	PC1	DPC	FE, MC, CEX, SPE
Ability to write or dictate concise, accurate, and informative histories, physical examinations, and progress notes	PC1, ICS2, ICS3	DPC	FE
Define and prioritize patients' medical problems and generate appropriate differential diagnoses	PC1, PC2, PC3, MK1	DPC, FR	FE
Develop rational, evidence-based management strategies	PC2, PC3, MK1, SPB2, SPB3, PROF3, PBL4	DPC, FR, MR, EBM	FE
PGY-1—Ability to make basic interpretation of chest and abdominal x-rays and electrocardiograms PGY-2/3—Develop and demonstrate proficiency in above	MK2	DPC, FR, MR DPC, FR, MR	FE, IE FE, IE
PGY-1—Ability to perform pelvic examination under supervision PGY-2/3—Ability to perform pelvic examination	PC4, MK2 PC4, MK2	DPC, ACS, AM DPC, ACS, AM	FE FE
Ability to recognize the physical findings of important medical illnesses	PC1, PC2, PC3	DPC, MR, MM	FE, MC, CEX
Willingness and ability to help patients engage in strategies of disease prevention	PC2, MK1, MK2, SBP3, PROF1, PROF3, ICS1	DPC	FE, SPE, MC

B. *Medical knowledge*			
Expand clinically applicable knowledge base of the basic and clinical sciences underlying the care of medical patients in the outpatient setting	PC1, PC2, MK1	AM, DPC, PIP, JC, NC, MR	FE, IE, PIP
Access and critically evaluate current medical information and scientific evidence relevant to patient care in outpatient setting	SPB2, PBLI4	DPC, JC, NC, EBM, MR	FE, IE

PGY-1—Understand basic pathophysiology, clinical manifestations, diagnosis, and management of medical illnesses seen by a general internist in the ambulatory setting PGY-2/3—Develop and demonstrate in-depth knowledge of above	PC1, PC2, MK1 PC1, PC2, PC3, MK1	DPC, NC DPC, NC	FE, IE FE, IE
PGY-1—Recognize the indications for and basic interpretation of chest and abdominal x-rays, electrocardiograms, and pulmonary function tests PGY-2/3—Develop and demonstrate in-depth knowledge of above	PC1, MK2, SBP3 PC1, MK2, SBP3	DPC, MR, ACS DPC, ACS, MR	FE, IE FE, IE
PGY-1—Learn indications for and basic interpretation of standard laboratory tests, including blood counts, coagulation studies, blood chemistry tests, urinalysis, body fluid analyses, and microbiologic tests PGY-2/3—Develop and demonstrate in-depth knowledge of above	PC1, MK2, SBP3 PC1, MK2, SBP3	DPC, MR DPC, MR	FE, IE FE, IE
PGY-1—Familiarity with basic principles of disease prevention, including adult immunizations, cardiovascular risk assessment, prevention of cardiovascular disease, screening for cancer, prevention of osteoporosis, and cessation of tobacco PGY-2/3—Develop and demonstrate in-depth knowledge of above	PC2, MK1, MK2, SBP3, PROF3, ICS1 PC2, MK1, MK2, SBP3, ICS1	DPC, ACS, PIP, AM DPC, ACS, PIP	FE, PIP FE, PIP
Appreciation of the evolution of chronic conditions over time	PC1, PC2, PC3,	DPC, NC, AM, ACS	FE
PGY-1 —Basic familiarity with pathophysiology, clinical manifestations, and nonoperative management of common musculoskeletal conditions, including occupational and sports-related injuries PGY-2/3—Develop and demonstrate in-depth knowledge of above	PC1, PC2, PC3, MK1 PC1, PC2, PC3, MK1	DPC, ACS, CC, NC, AM DPC, ACS, NC, AM	FE, IE FE, IE
PGY-1—Basic familiarity with pathophysiology, clinical manifestations, and medical management of common gynecological conditions, including acute salpingitis, vaginitis, dysmenorrhea, irregular menses, and menopausal symptoms PGY-2/3-Develop and demonstrate in-depth knowledge of above	PC1, PC2, PC3, MK1 PC1, PC2, PC3, MK1	DPC, ACS, AM, NC DPC, ACS, AM, NC	FE, IE FE, IE
PGY-1 —Basic familiarity with pathophysiology, clinical manifestations, and medical management of common otolaryngological conditions, including acute and chronic sinusitis and allergic rhinitis PGY-2/3—Develop and demonstrate in-depth knowledge of above	PC1, PC2, PC3, MK1 PC1, PC2, PC3, MK1	DPC, ACS, NC, AM DPC, ACS,AM,	FE, IE FE, IE

PGY-1—Basic familiarity with pathophysiology, clinical manifestations, and management of common ophthalmologic conditions, including minor ocular injuries and conjunctivitis PGY-2/3—Develop and demonstrate in-depth knowledge of above	PC1, PC2, PC3, MK1 PC1, PC2, PC3, MK1	DPC, ACS, NC, AM DPC, ACS, NC, AM	FE, IE FE, IE
Familiarity with special features of diagnosis, interpretation of tests, and management of illnesses in a geriatric population	PC1, PC2, PC3, MK1, MK2, PROF3	DPC, SL, AM, NC	FE, IE

C. *Interpersonal skills and communication*			
Communicate effectively with patients and families	PROF1, PROF3, ICS1	DPC	FE, SPE, PE
Communicate effectively with physician colleagues at all levels	PC5, SBP1, SBP4, PBLI3, ICS2	DPC, PC	FE, PR
Present information on patients concisely and clearly, both verbally and in writing	PROF1, PROF3, ICS1, ICS3	DPC, MR	FE, PR, NE, MRF, ABF

D. *Professionalism*			
Interact professionally toward patients, families, colleagues, and all members of the healthcare team	SBP1, PBLI3, PROF1, ICS1, ICS2	DPC	FE, PR, NE, PE, SPE
Acceptance of professional responsibility as the primary care physician for patients under his/her care	PC3, PBLI1, PROF2, PROF4	DPC	FE
Appreciation of the social context of illness	PC2, MK1, PROF3, ICS1	DPC	FE, SPE
Understand ethical concepts of confidentiality, consent, autonomy, and justice in the outpatient setting	PROF1, PROF4	DPC, EC	FE, PE
Understand professionalism concepts of integrity, altruism, and conflict of interest in the outpatient setting	PROF1, PROF4	DPC, EC	FE

E. *Practice-based learning and improvement*			
Identify and acknowledge gaps in personal knowledge and skills in the care of ambulatory patients	PC2, PC3, PBLI1, PBLI3	DPC, PIP	FE, PIP
Develop and implement strategies for filling gaps in knowledge and skills	SPB2, PBLI1, PBLI2, PBLI4	DPC	FE, IE, HEC
Commitment to professional scholarship, including systematic and critical perusal of relevant print and electronic literature, with emphasis on integration of basic science with clinical medicine, and evaluation of information in light of the principles of evidence-based medicine related to the outpatient world	PBLI2, PBLI4, PROF4	DPC, EBM, JC	FE, JCF, ABF

F. *System-based practice*			
Understand and utilize the multidisciplinary resources necessary to care optimally for clinic patients	PC3, PC5, SBP1, SBP4	DPC	FE
Collaborate with other members of the healthcare team to assure comprehensive patient care	SBP1, SBP4, PBLI3, PROF1	DPC	FE
Use evidence-based, cost-conscious strategies in the care of outpatients	MK2, SBP3	DPC, SS	FE
Effective collaboration with other members of the healthcare team, including nurses, clinical pharmacists, occupational therapists, physical therapists, nutrition specialists, patient educators, speech pathologists, respiratory therapists, enterostomy nurses, social workers, and providers of home health services	SBP1, SBP4, PROF1	DPC	FE
Knowing when and how to request medical consultation and how to utilize the advice provided	PC5, SBP1, PROF1	DPC	FE
Consideration of the cost-effectiveness of outpatient diagnostic and treatment strategies	MK2, SBP3	DPC	FE
Knowing when to refer patients to specialists in orthopedics, gynecology, otolaryngology, and ophthalmology	PC5	DPC, ACS, AM	FE
Knowing when to consult or refer a patient to a medical subspecialist	PC5	DPC, ACS	FE
PGY-2/3—Willingness and ability to teach medical students and PGY-1 residents	PROF2, ICS2	DPC, RAE	FE, PR

Legend for milestones competencies (per ACGME reporting milestones): *PC* Patient care, *MK* Medical knowledge, *SBP* System-based practice learning, *PBLI* Practice-based learning improvement, *PROF* Professionalism, *ICS* Interpersonal and communication skills
Legend for learning activities: *ABS* Ambulatory block series, *FR* Work and teaching rounds, *MM* Morbidity and mortality, *AM* Ambulatory month, *GR* Grand rounds, *MR* Morning report, *DPC* Direct patient care, *EBM* EBM week, *NC* Noon conference, *EC* Ethics conference, *JC* Journal club, *PIP* Performance improvement project
Legend for evaluation methods for residents: *AM* Ambulatory month, *PR* Peer review, *ABW* Ambulatory block workshop feedback, *SPE* Standardized patient evaluation, *FE* Faculty evaluations, *PE* Patient evaluation, *IE* In-service exam, *MCEX* Mini-CEX, *CCC* Clinical Competency Committee semiannual review, *PCRM* Patient care resource manager evaluation, *OSCE* Objective structured clinical examinations, *MRF* Morning report feedback, *NE* Nursing evaluations, *JCF* Journal club feedback

Appendix 4: Checklist for Curriculum Implementation

- Identify resources
  - Personnel required: faculty, staff, others
  - Time: faculty, learners, support staff

  - Facilities: space, equipment, sites
  - Funding/costs: direct and indirect costs
- Obtain support
  - Internal: program director, department chair, learners, faculty
  - External: professional societies, if applicable (e.g., SGIM, AAIM)
- Develop administrative mechanisms to support the curriculum
  - Administrative structure of team
    - Necessary for delineating responsibilities and decision-making
  - Communication
    - Content to learners and faculty: includes goals and objectives, information about curriculum, facilities, scheduling, changes, evaluation results
    - Mechanisms: email, meetings, website, etc.
  - Operations
    - Preparation and distribution of schedules and curricular materials
    - Method of collecting, collating, and distributing evaluation data
    - Process for revisions
- Anticipate and address barriers
  - Financial
  - Competing demands
  - People: attitudes of learners and faculty, faculty without enough time, authority, etc.
- Introduce curriculum in stepwise fashion
  - Pilot project
  - Phase-in
  - Full implementation

Adapted from: *Kern DE, et al.: Curriculum Development for Medical Education – A Six-Step Approach, 2nd edition. Baltimore: The Johns Hopkins Univ. Press. 2009*

Appendix 5: Sample Mini-CEX for Gynecological Examination

Resident: _____
Date: _____
Supervisor: _____

Please rate the resident on the following criteria:

	Poor/not done	Minimal/adequate	Excellent
1. Proper patient positioning	1	2	3
2. Communication with patient during exam	1	2	3
3. Inspection of the external genitalia	1	2	3
4. Use of speculum (insertion and removal)	1	2	3
5. Inspection of vaginal walls and cervix	1	2	3
6. Obtained sample for Pap smear and/or wet mount/culture	1	2	3
7. Bimanual examination	1	2	3
8. Examination for inguinal adenopathy	1	2	3
9. Overall rating	1	2	3

Do you feel this resident is competent in performance of the pelvic exam? Yes No
Please provide any additional comments below:

Appendix 6: Sample 18-Month Curriculum for x + y Clinic Design, Repeated Twice over Residency

Block	Theme
1	Introduction to office-based practice I
2	Screening, prevention, population health
3	Pain management/musculoskeletal
4	Cardiology
5	Psychiatric disease
6	Pulmonary
7	Infectious disease/HIV
8	Endocrine
9	Gastroenterology
10	Renal
11	Geriatrics
12	Women's health
13	Neurology/dermatology
14	ENT/ophthalmology/hematology
15	Palliative
16	High-value cost-conscious care
17	Urban curriculum
18	Career development and wellness

Sample 36-month curriculum for traditional, weekly half-day clinic design

Month	Topics		
	Year 1	Year 2	Year 3
July	Billing and coding	Billing and coding	Billing and coding
August	Preventative services: vaccine/cancer screen	Preventative services: vaccine/cancer screen	Preventative services: vaccine/cancer screen
September	Type 2 diabetes mellitus	Preoperative evaluation	Sexually transmitted diseases
October	Hypertension	Coronary artery disease	Geriatric wellness
November	Hyperlipidemia	Obesity	Congestive heart failure
December	Panel management	Panel management	Panel management
January	Depression/anxiety	Hypogonadism and erectile dysfunction	Chronic pelvic pain and dysmenorrhea
February	Chronic pain syndrome	Gout vs. osteoarthritis	Women's health
March	URI vs. sinusitis	Fibromyalgia	Hepatitis C
April	Asthma and COPD	CVA/TIA	Atrial fibrillation
May	Thyroid disease: hypo-/hyperthyroidism	GERD	Community-acquired pneumonia vs. influenza
June	Transitions of care	Migraines vs. tension headaches	Osteoporosis and vitamin D deficiency

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