CURRICULUM ON MEDICAL KNOWLEDGE
MSU INTERNAL MEDICINE RESIDENCY PROGRAM

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I. Educational Purpose and Goals

Physicians must demonstrate knowledge about both established and evolving biomedical, clinical, and cognate (e.g. epidemiological and social-behavioral) sciences. Physicians must also be able apply this knowledge to patient care. MSU Internal Medicine residents must therefore develop breadth and depth of medical knowledge, and they must develop analytic skills to continuously refine and appropriately apply their knowledge in varied clinical settings.

II. Principal Teaching Methods

a. Supervised Direct Patient Care:
   i. Residents encounter diverse inpatient and outpatient populations. When providing care to these patients under the supervision of an attending physician, residents must incorporate knowledge of both biomedical and social-behavioral sciences. Management rounds, Teaching Attending rounds, and outpatient clinic experiences all contribute to an expanding knowledge base.
   ii. Required inpatient clinical experiences include General Internal Medicine (Firm, SH-Med, Hospitalist, Consult Medicine, Night Float), Intensive Care Unit, Cardiology, Neurology, Emergency Medicine, Geriatrics, and Hematology-Oncology.
   iii. Required outpatient medicine learning experiences include weekly continuity clinic, Women's Health, Emergency Medicine, and a minimum number of ambulatory medicine selectives.
   iv. Required social-behavioral training is performed during the Psychosocial Medicine block.

b. Small Group Discussions
   i. *Teaching Morning Report*: All residents on Firm, SH-Med, and Night Float rotations attend teaching morning report as described in the residency manual. Each resident is responsible for identifying a learning objective; presenting the case; leading the ensuing academic discussion; and directing teaching at the bedside.
   ii. *Multidisciplinary Report*: All residents on Firm, SH-Med, and Night Float rotations attend multidisciplinary report as

described in the residency manual. These sessions include discussions of pharmacology, ethics, and systems based practice.

c. Didactic Sessions
    i. *Core Curriculum Conference*: This weekly lecture series covers fundamental clinical and scientific topics pertinent to hospital-based medicine, as well as special topics addressing the Core Competency curriculum and mandatory ACGME interdisciplinary topics. Topics are drawn largely from the major specialty disciplines and are repeated in an 18-month cycle to ensure adequate opportunity for all residents to attend core conferences.
    ii. *Medical Emergencies Conference*: These sessions repeat yearly during the initial 8-10 weeks of the academic year, reviewing knowledge of common urgent medical symptoms.
    iii. *Journal Club*: This weekly conference alternates between evidence-based medicine and basic science topics. Both types of sessions teach critical reading skills and analysis, with resident presentation of articles from current medical literature. Articles contributing to recent advances in knowledge are stressed.
    iv. *Morbidity and Mortality Conference:* While this monthly conference primarily focuses on practice-based learning and improvement, it also covers fundamental medical knowledge including basic and clinical sciences.
    v. *ECG conference*: Monthly ECG didactics are followed by interactive ECG readings in a group setting, stressing fundamental ECG principles, wave forms, ECG patterns for common clinical conditions, and ECG patterns in cardiovascular emergencies.
    vi. *Clinical Pharmacology Conference*: This monthly conference teaches principles of pharmacotherapy. Topics coincide with board review or are drawn from resident questions.
    vii. *Interesting Case Conference*: Residents give case presentations to their peers based on clinical encounters, with review of pathophysiology, diagnosis and treatment strategies.
    viii. *Ethics Conference*: This conference teaches residents to identify key ethical principles and potential ethical conflicts.
    ix. *Board Review*: The subject books of the MKSAP series are covered during four-week modules during which residents are expected to read the selected MKSAP book including the self-assessment questions. During the first three weeks of each module, MKSAP practice examination items are reviewed, including critique and group discussion of each item. Brief presentations focus on facilitation of the ability to

answer the questions. Whenever possible, questions for the practice examinations are selected based on content results from a recent In-Training Examination. A faculty facilitator discusses the questions and responds to resident questions. The fourth week of each module is a Final Exam.

x. *Grand Rounds*: Traditional Grand Rounds are held weekly.
xi. *Ambulatory Conference*: Periodic conferences focus on knowledge required for the practice of ambulatory medicine.
xii. *Residents as Teachers Day and PEERS Day*: These annual conferences provide residents with knowledge of teaching techniques, including RIME assessment, one-minute preceptor skills, evaluation methods, and giving feedback.

d. Simulated Care Training Sessions
    i. Formal instruction regarding procedure indications, consent, performance technique, complications, and post procedure care are taught through workshops with hands-on learning using simulators.
e. Independent Study
    i. Independent review of MKSAP books is expected in preparation for Board Review conferences.
    ii. Residents must independently complete online learning modules as part of a web-based ambulatory curriculum and in conjunction with many ambulatory subspecialty rotations.
    iii. Residents have 24-hour access to written and electronic medical reference materials, including access to MSU's and Sparrow Hospital's extensive web-based electronic library. Residents are expected to independently read primary literature.
    iv. Residents may request up to 5 days/yr of leave to attend scientific meetings or other CME activities. In addition, residents receive a yearly stipend toward texts, journals, or attendance at approved scientific meetings.
    v. Residents may request up to two 4-week blocks of clinical investigation electives during their three years of training. During these blocks, residents work with a mentor to explore biomedical, clinical, or cognate sciences in depth.

III. Educational Content

a. Medical Knowledge Topics/Content: The following topics are addressed throughout didactic conferences. Supervised patient care rotations pertinent to each topic are noted:
    i. General Ambulatory Internal Medicine - Included in the mandatory Women's Health, Continuity Clinic, Emergency Medicine, and Geriatrics experiences, as well as the Primary Care Conference didactic series and the required web-based modular curriculum:

1. Gender specific medicine, including office gynecology and women's medicine
2. Urgent care/emergency medicine
3. Ambulatory consultative medicine
4. Geriatrics

ii. General Inpatient Internal Medicine – Included in Firm, SH-Med, Hospitalist, Consultative Medicine and Night Float rotations:
    1. Group-practice based secondary care medicine, including geriatrics
    2. Inpatient Consultative Medicine
    3. Hospitalist medicine

iii. Medical Subspecialties – Addressed in core didactics and the required Medical ICU, Cardiology, Heme-Onc, and general inpatient medicine rotations. Further subspecialty training is available in elective rotations for both inpatient and ambulatory subspecialties.
    1. Adolescent Medicine
    2. Allergy and Immunology
    3. Cardiology
    4. Critical Care
    5. Electrophysiology
    6. Endocrinology and Metabolism
    7. Gastroenterology
    8. Hospice
    9. Infectious Diseases
    10. Nephrology
    11. Non-invasive cardiology
    12. Oncology
    13. Pulmonology
    14. Rheumatology
    15. Thrombosis

iv. Other clinical knowledge essential to the practice of internal medicine, taught in clinical rotations
    1. Neurology – Required
    2. Psychiatry
        a. Psychosocial medicine – Required
        b. Inpatient psychiatry – Elective
        c. Addiction medicine - Elective
    3. Dermatology –Ambulatory selective
    4. Ophthalmology – Ambulatory selective
    5. Sports Medicine/Outpatient orthopedics – Ambulatory selective
    6. Physical Medicine and Rehabilitation – Elective
    7. Anesthesiology – Elective
    8. Occupational and Environmental Medicine – Elective

9. Radiology – Elective
10. Pathology - Elective

v. Interdisciplinary knowledge: These topics are addressed at least once every 18 months in the mandatory didactics.
    1. Adolescent medicine
    2. Clinical ethics
    3. Medical genetics and genomics
    4. Quality assessment and quality improvement:
    5. Risk management
    6. Preventive medicine
    7. Medical informatics and decision-making skills
    8. Law and public policy
    9. Pain management
    10. End-of-life care
    11. Domestic violence
    12. Physician impairment
    13. Substance-use disorders

vi. Knowledge central to the performance and interpretation of procedures:
    1. Technical knowledge for performance of procedures
        a. Instructed during orientation
            i. Basic and advanced cardiac life support
            ii. Pap smear and endocervical culture
            iii. Endotracheal intubation
        b. Instructed through self-study on-line modules in Procedure Consult
            i. Abdominal paracentesis
            ii. Arterial puncture and arterial line
            iii. Arthrocentesis
            iv. Central venous line
            v. Incision and drainage of abscesses
            vi. Lumbar puncture
            vii. Nasogastric intubation
            viii. Pulmonary artery catheterization
            ix. Skin biopsies
            x. Soft tissue injections
            xi. Thoracentesis
        c. Instructed with hands-on procedural workshops
            i. Central venous line
            ii. Peripheral venous lines
            iii. Drawing venous blood
            iv. Skin biopsy
    2. Interpretation of laboratory and other technical data
        a. Instructed during orientation
            i. Peripheral blood smear
            ii. Sputum gram stain

iii. Microscopic urine
iv. KOH and wet prep of vaginal discharge
v. Fecal occult blood

b. Instructed as part of mandatory conferences
i. Electrocardiogram

c. Instructed in clinical rotations
i. Chest roentgenogram
ii. Spirometry
iii. Exercise stress tests

3. Optional procedural knowledge content available to interested residents during the course of subspecialty rotations. Rotations with the available experience are noted (not exhaustively).
a. Cryosurgical removal of skin lesions – ambulatory medicine and dermatology
b. Elective cardioversion – cardiology
c. Skin biopsy – dermatology
d. Soft tissue and joint injections – ambulatory medicine, rheumatology, and sports medicine/outpatient orthopedics
e. Temporary pacemaker placement – cardiology
f. Treadmill exercise testing – cardiology
g. Spirometry - pulmonology
h. Sleep study interpretation – pulmonology
i. Ambulatory electrocardiogram interpretation – cardiology
j. Ambulatory blood pressure monitor interpretation – cardiology

b. Patient characteristics – Medical knowledge is acquired during supervised care of a diverse population of general medical patients, including patients with neurologic presenting complaints. Internal medicine residents also see patients in consultation on surgical, rehabilitation, obstetric/gyn, or subspecialty services. The patient population has extensive socioeconomic diversity.

c. Learning venues:
i. Sparrow Hospital: A level-one trauma center and the largest mid-Michigan hospital, serving as the regional medical center for an eight-county area.
ii. Michigan State University HealthTeam Practices (Clinical Center, Sparrow Professional Building and Breslin Cancer Center): An ambulatory clinical site with conference/lecture room facilities
iii. Community Physician Offices

d. Ancillary services interacted with
i. Medical librarians are available at both Michigan State University and Sparrow Hospital.

ii. Clinical pharmacists interact with residents on ICU rounds and in the care of general medicine patients in the hospital.

e. Structure of the curriculum
   i. Experiential medical knowledge acquisition
   ii. The block training structure, including required conferences and required rotations, is fully documented in the MSU Residency Manual and the residency website. Individual rotation structures are documented separately.

IV. Principal Ancillary Educational Materials

a. Residents must purchase the Medical Knowledge Self Assessment Program (MKSAP) produced by the American College of Physicians, and are provided funds to do so. MKSAP prep-for-boards is available to residents through the residency office.
b. Readings in primary literature are assigned by attending physicians throughout rotations.
c. Residents must complete Johns Hopkins Internet Learning Center online modules for a variety of rotations.
d. Full service 24-hour libraries with electronic and web-based databases are present at Sparrow Hospital and Ingham Regional Medical Center, with onsite medical librarians. Standard texts and medical journals are available in both print and electronic formats. All residents have 24-hour accessibility to the extensive online Michigan State University electronic library.
f. In the residency office and hospital libraries, videotapes and audiotapes are available including procedures videotapes. Residents can access Procedures Consult remotely after registering as a user at Sparrow Hospital.
g. Continuity clinics are stocked with resource texts.

V. Methods of Evaluation

a. Resident Performance
   i. Faculty and nursing staff complete web-based electronic resident evaluation forms provided by the residency office for each rotation. The evaluations are competency-based and assess medical knowledge. The evaluations are shared with the resident, are available for on-line review by the resident at their convenience, and are available to the residency office for internal review. Evaluations are part of the resident file and are incorporated into the semiannual performance review for directed resident feedback.
   ii. Residents are required to pass ACLS content exams on entry to the program and to maintain certification.
   iii. Board Review content knowledge is examined every 4th week of each conference module with a Final Exam. The exam consists of questions taken directly from the same

MKSAP topic book covered during the previous three weeks of the module. The practice examinations from the first three weeks of each module are scored and residents are able to use their performance on practice examinations as formative feedback. Residents must pass or remediate a minimum number of final module examinations. Summative feedback and evaluation are based on the resident's performance on the final examinations.

iv. Social-behavioral knowledge is assessed at the completion of the required Psychosocial Medicine rotation as well as during general medicine rotations.

v. Annually, residents are must take the ACP In-Training Examination. Osteopathic residents in the parallel-certified program also take the ACOI In-Training Examination annually. Residents are provided with their scores and made aware of content-specific deficits. Residents who perform poorly, as judged by the Program Director, may be required to participate in specific remediation activities. Performance does not however affect promotion.

vi. First year residents complete a medical knowledge quiz as part of the orientation OSCE at the Learning and Assessment Center. This is a formative experience focusing on core medical knowledge across specialties.

vii. Knowledge regarding performance of procedures and obtaining informed consent is tracked using an on-line procedure log and completion of Procedures Consult post-module quizzes.

b. **Program and Faculty Performance**

i. Using the online evaluation system, residents complete service evaluations. The residency office reviews evaluations and attending faculty physicians receive anonymous copies of aggregate completed evaluations. Collective evaluations serve as tools to assess faculty development needs. The Training and Evaluation Committee review evaluation results annually.

ii. Residency key faculty assess instructional outcomes using results of the annual In-Training Exam.

iii. ABIM Board Certification pass rates are reviewed yearly for outcomes assessment.

VI. Institutional Resources: Strengths and Limitations

a. Strengths

i. Faculty have received high ratings for ability and dedication to teaching, and have won numerous awards for teaching excellence.

ii. 24 hour medical library and online medical literature is

available at all major training sites. Medical research librarians are available at each major teaching site.

iii. Psychosocial Medicine training is performed by dedicated and experienced faculty.

b. Limitations

i. Lack of a transplant unit limits training in this area.

VII. **Medical Knowledge Specific Competency Objectives.**

Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognate (e.g. epidemiological and social-behavioral) sciences and the application of this knowledge to patient care. Residents are expected to:

a. Know and apply the basic and clinically supportive sciences which are appropriate to their discipline

i. R residents will

1. Demonstrate knowledge of common procedural indications, contraindications, equipment, specimen handling and patient after-care.
2. Demonstrate knowledge of basic and clinical sciences.
3. Demonstrate satisfactory knowledge of common medical conditions, sufficient to manage urgent complaints with supervision. Residents must exhibit sufficient content knowledge of common conditions to provide care with minimal supervision by completion of the R1 year.
4. Take the USMLE or COMLEX Step 3 exam.
5. Score a passing grade of 70% on at least 60% of Board Review final exams.
6. Complete all assigned JHILC ambulatory modules

ii. R2 residents will additionally

1. Demonstrate a progression in content knowledge and analytical thinking in order to develop well-formulated differential diagnoses for multi-problem patients.
2. Demonstrate understanding and responsiveness to socio-behavioral issues.
3. Develop knowledge of statistical principles. Understand and appropriately use sensitivity, specificity, predictive values, likelihood ratio, number needed to treat, and odds ratios.
4. Pass the USMLE or COMLEX Step 3 exam, with documented passing grade required for promotion to R3.
5. Score a passing grade of 80% on at least 60% of Board Review final exams.

iii. R3 residents will additionally

1. Demonstrate growing knowledge in the area of their chosen career path.
2. Demonstrate knowledge regarding performance of procedures while minimizing patient risk and discomfort.
3. Exhibit knowledge of effective teaching and evaluation methods, including RIME, one-minute preceptor, and evaluation techniques.
4. Pass the final ECG reading examination as part of the ECG conference series requirements.

b. Demonstrate an investigatory and analytic approach to clinical situations
   i. R1 residents will
      1. Exhibit use of library resources.
      2. Exhibit self-motivation to learn.
      3. Demonstrate sufficient analytic skills necessary to develop appropriate assessments and plans for common medical diagnoses and complaints.
   ii. R2 residents will additionally
      1. Independently present up-to-date scientific evidence to support hypotheses.
   iii. R3 residents will additionally
      1. Regularly display self-initiative to stay current with new medical knowledge.
      2. Regularly demonstrate knowledge of the impact of study design on validity or applicability to practice.
      3. Present a formal didactic Core Curriculum conference, demonstrating in-depth knowledge of a clinical topic of their choice.