

Curriculum for Fellowship Training in Gastroenterology and Hepatology
Division of Gastroenterology
Department of Medicine
University of Washington School of Medicine

Preamble. The faculty of the Division of Gastroenterology are committed to the training of physicians and scientists in the specialty fields of Gastroenterology and Hepatology. This commitment encompasses education of medical students, residents, fellows, and fully trained physicians in practice. The curriculum described here covers fellowship, that period of training which follows residency in internal medicine, for physician trainees. [The Division also offers training to holders of advanced degrees in the sciences (usually Ph.D. degrees in biologic sciences) who wish to pursue research that is relevant to gastrointestinal, pancreatic, and hepatobiliary medicine.]

The fellowship curriculum comprises two categories of fellowship (clinician – teacher and physician – scientist) covering the following six basic skills that are to be mastered by trainees:

- (1) knowledge base of anatomy, physiology, nutrition, biochemistry, cell biology, genetics, and pharmacology that is relevant to the specialty
- (2) clinical care of hospitalized patients with disease
- (3) technical aspects of gastroenterology/hepatology practice; including endoscopic procedures and liver and other tissue biopsies
- (4) ambulatory care skills (including disease prevention and screening)
- (5) research training
- (6) ancillary skills geared to each trainee's career plans

All trainees will participate in clinical research training to understand the process of generating new knowledge in Medicine. Trainees will work with one or more mentor(s) through their 3 to 5 year program to achieve a good grasp of addressing clinically relevant questions with scientific rigor, and have first hand experience in analyzing and presenting scientific data. The program is committed to providing the trainee with protected time to focus on a selected topic of special training on a rotational basis in all of our teaching institutions.

Specialized areas of training embedded within the fellowship include:

- GI Pathology – where trainees will learn the techniques of preparing tissue sections, special histochemical and immunocytochemical staining methods, as well as interpretation of morphological structures in various disease states.

- GI Radiology – where trainees will learn the principles and methods of imaging including abdominal plain films, ultrasonography, CT scan, MRI and PET. They will be able to study how to interpret imaging results with expert GI radiologists.
- Specialized clinics, where patients presenting with a defined disorders are cared for by a focused and concentrated effort and expertise. These training scenarios afford unique opportunities to benefit the trainees in the following areas: Hepatology Liver Transplantation, Barrett’s Esophagus, Inflammatory Bowel Disease, Esophageal Motility Disorders, Office Proctology, and Hematopoietic Stem Cell Transplantation.

Physicians who enter fellowship already have substantial knowledge in most of these areas that serves as a base for further learning. The fellowship in Gastroenterology has two levels of training, level I for general gastroenterology and hepatology, and level II for more complex and difficult diagnoses and procedures. Selected fellows progress to level II training after demonstrating competence in general gastroenterology and hepatology.

Our curriculum is largely based upon the Gastroenterology Core Curriculum, developed by the major gastroenterology societies. The Third Edition of this Core Curriculum was published in May 2007, and our curriculum has been updated to reflect these changes (<http://www.gastro.org/wmspage.cfm?parm1=72>).

1. Clinical care of hospitalized patients with disease.

1.1. Primary objectives.

- To recognize the signs and symptoms of illness, identify the disease process or the cause of symptoms, effect a treatment that will relieve symptoms, and, whenever possible, cure the disease.
- To acquire the attributes of professionalism in medicine, as defined by the American Board of Internal Medicine:

Professionalism in medicine requires the physician to serve the interests of the patient above his or her self-interest. Professionalism aspires to altruism, accountability, excellence, duty, service, honor, integrity, and respect for others. The elements of professionalism encompass a commitment to the highest standards of excellence in the practice of medicine and in the generation of knowledge, a commitment to sustain the interests and welfare of patients, and a commitment to be responsive to the health needs of society (ABIM Document on Professionalism, 1995).

1.2. Methods of instruction. The skills to be learned are among the most difficult to teach, as they involve interpersonal relationships with patients, synthesis of information, application of a large knowledge base of medicine, and judgment. At the core of this teaching is a mentoring process that pairs a fellow trainee with a member of the faculty, in the consideration of every patient encountered during fellowship. The trainee must encounter patients with diseases that vary widely in etiology and severity. Trainees must have ready access to the world's accumulated knowledge about disease processes.

1.2.1. Sites of training. The University of Washington's teaching hospitals offer five models of health care delivery and as many different populations of patients and diseases. An overview including teaching objectives, rotation responsibilities and curricula for each site of training can be found in Appendix H.

- Harborview Medical Center (see Appendix H1) is Seattle's "city hospital" and the region's referral center for trauma, burns, and emergency medical care. Fellows care for patients with both acute and chronic intestinal and liver diseases here, with a large number of cases of acute intestinal bleeding, acute abdominal pain, pancreatitis, alcoholic and viral liver diseases, and complications of AIDS. Harborview Medical Center's community clinics also care for immigrant populations, who provide fellows with exposure to problems in tropical and geographic medicine.

- The Puget Sound Veterans Affairs Health Care System (see Appendix H2) encompasses hospitals and clinics in both Seattle and Tacoma. Currently, fellows rotate only through the Seattle site, which provides both local primary care and regional tertiary care to military veterans. A full spectrum of gastrointestinal and liver disorders is encountered, from relatively straight-forward conditions (such as peptic ulcer) to complex problems (such as inflammatory bowel disease and pancreatobiliary disorders). In this population of veterans, many aged, there is a high prevalence of gastroesophageal reflux, viral hepatitis, alcoholic liver disease, and gastrointestinal malignancies. In addition, expertise is also available in gastrointestinal aspects of health care research and development, geriatrics, substance abuse, hematopoietic stem cell transplantation, and spinal cord injury.
- Pacific Medical Center (see Appendix H3) is a multi-specialty, regionally distributed system of clinics that is at the forefront of managed care. It is one of the larger providers of primary care to a diverse multicultural population throughout the region, and offers fellow trainees the methods of diagnosis and treatment of gastrointestinal illness in a managed care setting. Large numbers of ambulatory patients with a wide spectrum of illnesses are seen in consultation, along with a smaller number of acutely ill, hospitalized patients. It functions as a highly structured and efficient HMO, but staffed by physicians who are faculty members of the University of Washington.
- Seattle Cancer Care Alliance (see Appendix H4) is a multispecialty oncology center, that operates a large clinic, a day-hospital, and in-patient services. Fellows evaluate patients who are referred by consultations from Medical Oncology, Radiation Oncology, and Gynecologic Oncology. One of the services is the hematopoietic stem cell transplant program for patients with otherwise incurable malignancies. Fellows participate in the care of the patients at three times - before, during, and years after transplantation. Before transplant, patients present with intestinal and liver problems common to oncology patients everywhere, providing fellow trainees with in-depth exposure to these potentially lethal problems. During the peri-transplant period, patients experience a large number of liver and intestinal problems that are managed by the fellow. Long-term survivors have a high prevalence of chronic liver disease as well as immunologic abnormalities that predispose to intestinal problems.
- The University of Washington Medical Center (see Appendix H5-H7) is at the same time the region's largest tertiary care center for complex medical and surgical problems and a primary care provider, through its ambulatory care clinics and satellite clinic facilities. There are three separate clinical rotations for fellows here 1) general gastroenterology, 2) hepatology (including liver transplantation), and 3) advanced interventional endoscopy (for Level II training). In addition, faculty in the Departments of Pathology, Radiology, and Surgery provide fellows with both Level I and Level II training in their respective areas. Through each of these rotations, fellows gain experience with both common and complex medical problems, including organ transplantation, motility

disorders, liver disorders, pancreatic and biliary disease, premalignant disease, cancers, and inflammatory bowel disease.

With the exception of the Seattle Cancer Care Alliance, each of the University's teaching hospitals has outpatient gastroenterology/hepatology clinics in which fellows see patients throughout their training (see Section 2, Ambulatory Care Skills, below).

1.2.2. The faculty involved in training fellows. There are 27 faculty in the Division of Gastroenterology at our five teaching hospitals. The Interim Head of the Division is Toan D. Nguyen, M.D.. There are Associate Chiefs - David M. Hockenbery, M.D. (Scientific Affairs), and Jason Dornitz, M.D., M.H.S. (Educational Affairs). All of the faculty have been trained in gastroenterology and hepatology. In addition, these faculty have demonstrated expertise and focus in the field of hepatology, evidenced by election to membership in the American Association for the Study of Liver Diseases: Renuka Bhattacharya, M.D.; Robert Carithers, M.D.; Rahul Kuver, M.D.; Iris Liou, M.D.; George McDonald, M.D.; Elizabeth Morrison, M.D.; and Margaret Shuhart, M.D. The fellowship program is also enriched by the participation of the following faculty at the University of Washington whose primary appointment is in other departments: Nelson Fausto, M.D., Melissa Upton, M.D., Matthew Yeh, M.D., and Paul Swanson, M.D. in the Department of Pathology; Carlos Pellegrini, M.D., Professor and Head of the Department of Surgery; Charles Rohrmann, M.D., Carlos Cuevas, M.D., and Joel Lichtenstein, M.D., Professors of Radiology; Dennis Christie, M.D., Professor of Pediatrics; Karen Murray, M.D., Associate Professor of Pediatrics; Simon Horslen, M.D., David Suskind, M.D. and Ghassan Wahbeh, M.D., Assistant Professors of Pediatrics; David Gretch, M.D., Ph.D., Associate Professor of Laboratory Medicine; Kenneth Thummel, Ph.D. Professor of Pharmaceutics. Each of these faculty have a primary interest in gastroenterology and/or hepatology as well as strong links to the Division's research and education mission.

The faculty directory on the Division's website, www.uwgi.org lists each of the faculty enumerated above, provides a description of their training, gives current interests, and lists representative recent publications.

1.2.3. Mentoring of trainees. The University of Washington's Teaching Hospitals are based on a general medical ward model, where in-patients are cared for by physicians from the Departments of Medicine, Surgery, Neurology, Rehabilitation Medicine, and so on. With the exception of the Liver Transplantation program at the University of Washington Medical Center, where fellows have primary care responsibilities, gastroenterology fellows provide patient care for hospitalized patients with gastrointestinal and hepatobiliary problems only on a consultation basis. That is, physicians who are primary care providers will request gastroenterology and hepatology consultations for their patients. Fellows in gastroenterology have first contact with patients and their physicians, obtaining detailed histories, reviewing past records, performing a physical examination, and formulating a problem-oriented assessment. This assessment is done independently and encompasses the synthesis of data into working diagnostic hypotheses, a plan to test the validity of the hypotheses with additional tests (if necessary), and the formulation of a treatment plan.

The fellow then presents this information to his or her attending physician, a member of the faculty in Gastroenterology, who critically reviews the validity of the fellow's observations, the ensuing logical deductions, and the plan for further tests. This is an intensely Socratic process whose depth and complexity varies with the complexity of the patient's illness. The fellow will then explore the medical literature relevant to the patient's illness, rework the initial formulations, and arrive at a diagnostic and treatment strategy, under the tutelage of the attending Gastroenterologist. The fellow has primary responsibility for communicating these finalized ideas to the physicians who care for that patient and to the patient. Attending gastroenterologists review the fellow's written consultation notes as well as his or her communication skills, and provides additional commentary and signatures under each consultation note.

This mentoring process covers every patient seen by a fellow, but the intensity of review changes over time. Early in fellowship, the scrutiny by the faculty is more intense. When fellows have demonstrated competence in dealing with certain patient problems, they are allowed greater independence, such that by the completion of clinical training they are ready to become effective consultants themselves. During their three years of fellowship, fellows are exposed to the teaching styles and knowledge of a broad range of faculty. There are currently 27 members of the faculty and 16 members of the clinical faculty who serve as mentors for our fellows during their clinical training. The faculty endeavors to pair a given fellow with as many different attending gastroenterologists as possible during the course of fellowship.

A similar mentoring system of teaching is in place in the Division's ambulatory care clinics, as described in Section 2 below.

1.2.4. Increasing responsibility commensurate with experience. At the start of fellowship, all physicians in our program have completed residency training in Internal Medicine, certified by their program directors. They are thus fully qualified to make independent medical decisions regarding patient care. During the fellowship, physicians gain in-depth, specialized knowledge and experience in the fields of gastroenterology and hepatology. The faculty evaluates the growth of each individual fellow and loosens the reins of supervision when appropriate. As fellowship proceeds, fellows become progressively more independent evaluating complex patients, in performing triage functions, and in planning complex endoscopic and surgical procedures, for example. In the ambulatory care setting, fellows become progressively more independent in their management of patients. However, for medical-legal and financial reasons, no patient seen by a fellow escapes the review of an attending physician. The intensity of this review changes with time, as the trust and respect that the faculty has for the medical knowledge and judgement of individual fellows grows.

1.2.5. Exposure of fellows to disparate disease processes.

- diseases of the esophagus, including:
motility disorders

swallowing disorders
congenital malformations
malignancy and pre-malignant conditions
benign neoplasms
infections
esophageal varices
trauma, medication, and radiation injury
acid-peptic reflux and its sequelae

- diseases of the stomach and duodenum, including:
 - motility disorders
 - ulcers
 - non-ulcer dyspepsia
 - malignancy
 - benign neoplasms
 - infection
 - post-surgical conditions
 - congenital malformations

- diseases of the small intestine, including:
 - congenital malformations
 - motility disorders including pseudo-obstruction and diverticula
 - mucosal diseases leading to malabsorption
 - disaccharidase deficiency syndromes
 - lymphatic obstruction
 - malignancy
 - obstruction syndromes
 - infections
 - inflammatory bowel disease
 - vascular malformations

- nutritional disorders, including:
 - malabsorption syndromes
 - micronutrient deficiency
 - genetic diseases
 - disease-related cachexia
 - protein-calorie malnutrition

- diseases of the pancreas, including:
 - malignancy, including hormone-secreting tumors
 - congenital malformations
 - acute pancreatitis
 - chronic pancreatitis
 - pancreatic pseudocysts
 - pancreatic insufficiency

- diseases of the hepatobiliary system, including:
 - viral infections
 - fungal, bacterial, and parasitic infections
 - congenital disorders
 - cirrhosis and its sequelae
 - acute and chronic liver failure
 - diseases of iron and copper metabolism
 - alcoholic liver disease
 - fatty liver disorders
 - toxic liver injury
 - malignancy
 - vascular diseases involving the liver
 - gallstones
 - cholecystitis
 - biliary sphincter disorders
 - cystic duct obstruction
 - hepatic and common bile duct obstruction, benign and malignant
 - immunological liver injury
 - cholangitis and its sequelae
 - sclerosing cholangitis
 - post-surgical conditions
 - metabolic disorders

- diseases of the colon, including:
 - motility disorders and their sequelae
 - functional disorders
 - inflammatory bowel disease
 - vascular malformations
 - infections
 - diverticular disease
 - congenital disorders
 - malignancy and pre-malignant disorders
 - radiation and chemotherapy-induced injury

- anorectal diseases, including:
 - fissures, hemorrhoidal vein enlargement, and fistulas
 - motility disorders and their sequelae
 - abscesses
 - viral infections
 - malignancy and pre-malignant conditions

- involvement of the gastrointestinal tract and hepatobiliary system in these cohorts of patients:
 - HIV infection
 - immunosuppression (congenital or acquired)

immunological disorders (including graft - vs. - host disease)
functional bowel disorders
malignancy involving the intestinal tract
short-bowel syndrome
gastrointestinal motility disorders
endocrine disorders (e.g., diabetes mellitus)
pregnancy

1.2.6. Knowledge about disease processes. Fellows are expected to add to their knowledge of pathophysiology and diseases processes in three ways: First, by a schedule of reading about disease in textbooks and monographs (see Appendix C); second, by attendance at Fellows' Seminars (see Appendix D), Journal Club (See Appendix E), lectures, and national meetings (the Division's fellows attend at least one national meeting yearly, usually the annual meeting of either the American Association for the Study of Liver Diseases, Digestive Diseases Week, or the American College of Gastroenterology); and third, by directed reading relevant to the patient problems at hand. The latter method is the most likely to lead to knowledge that is retained for life, as it is tied to a living, breathing patient whose real time problems have an immediacy and relevance that cannot be matched by reading in the abstract. The faculty plays a role here in directing a fellow's reading, first toward textbooks and monographs, then to the medical literature. Although search engines for medical literature have become remarkably efficient and user-friendly, the faculty plays an important role in helping fellows read the literature critically. The Division's Journal Club addresses this educational need by assigning fellows to each of the thirteen Journal Club topics, in rotation. Each topic is managed by one of our faculty with expertise in that area, along with other members of the faculty with like interests (see Appendix E). Journal Club meets twice monthly, covering two to three subtopics - one of which is researched and presented by a fellow, under the supervision of that topic's faculty leader. Over the course of a three year fellowship, fellows will attend 72 Journal Club sessions, covering up to 216 subtopics - approximately 20 of which will be discussed by any given fellow. A critical review of fellow performance by the faculty member to whom the fellow is assigned and by the faculty at large during Journal Club presentations provides further feedback about the fellow's ability to critically read the literature.

1.3. Minimum requirements for assurance of competence. All fellows will complete a minimum of 18 months of Level I clinical training, consisting of both inpatient and outpatient rotations, allowing exposure to patients with a spectrum of acute and chronic diseases. Approximately 30% of this training will be in the care of patients with liver disease. For fellows whose career goals consist primarily of patient care, an additional 12 months of training will be spent gaining experience in general consultative gastroenterology as well as Level II training in specialized areas of gastroenterology and hepatology as desired.

1.4. Assessment of competence. Fellows rotate through the University of Washington's Teaching Hospitals and clinics in one or two month blocks, except for Hepatology/Liver Transplantation at the University of Washington Medical Center, which is a three-month

rotation. The attending physician for each rotation evaluates a fellow's abilities according to the following six competencies: 1). **Patient care**, including making appropriate medical decisions, as well endoscopy procedural technical ability 2). **Medical knowledge**, including knowing the established evidence for medical decisions 3). **Practice Based Learning & Improvement**, including daily attending rounds, M&M conferences, combined radiology-gastroenterology-surgery conferences and journal clubs, as well as self-directed learning and reading 4). **Interpersonal and communication skills**, including exchange of information with patients, colleagues, staff and attendings 5). **Professionalism**, including their level of accountability and ethics and 6) **Systems based practice**, including M&M conference, quality improvement projects, grand rounds presentations, journal clubs, performing literature searches and use of other on-line resources. At the beginning of each rotation, the attending physician orients the fellow to the educational goals, patient care responsibilities and educational resources available, and at the end of the month meets with the fellow to give feedback about his or her performance during a discussion session, including recommendations for improvement. Appendix E is the form that our faculty uses to evaluate fellow performance at the end of each month's clinical rotation. Fellows have the opportunity to present their knowledge at Journal Club (where they present thrice yearly), Research in Progress seminars (see Section 5, below), and Morbidity, Mortality, and Management conferences (where they appear once monthly). The faculty meets quarterly to systematically review the performance and competence of individual fellows, based on monthly evaluations by attending physician and on presentations.

At the end of each year of fellowship, fellows undergo a written examination (the American Gastroenterological Association Fellows' Examination) that covers the fundamentals of gastrointestinal and hepatobiliary medicine and pathophysiology.

2. Ambulatory care skills

2.1. Primary objectives.

- For fellows to become skilled in the care of outpatients with gastrointestinal and hepatic problems. Specifically, to hone their skills of history-taking and physical examination, to become cognizant of psychosocial aspects of illness, to coordinate care with other care providers, to experience longitudinal care of patients with chronic disease, and to learn aspects of geriatric medicine as they affect the gastrointestinal system.
- To become familiar with different health care delivery models and delivery of cost-effective yet high standard, medically effective care.

2.2. Methods of instruction.

2.2.1. Sites of training (Table 1). The outpatient clinics at each of the teaching hospitals differ, and at some hospitals there are a number of different clinics, each served by different members of the faculty.

- At Harborview Medical Center, a weekly clinic in general gastroenterology is supervised by Dr. Surawicz with additional attendings, Drs. Shuhart, Strate, and Carlson. These clinics evaluate new patient referrals as well as patients with chronic gastrointestinal illnesses and those recently discharged from hospital.
- At the Seattle division of the Puget Sound Veterans Health Care System, both gastroenterology and hepatology patients are seen in a weekly clinic, with particular emphasis on geriatric and stress-related illness, in addition to the care of a large number of patients with other gastrointestinal problems. During these sessions, a faculty member is assigned, on a rotating basis, to review new and follow-up cases with trainees (students, residents, and fellows) and to provide case-based teaching. A 30-minute didactic session on a topic related to ambulatory care gastroenterology precedes each clinic.
- Pacific Medical Center is at the hub of a large number of community based clinics and functions as an HMO-based teaching model. There are daily ambulatory clinics in gastroenterology and hepatology; most of the care provided here is in the outpatient setting. There is a weekly teaching clinic for fellows and residents supervised by the faculty in Gastroenterology. A wide variety of “bread and butter” intestinal and liver problems are seen and followed. Patients with difficult motility problems are also seen in these clinics.
- The Seattle Cancer Care Alliance does not have a separate Gastroenterology/Hepatology continuity clinic, but fellows see ambulatory patients with cancer-related intestinal and liver problems in a large multispecialty outpatient department/day hospital, as part of their monthly rotations here. Fellows are also involved in screening University of Washington

Physicians Network patients for colorectal cancer. There is a clinic specializing in care and management of patients felt to be at high risk for developing gastrointestinal cancers, where fellows may see patients with hereditary cancer syndromes.

- The University of Washington Medical Center's outpatient clinics encompass Level I and II training. Patients with common gastrointestinal and liver conditions as well as those with complicated diagnostic and therapeutic dilemmas are seen. Patients with end-stage liver disease, complicated inflammatory bowel disease, and functional bowel disorders are particularly prevalent. Outpatient experiences in Hepatology include four clinics in general hepatology and two multidisciplinary liver transplant clinics weekly

Table 1. Ambulatory Care Clinics for fellowship training

Institution/Clinic	Director	Level of Training	Number of patients yearly	
			New	Follow-Up
Harborview Medical Center				
1. Gastroenterology Clinic	Surawicz	I	275	675
2. Liver Clinic	Shuhart	I and II	125	225
Puget Sound Veteran's Affairs Health Care System (Seattle Division)				
1. Gastroenterology Clinic	Nguyen	I	500	2000
2. Hepatology Clinic	Morrison	I		
Pacific Medical Center				
1. Gastroenterology Clinics	Krishnamurthy	I and II	1800	2400
University of Washington Medical Center				
1. General Gastroenterology	Kuver	I	600	1200
2. Pancreaticobiliary	Saunders	II	400	150
4. Hepatology Clinic	Carithers	I and II	180	380
5. Liver Transplant	Carithers	II	160	975
6. IBD	Lee, Scott	I and II	200	400

2.2.2. Mentoring of trainees. The Director of each clinic is an attending gastroenterologist. Fellows are closely supervised by assigned attending physicians, and all patient care decisions are reviewed with these attendings. Similar to the mentoring process that goes on in the hospital, the mentoring in our outpatient clinics is a Socratic process, particularly in the first year of fellowship. Each clinic also has a period during which all physicians and medical students in attendance discuss the day's cases and the challenges presented. As fellowship progresses, fellows are given increasing independence in managing outpatient problems.

2.2.3. Knowledge about ambulatory care aspects of gastroenterology/hepatology and nutrition practice. Because most of gastroenterology and hepatology is practiced in the ambulatory setting, the knowledge base of the field and its diseases is as described in

Sections 1.2.5. and 1.2.6. Special emphasis is given to psychosocial aspects of gastrointestinal illnesses and to long-term goals of patient care, particularly in the areas of nutrition and disease prevention. Fellows are involved in care of both men and women at all clinics, and therefore learn aspects of gastroenterology specific to women.

Because our clinics care for patients who are on long-term tube feedings (usually via percutaneous endoscopic gastrostomy or jejunostomy tubes), fellows become expert in the management of nutritional problems. Our charge in this area also extends to patients with short bowel syndrome, small intestinal diseases, and motility disorders who may require home total parenteral nutrition to sustain life. Fellows work closely with colleagues in the Division of Endocrinology, Metabolism, and Nutrition and with Clinical Dieticians in managing these complex patients. Patients with pre-malignant diseases of the intestinal tract are a major focus of our outpatient clinics, as many cancers arise from mucosa that can be recognized as having the potential for malignant transformation. Other common ambulatory care problems include those experienced by patients with gastroesophageal reflux disease, inflammatory bowel disease, irritable bowel syndrome, chronic dyspepsia, chronic viral hepatitis, and AIDS. Clinics in Hepatology follow patients who have received liver transplants. At the Seattle Cancer Care Alliance, long-term marrow transplant survivors are followed by fellows in gastroenterology for their chronic hepatitis and chronic graft -vs- host disease. Patients with hereditary predisposition to gastrointestinal cancers are seen in a specialized clinic at the Seattle Cancer Care Alliance.

Through the course of three years' rotations at the Division's ambulatory care clinics [which, like the hospital populations, differ markedly in their demographics and disease mix], fellows are exposed to virtually all of the clinical problems they are likely to encounter in the practice of gastroenterology and hepatology. Perhaps more importantly, they learn an approach to the care of ambulatory patients from experienced clinicians, an approach that will serve them well throughout their careers.

2.3. Minimum Requirements. Each fellow will spend one half-day weekly in a clinic setting for three years. In the first and second years, the clinics attended will be in general gastroenterology/hepatology. In the third year, fellows may opt for subspecialty clinics in lieu of general clinics (see Table 1). Fellows attend specific clinics for a minimum of 6 month blocks of time. In addition, several monthly inpatient rotations have clinic attendance by fellows as part of the experience, for example, the Hepatology/Liver Transplantation rotation at UWMC, and the rotations at Pacific Medical Center and the Seattle Cancer Care Alliance. Fellows spend 25-40% of their time in clinical training in ambulatory care settings. Ambulatory patients also make up the majority of patients who undergo endoscopy at each of the Teaching Hospitals.

2.4. Assessment of competence. Fellow performance is assessed by the attending gastroenterologist for each patient presented. A summary of each fellow's performance in the clinic setting is given to the faculty at its quarterly review of fellow progress. Fellows are given immediate feedback at the time of their clinics, and if there are substantial concerns expressed at the faculty review, specific suggestions are made for improvement. The attending physician for each rotation evaluates a fellow's abilities according to the

following six competencies: 1). **Patient care**, including making appropriate medical decisions, as well endoscopy procedural technical ability 2). **Medical knowledge**, including knowing the established evidence for medical decisions 3). **Practice Based Learning & Improvement**, including attending rounds, M&M conferences, and journal clubs 4). **Interpersonal and communication skills**, including exchange of information with patients, colleagues, staff and attendings 5). **Professionalism**, including their level of accountability and ethics and 6) **Systems based practice**, including M&M conference, grand rounds presentations, journal clubs, performing literature searches and use of other on-line resources. At the beginning of each clinic assignment, the attending physician orients the fellow to the educational goals, patient care responsibilities and educational resources available, and at the end of the month meets with the fellow to give feedback about his or her performance during a discussion session, including recommendations for improvement.

3. Knowledge base of anatomy, physiology, nutrition, biochemistry, cell biology, genetics, immunology, molecular and cell biology, and pharmacology relevant to gastroenterology and hepatology.

3.1. Primary objective. To have a working knowledge of the structure and normal function of the intestinal tract, pancreas, and hepatobiliary system, and their neural and humoral control mechanisms.

3.2. Methods of instruction. The faculty selects as trainees physicians who have evinced overall knowledge in these areas by performance on standard examinations (USMLE I, II, and III) and who have successfully completed residency training in internal medicine. During fellowship, there is a focus on gastrointestinal and hepatic aspects of human physiology.

3.2.1. Self-paced reading curriculum. All fellows are expected to have a working knowledge of normal human anatomy, physiology and nutrition gleaned from reading. Beginning fellows are given the syllabus prepared by the faculty for University of Washington Human Biology 551, the Gastrointestinal System, a course that is given yearly to University of Washington medical students. With this as a platform for further learning, fellows then read in greater depth, relying on recent textbooks, monographs, and reviews in medical and scientific journals. Appendix C lists the recommended textbooks that the faculty has selected for reading.

3.2.2. Didactic lectures. These basic science principles are covered by lectures by experts in these fields, either as part of the Division's program of Visiting Professorships or as lectures in the Fellows' Seminars series (see Appendix D). In depth lectures on the pharmacology of sedatives and the clinical practice of conscious sedation are given by faculty from the Department of Anesthesiology and the Division's senior faculty. In addition, fellows attend seminars and lectures sponsored by other Divisions and Departments in the Schools of Medicine and Public Health that are relevant to gastrointestinal, hepatobiliary, and pancreatic physiology. Examples include the Science in Medicine series, Medicine Grand Rounds, Surgery Grand Rounds, Pathology Grand Rounds, and division-level presentations throughout the School of Medicine. In addition, fellows on the Physician/Scientist pathway attend seminars in the departments of their scientific mentor in either a basic science discipline or the School of Public Health (see Section 5, below). All of the Journal Club topics (Appendix E) encompass the knowledge base of their respective fields, and fellows are expected to review and present the literature from basic science as well as clinical journals.

3.2.3. National meetings/courses. All fellows attend at least one scientific meeting in the gastroenterology and hepatology fields yearly. Fellows on the Physician/Scientist pathway may also attend meetings and workshops in their areas of laboratory interest. At the annual meetings of the American Gastroenterological Association and American Society for Gastrointestinal Endoscopy (Digestive Diseases Week), the American College of Gastroenterology, and the American Association for the Study of Liver Diseases, a

substantial proportion of the respective Postgraduate Courses, State-of-the-Art lectures, and research presentations are devoted to the scientific underpinnings of the field. Over half of the research presentations are given at poster sessions, which allow fellows to discuss with experts in the field a wide variety of physiologic and cell biology-related topics.

3.3. Minimum requirements. All fellows are expected to read the syllabus for University of Washington Human Biology 551 (Gastrointestinal System) as well as the sections that cover physiology and cell biology in journals and in one of the recommended textbooks in gastroenterology and one in hepatology. Attendance at the Division's Journal Clubs, Research in Progress Seminars, lectures by Visiting Professors, and Fellows' Seminars is mandatory. All fellows attend at least one national scientific meeting yearly.

3.4. Assessment of competence. The faculty probes the depth and breath of basic science knowledge in several settings - during clinical rounds at each of the University's hospitals and at Journal Club and Research in Progress seminars. First year fellows are formally tested on the material covered in Human Biology 551 in the latter half of the first year, using an essay format identical to that used for medical student evaluation. All fellows are required to take the in-service examination produced by the American Gastroenterological Association. The attending physician for each rotation probes each fellow's knowledge of basic science in relation to gastroenterology in according to the six core competencies: 1). **Patient care**, including knowledge of basic science to make appropriate clinical decisions 2). **Medical knowledge**, including knowledge of the basic science that underlies medical decisions 3). **Practice Based Learning & Improvement**, including discussion of basic science on daily attending rounds, at M&M conferences, and journal clubs 4). **Interpersonal and communication skills**, including exchange of information with patients, colleagues, staff and attendings 5). **Professionalism**, including their level of accountability and ethics and 6) **Systems based practice**, including grand rounds presentations, journal clubs, performing literature searches and use of other on-line resources.

4. Technical aspects of gastroenterology/hepatology clinical practice

4.1. Primary objectives.

- For the fellows to be skilled in the diagnostic and therapeutic procedures of gastroenterology and hepatology.
- To have a working knowledge of the indications, contraindications, complications of, and economic impact of these procedures.
- To understand the indications, contraindications, and safe and appropriate use of moderate sedation for gastrointestinal endoscopy procedures.

4.2. Methods of instruction. As in the methods for teaching the clinical care of patients (see Section 1, above), instruction in the technical, procedural aspects involves a mentoring system. Fellows are given graduated responsibility and independence in performing endoscopic procedures. All endoscopic procedures are directly supervised by attending physicians, who provide instruction in technical aspects of the procedure as well as interpretation of findings and development of subsequent management plans. In some ways, the fellows in training are apprentices to attending physicians who are skilled at their craft.

4.3. Minimum Requirements. See Tables 2 and 3.

4.3.1. Level 1 training. All fellows receive instruction in endoscopy, gastrointestinal motility, and liver biopsy and paracentesis. Although liver biopsy is not required for level 1 training, our fellowship offers substantial training in this procedure in the Hepatology/Liver Transplantation Rotation at UWMC.

Table 2. Level 1 training and the threshold for assessing competence*

	Number of Procedures
Gastrointestinal endoscopy	
EGD (general)	130
EGD with treatment of non-variceal bleeding	25
EGD with treatment of variceal bleeding	20
Flexible sigmoidoscopy	30
Colonoscopy (general)	140
Colonoscopy with snare polypectomy	30
PEG placement	15
Esophageal dilation	20
Capsule endoscopy	25
Motility	
Observe esophageal manometry and pH probe studies	5
Interpret esophageal manometry tracings (from didactic library)	10

Observe anorectal motility studies	5
Hepatology	
Percutaneous liver biopsy	20
Paracentesis	20

*The Gastroenterology Core curriculum, Third Edition – May 2007;
<http://www.gastro.org/wmspage.cfm?parml=72>

Endoscopy instruction begins with didactic lectures that cover the design and function of the instruments themselves, along with their maintenance and sterilization. The principles of electrocautery, heater probe, injection, argon plasma coagulation, and hemoclips are covered in detail with reference to their use and limitations in endoscopic procedures. The Fellows' Seminars series addresses the theoretical and practical basis of measuring gastrointestinal and anorectal motility. Techniques of gastrointestinal mucosal and liver biopsy are discussed, with particular emphasis on biopsy technique and location as well as tissue fixation, orientation, sectioning, and interpretation. At the beginning of each fellow's training, the faculty presents a series of lectures on the endoscopic management of gastrointestinal bleeding, including reviews of recent controlled clinical trials of therapeutic methods to control bleeding at endoscopy. A lecture is provided on the principles and practice of conscious sedation, the pharmacology of the drugs involved, and management of complications. More detailed coverage of the topic of training fellows in the use of conscious sedation can be found below (see Section 4.3.3).

Fellows then begin the process of learning these procedural skills, under the direction of a member of the faculty in Gastroenterology. Emphasis is placed on patient assessment prior to the procedure to determine whether special needs are present. Each of the five teaching hospitals carries out Level I endoscopic procedures, and the University of Washington Medical Center has a gastrointestinal motility laboratory. The skills of upper gastrointestinal endoscopy are taught in steps - conscious sedation, intubation techniques, and endoscopic anatomy are demonstrated first by the faculty physician, then by the fellow under the direct supervision of the attending. When sufficient skill has been demonstrated, the fellow is introduced to the methods of mucosal biopsy; hemostasis using electrocautery, heater probe, injection, or endoscopically placed clips; variceal sclerotherapy; band ligation of varices; endoscopic balloon dilation of strictures; esophageal dilation; methods of foreign body removal; and PEG placement. Colonoscopy skills are also taught in stages, the more difficult procedures following mastery of the basic endoscopic skills. When the fellow has demonstrated sufficient skill, the techniques of snare polypectomy and hemostatic procedures in the colon are taught.

In some ways the most difficult aspect of endoscopic skills to teach is the recognition of specific disease processes at endoscopy, as many of the diagnostic and therapeutic maneuvers done through an endoscope are driven by the gross appearance of the lesion. There is no substitute for actually seeing examples of a wide range of gastrointestinal disorders, to enhance a fellow's ability to recognize mucosal pathology. Table 2 lists the minimal number of procedures that a fellow must perform for his or her technical competence to be assessed. The faculty feels strongly that fellows must perform many

more procedures than this in order to recognize a wide range of pathological conditions, especially less common conditions. Our teaching hospitals provide fellows with such a spectrum of patient illness that they become expert in endoscopic recognition of not only common conditions but also less common illness, for example, geographic and tropical medicine at Pacific Medical Center and Harborview Medical Center; AIDS related illness at Harborview Medical Center; complex oncology problems at the UWMC and Seattle Cancer Care Alliance; hematopoietic stem cell transplant-related illness at the SCCA; and unusual referral cases at the UWMC. In addition, fellows are encouraged to review the major color atlases of gastrointestinal endoscopy (see Appendix C). Unusual cases are also reviewed for the entire Division at the monthly Morbidity/Mortality/Management conference.

All fellows are expected to be able to interpret esophageal and intestinal motility tracings, but the actual execution of these studies and a mastery of the instrumentation involved is a Level II skill (see below). Fellows on rotation at the UWMC are expected to observe motility procedures while on clinical rotation at this hospital. Archival motility tracings are available for review, and the Fellows' Seminars include coverage of upper gastrointestinal and anorectal motility. Textbooks and monographs (see Appendix C) are additional source material.

Liver biopsy and paracentesis are taught in the course of patient care at each of the teaching hospitals. In addition, fellows on the UWMC's Hepatology rotation gain considerable experience in liver biopsy on the Liver Transplant Service, including a weekly liver biopsy conference chaired by colleagues from the Department of Pathology. On Seattle Cancer Care Alliance rotations, fellows observe transfemoral and transjugular biopsy methods and measurement of hepatic venous pressure gradients, done by faculty in the Department of Radiology. Transhepatic stent placements are also done by Radiology faculty at each teaching hospital.

Although fellows are not trained radiologists, they are expected to know the methods of imaging relevant to gastroenterology and hepatology. Drs. Charles Rohrmann and Joel Lichtenstein, Professors of Radiology, deliver 12 hours of instruction on these topics in the Fellows' Seminars series, in addition to being topic leaders of the Radiology section of Journal Club. Fellows review all imaging tests done on their patients with attending radiologists and are expected to have a working knowledge of the imaging literature (see Appendix C). Fellows on the Transplant Hepatology rotation also attend a weekly radiology conference in the Department of Radiology

4.3.2. Indications, contraindications, outcomes. The Division places emphasis on a fellow knowing when a given procedure is indicated, what the alternatives are, and what the contraindications are. The gastroenterology and endoscopy literature and the attending gastroenterologist's experience are the primary sources of this knowledge. Guidelines on the management of anticoagulation and use of prophylactic antibiotics are carefully reviewed, with particular reference to the criteria published by the American Society for Gastrointestinal Endoscopy. A recent literature has applied the methods of epidemiology

to the study of the outcomes of clinical care. Our faculty has several members with advanced training in epidemiology and outcomes research. These faculty guide the fellows through the literature and methods of outcomes research, through quarterly Fellow's Seminars on outcomes research and methods and the personal mentoring of fellows who attending clinics.

4.3.3. Training of fellows in patient monitoring, sedation, and analgesia. The faculty has designed a curriculum for our fellows that is based on guidelines published by the American Society of Anesthesiologists (American Society of Anesthesiologists Task Force. **Practice Guidelines for sedation and analgesia by non-anesthesiologists.** A report by the American Society of Anesthesiologists Task Force on Sedation and Analgesia by Non-Anesthesiologists. *Anesthesiology* 2002;96:1004-17) and the American Society for Gastrointestinal Endoscopy (Waring JP, Baron TH, Hirota WK, et al; American Society for Gastrointestinal Endoscopy, Standards of Practice Committee. **Guidelines for conscious sedation monitoring during gastrointestinal endoscopy.** *Gastrointestinal Endoscopy* 2003 Sep;58(3):317-22). The ability to provide sedation and analgesia safely and effectively and to ensure patients' clinical stability by appropriate monitoring during gastrointestinal endoscopy are skills that gastroenterology fellows must develop. At present, the vast majority of patients undergoing gastrointestinal endoscopy receive moderate sedation. Cardiopulmonary complications of endoscopy, while uncommon, are likely due in large part to sedative and analgesic medications. Appropriate training in the administration of these medications is thus essential to the provision of patient safety and comfort before, during and after each endoscopic examination. Training in patient monitoring and the administration of sedatives and analgesics occurs within the context of a global training program in gastrointestinal endoscopy. Much of the training process occurs within the endoscopy suite, with fellows learning appropriate sedation and monitoring practices while performing endoscopic procedures under the close supervision of an expert faculty mentor. Clinical training is complemented by a yearly comprehensive didactic review of pharmacology, cardiopulmonary physiology, principles of anesthesiology and other relevant areas. A monthly Morbidity/Mortality/Management Conference will review complications. The components of training are enumerated below:

1. Fellows must be able to provide the patient with adequate pre-procedure education regarding the sedation/analgesia aspects of the examination.
2. Fellows performing endoscopy must obtain appropriate patient information in the pre-procedure clinical assessment (history and physical). It should be stressed that this initial evaluation may identify cases, such as uncooperative patients, patients likely to aspirate, or patients with instability due to co-morbid conditions, where the use of general anesthesia and endotracheal intubation as an alternative to conscious sedation and analgesia constitutes the safest and most prudent approach. In addition, information about patient medications before endoscopy may influence the choice of sedative or analgesic medications and their dosing.

3. Fellows will be instructed in the precise definitions of the various levels of sedation, such that they understand both the physiologic characteristics and the clinical and medico-legal implications of moderate sedation, deep sedation, and general anesthesia.
4. Fellows will develop a thorough understanding of the pharmacology of all drugs used for sedation/analgesia, including mechanisms of action; appropriate dosing intervals; the potential for drug-drug interactions; the effects of patient comorbidity, tolerance for opioids and benzodiazepines, and patient age on the process of sedation, and the rational usage of reversal agents. The use of careful incremental drug dosing, titrated to achieve specific clinical end-points, will be taught by Division of Gastroenterology faculty with extensive experience in moderate sedation.
5. Endoscopists in training must understand basic cardiopulmonary physiology and pharyngeal anatomy and be able to establish and maintain an adequate airway.
6. Fellows must comprehend the essential role of the well-trained gastrointestinal nurse or assistant in providing optimal patient monitoring and must be aware of the circumstances in which additional personnel are required, such as during ERCP and complex therapeutic interventions. During these complex procedures, one assistant should remain primarily focused on monitoring the patient. Consultation with and assistance of colleagues from the Department of Anesthesiology should be readily sought.
7. Clinical parameters to be monitored during the procedure and appropriate standards of intra-procedure documentation must be understood. The fellow, who initially will be focused on mastering the technical basics of endoscopy, must appreciate that, although the assistant plays an essential role, ultimate responsibility for all aspects of the monitoring process rests with the endoscopist.
8. The fellow must learn a rational approach to the provision of supplemental oxygen during endoscopic procedures.
9. The appropriate role of automated monitoring devices should be conveyed, including routine pulse oximetry and selective employment of continuous electrocardiographic and blood pressure monitoring. It is essential that fellows appreciate that the use of pulse oximetry and other monitoring devices, such as end-tidal CO₂ measurements, do not replace direct clinical assessment and observation of ventilatory function, in particular given the potential for severe hypoventilation and hypercapnia in patients who receive supplemental oxygen.
10. Fellows should understand the significant risk of post-procedure complications of sedation and analgesia and learn appropriate standards of post-procedure monitoring and predischarge assessment.

11. Fellows should be familiar with antagonistic agents of those sedative and analgesic drugs in common use, including their pharmacology, duration of action, and indications. Fellows should also be knowledgeable about the necessity for monitoring of patients following use of these antagonists to detect spontaneous re sedation and unexpected respiratory depression.
12. Fellows who care for pediatric patients at the Seattle Cancer Care Alliance will require special training and experience in sedation and monitoring techniques beyond that needed for endoscopy in adults, due in part to highly unpredictable drug metabolism in children and a much greater reliance on deep sedation and general anesthesia. The curriculum for fellows will reflect established guidelines pertaining to the monitoring of children during procedures.

4.3.4. Level 2 training. Selected fellows receive training in advanced therapeutic endoscopy and motility procedures, according to their interest and aptitude. Training in these advanced procedures proceeds similarly to training for level 1 procedures. Minimum thresholds for assessing competence are shown in Table 3.

Table 3. Training and the threshold for assessing competence*

	Minimum Number of procedures before competence can be assessed
Motility	
Esophageal manometry	50
pH-probe studies (including 24 h. tests)	25
Anorectal manometry	30
Anal sphincter biofeedback training	10
Gastrointestinal endoscopy	
ERCP - diagnostic	200
ERCP - therapeutic	50
Endoscopic ultrasound	150
Endoscopic plasma coagulator or laser therapy	20
Luminal stent placement	10
Enteroscopy	20
Liver biopsy interpretation	40

*The Gastroenterology Core curriculum, Third Edition – May 2007;
<http://www.gastro.org/wmspage.cfm?parm1=72300>

4.4. Assessment of competence in gastroenterology and hepatology procedures. As each procedure carried out by a fellow is directly observed by a member of the faculty, there is immediate feedback to the fellow about technique and suggestions for improvement. At the end of each month of clinical training, the attending physician evaluates the fellow's technical performance alongside his or her cognitive and communication skills. The entire faculty reviews the fellow performance quarterly. Faculty assessments at the end of each monthly rotation include specific evaluation of fellows' knowledge of the indications and contraindications to procedures; technical competence; recognition and interpretation of abnormalities; and ability of incorporate findings into post-procedure management.

5. Research Training

5.1. Primary objectives. Under this heading, the objectives of the faculty diverge, as we have a two-track fellowship with regard to research training. During the selection process, fellows are asked to choose either the physician-scientist or Clinician-Teacher pathways, and enter the fellowship with a specific understanding of the expectations for research training specific to each pathway.

- For fellows who are chosen for the Physician-Scientist pathway, the objective is to endow fellows with either laboratory-based skills or public health sciences skills to enable them to seek careers as academic physicians in these areas. Fellows in this pathway receive four years of training in our fellowship, divided between research and clinical instruction.
- For fellows on the Clinician-Teacher pathway, there are two objectives: First, to instruct all fellows in the design, execution, and analysis of clinical research; and second, to prepare selected fellows for careers in academic medicine as clinical investigators. Fellows in this pathway receive three years of training in our fellowship, with the focus being upon clinical instruction.

The rationale for a two-track fellowship is as follows: The Division of Gastroenterology revised its fellowship program in 1994 to reflect the changes in academic medicine in the U.S.A. and the changes in the faculty code at the University of Washington School of Medicine. Traditionally, medical school faculty have aspired to excellence using as a model the “three-legged stool” of academic medicine, that is, teaching, research, and clinical care. In the late 1970s it became apparent that academic physicians who were involved in laboratory-based research could no longer be competitive for research grants while allotting 30-40% of their time to research. Dr. William Kelley, then Professor and Head of the Department of Medicine at the University of Michigan, revised his school’s faculty code to reflect the need for protected time for physicians who spent the majority of their time in research endeavors, while at the same time rewarding physicians whose duties involved patient care, teaching, and clinical research. Dr. Kelley’s revisions in the faculty code at Michigan (summarized in Kelley WN, Stross JK. Faculty tracks and academic success. *Annals of Internal Medicine* 116:654-659; 1992) were adopted at the University of Washington School of Medicine and at many medical schools in the U.S.A. The faculty in the Division of Gastroenterology are training fellows who have skills as either Physician-Scientist academic physicians, Clinician-Teacher academic physicians, or Physician Specialists in non-academic, practice settings.

5.2. Methods of instruction. The two pathways are similar in their assignment of mentors for fellows and in their periodic review of fellow performance, but differ in the nature of the research undertaken, in the protected time made available for research, and in the funding of research.

5.2.1. Physician-Scientist Pathway. The first year of fellowship is largely taken up with clinical rotations through our teaching hospitals, but during this year fellows on this

pathway meet with members of the Physician-Scientist Review Committee to finalize decisions about a) a research mentor; b) a research area of interest; c) medium- and long-range goals about application of research methods to gastroenterology and hepatology. The Division's Physician-Scientist Review Committee is composed of Toan Nguyen, M.D.; Brian Reid, M.D., Ph.D.; George McDonald, M.D.; and David Hockenbery, M.D. Research mentors for fellows on the Physician-Scientist Pathway include both faculty within the Division of Gastroenterology and faculty in other Schools and Departments at the University of Washington. Appendix F gives details of the broad areas of research interest that are available for fellows along with the individual laboratory heads under whom fellows would work. If a fellow chooses a laboratory outside the Division of Gastroenterology, one of the Division faculty is also assigned to the fellow in order to closely monitor his or her progress and to serve as a liaison between the Division and the assigned laboratory.

- **Laboratory-based research training.** Fellows who choose basic science or physiology laboratories will be incorporated into the culture of that laboratory and will work along-side technicians, graduate students, post-doctoral researchers, and visiting scientists, a mix that will vary from laboratory to laboratory. Fellows will have extended blocks of time to devote to the laboratory, that is, 6 months in the second year, 10 months in the third year, and 10-12 months in the fourth year of fellowship.
- **Epidemiology/outcomes research training.** In conjunction with the faculty in the University of Washington's School of Public Health and Community Medicine, the Division offers training in the methodology of the public health sciences that is integrated into the fellowship in gastroenterology. The faculty feels that the training offered in this field is of a similar level of complexity and depth as that in laboratory-based fields and deserves protected time to allow fellows to master the material. In the second year, fellows have the opportunity to enter in the Master of Public Health (M.P.H.) or Master of Science (M.S.) degree program in the School of Public Health and Community Medicine and will be assigned a faculty mentor. The required course work encompasses five to six quarters to obtain an M.P.H. or M.S. degree. A master's level thesis is also required for graduation. In the fourth year of fellowship, epidemiologic or outcomes research and additional clinical training are carried out.

5.2.2 Clinician-Teacher Pathway. Fellows in this pathway arrive at the University of Washington without a specific research mentor or project. In the first several months of fellowship, fellows are presented with a list of the faculty who have active, ongoing clinical research projects and summaries of those projects. Fellows then interview with these potential mentors to enable a choice to be made by the sixth month of fellowship.

Once a research mentor and specific projects are chosen, a series of planning sessions ensure that fellows read background information about their projects and formulate a study

design, usually in the form of a written protocol. If the project involves human subjects, fellows prepare applications to the Institutional Review Board.

Fellows on clinical rotations are given a half day per week to conduct their clinical research projects. This protected time is achieved by having their attending gastroenterologist cover clinical duties while the fellow meets with his research mentor. In addition, when fellows are not assigned to clinical rotations, they are expected to devote all of this time to their research projects.

5.3. Minimum Requirements. The requirements that are to be met by fellows are those set by their assigned mentor, whether on the Physician-Scientist pathway (where the mentor may be either a physician or a Ph.D.) or Clinician-Teacher Pathway (where the mentor will be a member of the Gastroenterology faculty). There are some objective milestones that mark the progress of successful research fellows.

5.3.1. Physician-Scientist Pathway All fellows are required to attend the Biomedical Research Integrity Lecture Series given by the University of Washington. A semi-annual presentation at Division of Gastroenterology Research in Progress Seminar is required as well, a forum where the fellow is offered constructive criticism and immediate feedback. Evidence of progress, in the form of a submitted research proposal for funding, a first authored manuscript, or a presentation of research results at a national meeting, is also required. At completion of their fellowship training, fellows are expected to give a formal presentation summarizing their research at the divisional Research in Progress Seminar.

5.3.2. Clinician-Teacher Pathway Fellows involved in clinical investigation are also required to present their study design and preliminary results at the Division's Research in Progress Seminar semi-annually. For each project or protocol that is undertaken by a fellow, a written plan of research and a timetable for completing data acquisition and analysis are required. There is also a requirement that research results are submitted for presentation at clinical meetings and colloquia and eventually submitted for publication. The faculty realizes that the incubation time for complex clinical studies can be a lengthy one, such that results may not be available for analysis until the latter part of fellowship. Nonetheless, fellows are required to make steady progress toward this goal during their protected half-day per week and during assigned research months. At completion of their fellowship training, fellows are expected to give a formal presentation summarizing their research at the divisional Research in Progress Seminar.

5.4. Assessment of competence.

5.4.1. Physician-Scientist Pathway The fellow's mentor has the primary responsibility for assessing research competence. This assessment is an ongoing process that is based on daily interaction in the laboratory (for laboratory based fellows). Formal assessments are documented every 2-3 months while fellows are in extended blocks of research time. For fellows working in the School of Public Health, the mentor can assess progress in both course work and in the research undertaken. The Division of Gastroenterology's Physician-Scientist Review Committee (see 5.2.1) has the responsibility for quarterly reviews of fellow progress, based on input from the fellows, the mentor, and from assessment of the fellow's presentations at Research in Progress seminars and research meetings. The Physician-Scientist Review Committee may call upon external reviewers for independent evaluation of fellow progress. Significant weight will be given to favorable peer review of a fellow's research, in the form of a grant proposal that is funded, a manuscript that is accepted for publication, or a research paper that is accepted for presentation at a national or international scientific meeting. Fellows who are not progressing satisfactorily, as determined by their mentor and the Division's Physician-Scientist Review Committee, will be counseled and given suggestions for improvement. Continued lack of satisfactory progress will be grounds for dismissal from the Physician-Scientist Pathway of fellowship.

5.4.2. Clinician-Teacher Pathway The mentor has primary responsibility for assessing a fellow's competence on this pathway, according to the six competencies described in previous sections. The faculty, at large, have the opportunity to critique fellow presentations at Research in Progress seminars. Favorable peer review of a fellow's research output, in the form of published manuscripts and presentations at national meetings, will be taken as objective criteria of satisfactory progress. The research mentor completes formal evaluations of progress on a monthly basis while the fellows are in months dedicated to research training.

6. Ancillary skills geared to the trainee's career plans

6.1. Primary objective.

- To prepare fellows for their careers in medicine either as Physician-Scientist members of a medical school faculty, or as Clinician-Teacher member of a medical school faculty, or as private practice consultants.
- To learn to practice medicine in an atmosphere of collegiality and mutual respect.
- To provide a foundation of knowledge in ethics, health care economics, and systems-based practice.

6.2. Methods of instruction. Throughout their training, all fellows are taught the skills necessary to become skilled clinical consultants, including communication skills, teamwork, and professionalism. This process occurs through one-on-one mentoring and instruction by faculty physicians in both the inpatient and outpatient settings. Faculty can give direct feedback about these skills in any clinical setting.

Fellows preparing for specific careers may choose to devote time to skills that will be useful in the future. For example, fellows on both the Physician-Scientist and Clinician-Teacher track may opt for coursework in biostatistics, if their background has not included this. Biostatistics and the principles of study design are available as a series of seminars given by the Department of Medicine or as courses in the School of Public Health and Community Medicine. Fellows on the Clinician-Teacher track may also elect courses in epidemiological methods, as their future work may be largely epidemiologic in nature. Fellows on both tracks may elect short courses in teaching methods given by the School of Medicine's Department of Medical Education. We have found courses in slide preparation and in presentation of medical and scientific lectures to be particularly useful to physicians entering academic medicine. Depending on background exposures, fellows may also opt for coursework in academic and professional writing, given by the University's faculty in the Department of English. Fellows on the Physician-Scientist track will be exposed to the art of grant writing and the methods of grant application by dint of their mentors' labors in these areas. In addition, the School of Medicine offers seminars on these topics.

The Division offers hands-on experience in teaching to its Senior Fellows who anticipate careers in academic medicine by having them participate as instructors in Human Biology 551, the course on the Gastrointestinal System given to second-year medical students at the University of Washington. This course covers the basics of anatomy, biochemistry, and physiology of the gastrointestinal organs and is given as a series of seminars in January of each year. The class is divided into groups of 20, each led by an instructor armed with teaching tools and a syllabus prepared by the faculty. No lectures are given, but rather patients are presented that illustrate specific points about pathophysiology, leading to a Socratic seminar in which underlying principles are covered. Our experience in over 30 years of teaching this course is that fellows consolidate their knowledge of physiology and pathophysiology while experiencing the joys of teaching.

There is considerable bonding that occurs between the instructor and his or her small group of students. For many of our fellows, this experience is an epiphany leading to a life-long commitment to teaching excellence.

For fellows on the Clinician-Teacher track who choose careers as consultant gastroenterologists and hepatologists in private practice - whether hospital-based, multi-specialty clinic based, or in a managed care setting - a different set of skills is often sought in the third year of fellowship. Our clinical faculty, themselves in different private practice settings, are available to fellows for advice and demonstration of such topics as ambulatory care office management, specialized outpatient procedures (diathermy for anorectal problems, manometry and ambulatory pH monitoring, etc.), and strategies in managed care medicine. The faculty of the Division of Gastroenterology support all of our fellows' career decisions and maintain close contact with them throughout their careers. In fact, those fellows who enter clinical practice in the greater Seattle area frequently join our clinical faculty, donating their time to teaching fellows in the program.

The faculty endeavors to create an atmosphere of collegiality in the day-to-day practice of medicine as well as in its conferences and seminars. The fellows also develop a bond among themselves that often extends beyond the fellowship years. The interactions between faculty and fellows and among fellows are actively promoted by the Division of Gastroenterology, as these interactions form the basis of the artful practice of subspecialty medicine.

Throughout their fellowship, trainees are directly exposed to many different systems of health care delivery, including academic, county, private practice, and VA settings. They receive specific instruction about the mechanics of insurance plans, coding and billing that they will need upon entering practice. Faculty also include instruction on ethical issues that arise in direct inpatient and outpatient clinical care. Fellows organize and participate in a month Morbidity, Mortality, and Management Conference, where they assess quality of care given and are given the opportunity to initiate quality improvement programs.

6.3. Minimum Requirements. All fellows are taught the skills necessary to become skilled clinical consultants through one-on-one instruction by faculty members. Training in other areas, such as courses in writing or public speaking skills, are elected by fellows on the basis of individual desires and needs, often under the direction of faculty mentors. There are no minimum requirements in these areas.

7. Fellow evaluation and feedback.

7.1. Clinical rotations. In all clinical rotations, fellows are evaluated on the following six competencies as required by the ACGME: 1). **Patient care**, including making appropriate medical decisions, as well endoscopy procedural technical ability 2). **Medical knowledge**, including knowing the established evidence for medical decisions 3). **Practice Based**

Learning & Improvement, including attending rounds, M&M conferences, and journal clubs 4). **Interpersonal and communication skills**, including exchange of information with patients, colleagues, staff and attendings 5). **Professionalism**, including their level of accountability and ethics and 6) **Systems based practice**, including M&M conference, grand rounds presentations, journal clubs, performing literature searches and use of other on-line resources. Fellows are given direct and written feedback at the completion of each rotation. Fellows are also evaluated quarterly on their performance in continuity clinic based on the same competencies. The methods and materials for these reviews are shown in table 4.

Fellows meet with the program director semi-annually to review their performance and make plans for additional training as needed. If faculty members express significant concerns about fellows' performance, additional meeting and plans for improvement can be requested.

7.2. Research: Evaluation of the fellows performance during research training is the responsibility of the research mentor, and differs for fellows in the Physician/Scientist and the Clinician/Teacher tracks. In the Physician/Scientist track, formal evaluations are required every 2-3 months while fellows have extended blocks of time dedicated to research. However, it is expected that the research mentor will monitor fellows' progress more frequently than that and provide frequent, in-depth contact with the fellow. For fellows in the Clinician/Teacher track, formal evaluations are required monthly during months that are dedicated to research training, rather than clinical training. The research mentor also evaluates the productivity of fellows during their research half-day that occurs weekly during clinical rotations. These evaluations of research performance are also reviewed with the fellows during their semi-annual meetings with the program director.

7.3 . 360° evaluations: In accordance with the ACGME requirements, fellows will be evaluated by nursing staff who work in close contact with the fellows, peers, and the administrative staff. Nursing evaluations will be completed at the end of each monthly clinical rotation, and evaluations by the administrative staff are completed semi-annually. Peer evaluations will be obtained semi-annually in a confidential fashion. These evaluations will reviewed with the fellows during their semi-annual meetings with the program director.

7.4 Patient evaluations: Patients seen by the fellows in their continuity clinics will have the opportunity to evaluate the fellows in regards to their professionalism, communication skills, and general patient care abilities. A summary of these evaluations will be available for fellows review at their semi-annual meeting with the program director.

Table 4. Evaluation of ACGME Fellowship Competencies

Competency	Method/Measures
1. Patient Care	
Informed decisions, counseling patients, performing procedures & applying established science	Attending teaching rounds Supervised continuity clinic Procedure logs QI conferences Monthly faculty evaluation forms Quarterly evaluations at faculty meetings Semi-annual meetings with program director GI-Radiology-Surgery conferences
2. Medical Knowledge	
Knowing established science	Attending teaching rounds Supervised continuity clinic Standardized AGA in-training examination M&M conferences QI conferences Monthly faculty evaluation forms
3. Practice Based Learning & Improvement	
Investigation; scientific evidence appraisal; information technology, QI	QI conference Grand rounds presentations Journal club presentations Research project Supervised continuity clinic Attending teaching rounds Pathology conference M&M conferences Documented self-directed learning
4. Interpersonal & Communication Skills	
Team player, exchange of information with patients, peers, staff and faculty	Attending teaching rounds Supervised continuity clinic Journal club presentations Grand rounds presentations Monthly faculty evaluations Monthly nursing evaluations Peer evaluations Patient evaluations
5. Professionalism	
Accountability; ethics, etc.	Attending teaching rounds Supervised continuity clinic Monthly faculty evaluations

	Monthly nursing evaluations Peer evaluations Patient evaluations Administrative staff evaluations
6. Systems Based Practice	
Patient advocate, cost effectiveness, use of available systems to improve patient access and care	Attending teaching rounds Supervised continuity clinic Monthly faculty evaluations Research project M&M conference Literature searches: grand rounds, journal club, patient care Use of Medline, UpToDate and other on-line resources