Pre-curriculum Review Advisory Committee Final Report

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Executive Summary

The University of Washington School of Medicine (UWSOM) is considered one of the nation’s best medical schools. In education, the UWSOM is widely and highly regarded for its ability to focus on both primary care and research and for its landmark WWAMI program that provides training for a five-state region. The UWSOM has a responsibility to be self-critical, innovative while respectful of what works well, and dedicated to producing the best physicians to improve the health of the public.

Two enduring values of the curriculum should remain unchanged and unchallenged in all present and future endeavors. These are: 1) the common understanding among patients and teachers that patient welfare comes first, including before students’ own educational needs; and 2) the School of Medicine’s commitment to a learner-centered educational environment that respects students, acts in students’ best interests, protects students from harm and negative experiences, and provides them with meaningful and positive learning experiences.

The last comprehensive curriculum review ended more than 10 years ago and the School has recently completed its LCME accreditation cycle that provides information about curricular needs and possible directions. Paul Ramsey, dean of the UW School of Medicine, has stated that the UW School of Medicine will begin a continuous curriculum improvement process. Dr. Ramsey charged a pre-curriculum review committee in summer 2010 to: 1) identify, discuss and evaluate broad curricular strengths and areas for improvement in the undergraduate medical school curriculum; 2) consider approaches to increasing class size to meet regional workforce needs; 3) outline pragmatic and cost-effective approaches to develop the scope of a curriculum review; 4) engage broadly with faculty, staff, students, and others concerning the School’s curricular strengths, areas for improvement, and possible expansion approaches, including the potential of offering four years of medical education at some regional sites; and 5) develop a rationale, a set of guiding principles, and proposed approach to a curriculum review, including recommendations concerning the scope of the curriculum review.

This report describes the committee’s work and findings, including a proposed foundation, set of guiding principles and scope for a curriculum review and continuous improvement process to start in late 2011 or early 2012.

Background

Previous curriculum reviews: Over its 55-year history, the UW School of Medicine curriculum has been shaped through three large-scale curriculum reviews. The current curriculum evolved through these reviews and reforms, as well as through incremental and ad hoc changes. The organ-based curricular approach for second year began with the curriculum review in the late 1960s. Required clerkships were implemented with the review in the early 1980s. The most recent curriculum review, between 1998 and 2001, resulted in initiation and development of the Colleges system, change in the governance structure, and modifications and additions to selected courses and clerkships.

Committee activities and participants: The committee membership consisted of basic science and clinical faculty and staff involved in medical education and medical students from across the five-state region. A subcommittee examined WWAMI expansion options, with some overlap in membership with broad representation from faculty, staff, and students from throughout the WWAMI region.
The pre-curriculum review advisory committee (PCRAC) met approximately every other week between October 2010 and July 2011. In initial meetings, the committee reviewed the existing curriculum, curricula at other medical schools and the existing literature, and discussed approaches to the curriculum broadly. Existing data about the UWSOM curriculum and its outcomes were reviewed and discussed, including the LCME self-study final report and AAMC Graduation Survey results; internal end-of-year program evaluation survey results from each medical school class; and USMLE Step 1 and 2 board scores. Subsequently, meetings, focus groups and interviews were held with constituents from throughout the medical school at all regional sites. These included curriculum committees, educational leaders, medical students, teaching faculty, educational program leaders, community hospital physicians and leaders, residency program directors, medical school finance administrators, technology specialists, educators from other health science disciplines, and UW Medicine senior leaders. Approximately 300 individuals participated in the pre-curriculum review process.

**Findings:** Using data available from meetings with constituents, interviews across the region, internal data and existing national data sources, the following curricular strengths and weaknesses of the overall four year curriculum were identified.

**Areas of strength identified from existing data include:**

- Diversity of clinical offerings;
- Quality of clinical instruction;
- Introduction to Clinical Medicine course/the Colleges program;
- Mentoring/role modeling.

**Areas of weakness identified from existing data include:**

- Poor integration of basic science and clinical medicine in the preclinical curriculum;
- Declines in student performance on USMLE scores for Step 1;
- Insufficient opportunities and preparation for independent learning;
- Inattention to skills for evaluating and thinking critically about medical information in its contemporary forms;
- Inadequate standardization of offerings across the WWAMI region in terms of objectives, quality of teaching, and course/elective offerings;
- Limited alternatives to large-group lectures as the primary preclinical curriculum approach.

Using information gathered in the interviews and meetings, the following curricular strengths and weaknesses of the first two years of the curriculum were identified.

**Areas of strengths identified in the first and second year curriculum:**

- Small class sizes in first-year regional sites;
- Unique opportunities at different regional sites, such as the clinical reasoning course at WWAMI-Spokane;
- Ability to pilot curricular innovations, service learning projects, and other initiatives at regional sites;
- Preceptorships and community service opportunities, particularly at regional sites;
- Small-group learning experiences in specific second-year courses, such as GI System and Respiratory System;
- The Colleges program, especially in the second year;
- Information evaluation skills and evidence-based medicine skills in a few specific courses;
- Emphasis on critical thinking and clinical reasoning in several courses;
- Improvements in technological support of teaching and learning;
- Opportunities for course chair interactions in curriculum meetings.
Areas of weakness identified in the first and second year curriculum:

- Predominantly passive teaching methods (too much lecture time, passive learning);
- Emphasis on memorization of facts in most classes rather than on critical thinking and clinical reasoning;
- Insufficient use of clinical correlations in teaching and insufficient emphasis on the relevance of content to the practice of medicine;
- Insufficient inclusion or integration of clinicians in first-year courses;
- Inconsistent and inadequate integration between courses within each year (horizontal) and across years (vertical);
- Inconsistent quality of instruction and content between small groups in some courses;
- Insufficient focus on lifelong learning skills;
- Insufficient time and resources for students for USMLE Step 1 preparation, and dissimilarity in UWSOM exam format and content compared with USMLE Step 1;
- Examinations excessively focused on recall of facts rather than critical thinking and clinical reasoning;
- The demands of the curriculum prevent students from participating in service learning and preceptorships;
- Inadequate resources for education, including space and technology support;
- Minimal or no teaching about and application of information management skills for information literacy and evidence-based medicine skills in most courses;
- Insufficient resources and time to ensure the Individual Investigative Inquiry (III) is meaningful for all students;
- Insufficient opportunities and time for students to work with patients in a meaningful way;
- Insufficient emphasis on interprofessional education;
- Insufficient opportunities for active career exploration, such as opportunities for multiple preceptorships;
- Minimal attention to bioinformatics and population-based medicine;
- Inconsistencies in course materials as well as emphases on major course objectives between sites within a first year course;
- Excessively large and growing curricular content, aggravated by lack of authority and policies for curriculum committees to consider and make meaningful deletions from the curriculum;
- Curriculum governance structure and department-based curriculum structure that do not foster integration across courses and years;
- Department-controlled curriculum structure does not encourage collaboration and integration between courses and faculty contribution to courses taught outside one’s home department;
- Insufficient faculty development, particularly for contemporary teaching and learning issues and methods;
- Perception by many teachers feel that they are not paid to teach and that transparency is lacking regarding the connection between teaching effort and financial reward.

Using information gathered in the interviews and meetings, the following curricular strengths and weaknesses of the third and fourth years of the curriculum were identified.

Areas of strengths identified in the third and fourth year curriculum:

- Strong administrative support and core curricula in a number of clerkships that are transported well to all sites, especially the family medicine, internal medicine, pediatrics and neurology core clerkships;
- Diverse and highly valued clinical experiences available throughout the region;
- Dedicated and enthusiastic clerkship faculty;
Frequent, close, one-on-one interactions with and supervision by attending physicians with students who complete clerkships in the region;

Many opportunities for unique rural learning, such as the WRITE program;

Opportunities provided by the state track programs.

Areas of weaknesses identified in the third and fourth year curriculum:

- Inadequate emphasis in the following content areas:
  - Relevance of basic sciences to the practice of medicine;
  - Team-based care, team communication and interprofessional education;
  - Motivational interviewing;
  - Evidence-based care;
  - Patient-centered medical home model;
  - Error detection, quality improvement, and system-based learning
- Insufficient opportunities for continuity experiences, particularly in chronic illness and care;
- Limited attention to the emotional status of students in relationship to events in clerkships;
- Inadequate attention on the presence and impact of the hidden curriculum;
- Insufficient attention on the continuum of education, particularly the ACGME competencies;
- Insufficient preparation for the demands of internship, especially multitasking, managing lists, and practicing efficiently; the capstone course is insufficiently rigorous for internship preparation;
- Insufficient opportunities for career exploration;
- Inadequate availability of subinternship experiences for all students;
- Insufficient and insufficient faculty development related to teaching methods, competencies and evaluation,
- Insufficient rewards and recognition for high-quality teaching, including insufficient time carved out from faculty FTEs for teaching;
- Difficulty in attracting, developing and retaining clinical teaching sites due to increased clinical productivity demands;
- Insufficient understanding of community-based practice by UWSOM faculty.

In reviewing curricula at other medical schools, many medical schools had moved away from the “2+2” traditional model currently employed at the UWSOM. Instead many curricula begin with intensive foundational work, followed by block courses that integrate basic and clinical sciences considerably more than occurs at the UWSOM; these are often led by multidisciplinary teams. Many schools have reduced lecture-based time, increased small-group learning and increased use of technologies that permit independent learning. Governance and design of curriculum at these schools are frequently directed by a central set of principles and objectives that have been discussed and molded in a central curriculum committee.

Rationale and recommendations for the curriculum: During the last curriculum review process (1998-2001) the working assumption was that the UWSOM curriculum was well designed and well-functioning; the charge was to look for opportunities to enhance the curriculum and innovate with regard to curricular content and administration without changing the basic structure. Now it is time for change. There are many areas of the curriculum where significant changes should be considered for content, delivery and basic structure. Overall, the next curriculum reform process should consider the many changes that have occurred in the healthcare environment, learning settings and methods, and technologies. These include:

- The explosion in medical and scientific content—representing far more content than can be taught;
- The explosion in information technology, with associated changes in learning technologies, healthcare technologies, advancing sophistication of patient knowledge and understanding, and the need and ability to focus on evidence-based medicine;
• Generational characteristics of students and variations in student learning styles;
• Advances in learning theory and a strong movement nationally toward active learning;
• Changes in the roles of physicians, particularly in a rapidly evolving healthcare system, including heightened focus on use of non-physician health professionals, team-based care, and patient safety.

These factors characterize the constantly and rapidly evolving nature of information and technology. They point to the need for an ongoing, dynamic, continuous improvement strategic educational process that matches the dynamic, ongoing nature of change. Such an approach could combine ongoing smaller “pilot” changes as well as consideration of large-scale changes. To be successful, the ongoing process will be optimized by development of an appropriate governance structure and initiation of a core “visioning” steering committee to evaluate, innovate, reflect, monitor and ensure ongoing attention to continuous curriculum improvement. The process should be inclusive and transparent. Success will depend on the full support of School of Medicine leadership. The primacy of patient-centered care and safety first and foremost, and learner-centered education must be foundational to all considerations and results.

Guiding principles for the continuous strategic curricular planning process include:

• Ongoing consideration of current and future patients;
• Characteristics and needs of current and future students;
• Structure and requirements of current and future healthcare systems, and the existence and evolution of current and future healthcare and learning technologies;
• The educational and cultural richness inherent in our geographically dispersed regional education system;
• The enduring and evolving knowledge of and understanding of pedagogy and learning theory;
• The success and value in community engagement and learning in “communities of practice” that characterize two of the School of Medicine’s most successful and satisfying innovations: the Colleges program and the WWAMI medical education program.

Four foundational areas were identified for change, including the need to:

• Increase active learning in place of the current predominantly lecture-based teaching methods of the first two years;
• Balance curricular content and reduce student contact hours to permit students to better reflect and engage in their learning (including self-learning), and to increase curricular flexibility that permits critical new areas in medical knowledge to emerge and assimilate into the curriculum;
• Integrate the curriculum horizontally (within courses in a year) and vertically (across years);
• Create flexibility in the curriculum to allow students to individualize their training.

Undertaking comprehensive curricular mapping of course and clerkship content will help to identify all topics and concepts being covered across the curriculum; this will facilitate these foundational areas for change.

Given these broad, foundational areas, the following are specifically proposed:

• Begin a continuous curriculum improvement process including benchmarks and timelines that allow for ongoing quality improvement in the curriculum;
• Change the governance structure, with a first step of convening an ongoing “visioning” committee that will have the responsibility for oversight of curricular outcomes and the authority to direct the activities of other governance committees;
• Develop and define overarching curricular goals, objectives and outcomes;
• Adjust and redesign the curriculum to meet these goals, objectives and outcomes;
- Focus on a continuum of undergraduate to graduate medical education to lifelong learning, with meaningful transitions, early clinical exposure and incorporation of evidence-based medicine
- Maintain focus on contextual learning opportunities and needs, including the contemporary clinical context, the scientific, interpersonal, cultural and social contexts, and social responsibility;
- Incorporate new training foci and modalities into the curriculum, including simulation through ISIS, interprofessional education and information management approaches and systems;
- Support faculty through faculty development, funding, sufficient time for teaching and other resources;
- Appropriately acknowledge the value of teaching, including in the promotion process.
Final Report of the Precurriculum Review Advisory Committee

Introduction

The UW School of Medicine has entered a period of evaluation and potential reform of its curriculum. The purpose of this report is to describe a proposed foundation, set of guiding principles, and scope for a curriculum review and continuous improvement process to start in late 2011 or early 2012.

Four issues drive the call for a curriculum review and potential reform. One is the focus of the national medical education community on the 100th anniversary of the Flexner Report and the recent publication of a Carnegie Foundation book on educating physicians (Cooke et al, *Educating Physicians*), as well as the nationally perceived need for educational reform in order to train the physician of the future.

The second driver is successful completion of the School’s reaccreditation by the Liaison Committee on Medical Education (LCME) in June 2010. As part of the LCME review process, the School of Medicine completed an extensive self-study; multiple areas were noted in that self-study and by the LCME as outstanding, and opportunities were also identified for improvement.

The third driver is the need to expand medical education throughout the WWAMI region as concern about an impending national physician shortage threatens to disproportionately affect rural states.

The fourth driver is recognition of the need for a curriculum that is continuously responsive to the demands introduced by the rapid pace of change in scientific knowledge and healthcare delivery. A curriculum must be nimble, flexible and contemporary and vigilance to the curriculum must be ongoing.

Paul Ramsey, dean of the School of Medicine, charged a Pre-curriculum Review Advisory Committee (PCRAC) to:

1) Identify, discuss and evaluate broad curricular strengths and areas for improvement, with particular attention to areas for improvement identified in the LCME self-study and report;
2) Consider approaches to increasing class size in order to meet regional workforce needs, including the advisability of initiating and implementing four-year regional WWAMI campuses and other potential approaches;
3) Identify pragmatic and cost-effective approaches that will minimize extra work for faculty and staff while maximizing quality to develop the scope of the curriculum review to be undertaken;
4) Engage broadly with faculty, staff, students, and other relevant individuals and groups to assess their perspectives and suggestions concerning the School’s curricular strengths, areas for improvement, and possible expansion approaches, including development and offering four years of medical education at some regional sites;
5) Develop a rationale, a set of guiding principles, and a proposed approach to a curriculum review, including recommendations concerning the scope of the curriculum review (limited or broad, proposed timeline).

This report reviews the activities and findings of the pre-curriculum review advisory committee and sets the stage for a broader, ongoing curriculum planning process. The report begins with a brief summary of the evolution of the current curriculum, followed by a description of the committee membership and activities, findings concerning the current curriculum and the need for change, and ends with a series of recommendations.
Evolution of current curriculum

Over its 55-year history, the UW School of Medicine curriculum has been shaped through three large-scale curriculum reviews. The first curriculum review in the late 1960’s resulted in:

- Formation of a regional medical school program, the WAMI program (Washington, Alaska, Montana and Idaho and expanded to WWAMI when Wyoming joined in 1996; an additional first-year WWAMI site was added at WSU-Spokane in 2008);
- Organ-based systems approach that is still in effect in Year 2 of the curriculum;
- The Introduction to Clinical Medicine (ICM) course that is still in existence in Years 1 and 2 of the curriculum;
- A “basic hospital clerkship” in the final quarter of the second year to teach fundamental history and physical exam skills;
- Pathways for development of specialists (terminated in 1981).

The second curriculum review in 1981 resulted in:

- A new cell biology course (later terminated);
- A new systemic pathology course (later expanded);
- Required clerkships in medicine, pediatrics, psychiatry, obstetrics and gynecology and surgery, as well as “selectives” in family medicine, emergency medicine/trauma, and rehabilitation medicine/chronic care (family medicine became a required clerkship in the late 1980’s);
- A research requirement.

The most recent curriculum review (1998-2001) resulted in:

- Formation of the Colleges program, which oversees a comprehensive four-year integrated clinical skills curriculum and provides a consistent mentor for each student and a year-long, preclinical, bedside introduction to clinical skills development;
- Formal skills assessment using standardized patients, simulations and structured clinical exams;
- Introduction of a web-based professional skills portfolio for students to use in measuring their progress against learning objectives and developmental benchmarks;
- A second-year capstone course on transitioning to clinical clerkships (this course no longer exists as it has become part of the Introduction to Clinical Medicine II course) and a fourth-year capstone course on contemporary issues, refresher topics and pre-residency skills;
- Modification of the research requirement to its current status, the Independent Investigative Inquiry (“III” or “Triple I”);
- Modification of the curricular governance structure to an oversight committee and individual committees for each year of the curriculum;
- Additional required clinical rotations in the 4th year in emergency medicine, neurology, chronic care and a month of surgical subspecialties.

Other changes have been implemented over time on an ad-hoc basis, driven in some cases by LCME recommendations and student evaluations and in other cases at the discretion of course chairs or as a result from suggestions by departmental leadership.

Table 1 summarizes the current curriculum, which follows a traditional model of two pre-clinical or basic science years (thirty six courses and a clinical preceptorship), and two years of clinical clerkships (ten required and four elective clerkships). An Independent Investigative Inquiry (triple I) project takes place between first and second years.
The first-year curriculum is offered at all WWAMI university sites; the second-year curriculum is currently delivered only at the Seattle campus. Courses in the first two years are primarily taught by faculty from individual departments, and a preponderance of the courses in the first two years are lecture-based. During the clinical years, students complete clerkships in both urban and rural settings across the WWAMI region in a combination of hospitals, clinics and small practices.

**Precurriculum Review Advisory Committee activities**

The committee, charged by Dr. Ramsey and titled the Pre-curriculum Review Advisory Committee (PCRAC), met 16 times between October 2010 and July 2011. All committee members initially read *Educating Physicians* by Molly Cooke et al and the Howard Hughes Medical Institute’s *Scientific Foundations for Future Physicians*. A common web site was used for sharing resources. The PCRAC initially reviewed the content and structure of the current curriculum, the LCME self-study summary, AAMC Graduate Questionnaire (AAMC GQ) results for the last three years, internal data from end-of-year program evaluation surveys completed by medical students, and summaries of performance by UWSOM students on national performance exams. The group discussed and developed a set of guiding principles for future curricular work.

Focus groups were held across the WWAMI region to gather input concerning the strengths and weaknesses of the current curriculum and ideas for curricular change. Groups included: first-, third- and fourth-year students throughout the region; open forums for second-, third- and fourth-year students in Seattle; first-year faculty, clinical faculty, and community clinicians in Anchorage, Spokane, Cheyenne, Laramie, Billings, Bozeman, Missoula, Moscow/Pullman, and Boise; the First-year Curriculum Committee; the Second-year Curriculum Committee; the Required Clerkship Committee; the Elective Clerkship Committee; residency program directors; Family Medicine Residency Network program directors; an open forum for faculty and staff in Seattle; Faculty Council for Academic Affairs; basic science chairs; clinical chairs; alumni; representatives from the UW Information School; and leadership meetings at the Talaris retreat, WWAMI regional affairs meetings and the annual UW Medicine Leadership Retreat. The committee also gathered data from applicants to the UW School of Medicine who chose not to attend the UWSOM. Approximately 300 individuals participated in discussions.

The committee reviewed the web sites of and conducted telephone interviews with 17 medical schools concerning their curricula and reforms and met with Dr. Tim Dornan from the University of Maastricht to learn more about innovative curricula at European medical schools. The list of medical school curricula reviewed is included in Appendix D.

The committee met with representatives of the School of Medicine to discuss financing of medical education (Mary Fran Joseph, associate dean for finance and administration), service learning (Rick Arnold, College head and Chair, Service Learning Advisory Committee), counseling and wellness activities (Mark Wicks, medical school counselor and Claudia Finkelstein, member of the Colleges and head of the Colleges wellness working group), simulation in medical education (Carlos Pellegrini, Brian Ross, and Richard Satava, leaders of the Institute for Simulation and Interprofessional Studies-ISIS), interprofessional training (Brenda Ziehrler, professor in the School of Nursing, Ruth Ballweg, executive director of MEDEX, Wendy Mouradian, assistant dean in the School of Dentistry, Nancy Murphy in the School of Pharmacy, Peter Esselman, chair of the Department of Rehabilitation Medicine), the Medical Scientist Training Program (Marshall Horwitz, head of the program), technology resources (Michael Campion, director of technology services for Academic Affairs), activities and progress related to diversity (David Acosta, associate dean for multicultural affairs), findings from the 1998 - 2001 curriculum review (Tom Norris, former vice dean for academic affairs and co-chair of the 1998-2001 curriculum review), and the perspectives of the former associate dean for curriculum (Susan Marshall).

As committee work proceeded, it became apparent that a more dedicated group should be convened to examine expansion of the medical school program and specifically what would be needed for the second- year curriculum to be taught at WWAMI first-year universities outside Seattle. Therefore, a subcommittee chaired by committee member Mark Whipple was charged to look at this process. The subcommittee consisted of 15 basic scientists and clinicians and
four medical students. The subcommittee began its work in January 2011 and concluded in July 2011. The subcommittee’s findings are included in this report.

The PCRAC held an all-day retreat in April 2011 to review and summarize data collected and assess findings. The guiding principles initially developed were also reviewed and revised, and work began on a summary of the curriculum’s strengths and weaknesses. The committee continued to meet and discuss findings and recommendations through July 2011.

Along with the committee activities described above, committee members reviewed a number of relevant papers. A bibliography is included as Appendix D.

**Methods for obtaining input from constituents**

In interviews, focus groups and meetings, common questions were asked: “What is good about the current curriculum?” and “What can be improved in the current curriculum?” Additional questions were asked specific to group categories.

Discussions ranged from 30 minutes to 1.5 hours. For each discussion, at least two committee members were present. One asked questions, directed discussions, and took notes as possible and the other took detailed notes and added questions or comments as needed. At the end of each session, notes were combined, summarized and placed on the committee web page for review by committee members. In addition, findings were verbally summarized periodically at committee meetings, with subsequent discussion among committee members about the findings. The approach to discussion groups is included in Appendix C.

**Data analysis**

Individual committee members reviewed subsets of data (i.e., discussions with regional faculty, discussions with medical students) and summarized primary themes. Summaries were reviewed in an all-day retreat and subsequent committee meetings and developed into a summary of findings. In addition to themes from discussions and meetings, consideration was given to “best practices” identified at other medical schools as well as to data from UW surveys and data, such as USMLE Board scores, results from the AAMC Graduation Questionnaire, a review of prior curriculum reviews, and other relevant data.

**Findings of the committee**

Using data available from meetings with constituents, interviews across the region, internal data and existing national data sources, the following curricular strengths and weaknesses of the overall four year curriculum were identified.

Areas of strength across these sources include:

- Diversity of clinical offerings;
- Quality of clinical instruction;
- Introduction to Clinical Medicine/the Colleges program
- Mentoring/role modeling

Existing data point to several weaknesses, as follows:

- Poor integration of basic science and clinical medicine in the preclinical curriculum;
- Declines in student performance as defined by USMLE Step 1 scores in preclinical basic science have recently been consistently below the national mean;
- Lack of opportunities and preparation for independent learning;
• Inattention to development of skills related to evaluating and thinking critically about medical information in its contemporary forms;
• Lack of standardization of offerings across WWAMI region addressed in terms of achieving objectives, quality of teaching, evaluation, and course/elective offerings;
• Few alternatives to large-group lectures as the primary preclinical curriculum approach through active learning modalities.

It must be recognized there are multiple potential reasons that must be considered for the decline in USMLE Step 1 scores including lack of integration, teaching methods, lack of congruence of UWSOM test questions with increased use of clinically based test questions on the USMLE Step 1, inadequate board review opportunities, insufficient learning resources, admissions policies that put less emphasis on incoming grades and MCAT scores and other possible reasons.

Some of the areas of weakness may also be noted as an area of strength in specific courses or clerkships.

Overall findings from the meetings held with stakeholders during the discovery phase concerning existing strengths and weaknesses in the curriculum include the following.

**Identified strengths of the first and second year curriculum**

**Curriculum content and delivery**

• Small class size in first-year regional sites;
• Unique opportunities offered to students at different regional sites, such as the clinical reasoning course at WWAMI-Spokane;
• Ability to pilot curricular innovations, service learning projects, and other initiatives at regional sites;
• Preceptorships and community service opportunities, particularly in regional sites;
• Small-group learning experiences in specific second-year courses, such as GI System and Respiratory System;
• The Colleges program, especially in the second year;
• Information evaluation skills and evidence-based medicine skills taught in several courses;
• Emphasis on critical thinking and clinical reasoning in limited number of courses.

**Management and administration**

• Improvements in technological support of teaching and learning;
• Opportunities for course chair interactions in curriculum meetings.

**Identified weaknesses of the first and second year curriculum**

**Curriculum Content and Delivery**

• Predominantly passive teaching methods (too much lecture time, passive learning);
• Emphasis on memorization of facts in most classes rather than on critical thinking and clinical reasoning;
• Insufficient use of clinical correlations in teaching and insufficient emphasis on the relevance of content to the practice of medicine;
• Insufficient inclusion or integration of clinicians in first-year courses;
• Inconsistent and inadequate integration between courses within each year (horizontal) and across years (vertical);
• Inconsistent quality of instruction and content between small groups in some courses;
• Insufficient focus on lifelong learning skills;
- Insufficient time and resources for students for USMLE Step 1 preparation, and dissimilarity in UWSOM exam format and content compared with USMLE Step 1;
- Examinations excessively focused on recall of facts rather than critical thinking and clinical reasoning;
- The demands of the curriculum prevent students from participating in service learning and preceptorships;
- Inadequate resources for education, including space and technology support;
- Minimal or no teaching about and application of information management skills for information literacy and evidence-based medicine skills in most courses;
- Insufficient resources and time to ensure the Individual Investigative Inquiry (III) is meaningful for all students;
- Insufficient opportunities and time for students to work with patients in a meaningful way;
- Insufficient emphasis on interprofessional education;
- Insufficient opportunities for active career exploration, such as opportunities for multiple preceptorships;
- Minimal attention to bioinformatics and population-based medicine;
- Inconsistencies in course materials as well as emphases on major course objectives between sites within a first year course.

Management and administration

- Excessively large and growing curricular content, aggravated by lack of authority and policies for curriculum committees to consider and make meaningful deletions from the curriculum;
- Curriculum governance structure and department-based curriculum structure that do not foster integration across courses and years;
- Department-controlled curriculum structure does not encourage collaboration and integration between courses and faculty contribution to courses taught outside one’s home department;
- Insufficient faculty development, particularly for contemporary teaching and learning issues and methods;
- Perception by many teachers feel that they are not paid to teach and that transparency is lacking regarding the connection between teaching effort and financial reward.

Many of the identified strengths and weaknesses are interrelated. For example, small interactive classes are appreciated and lectures and passive learning are the norm; preceptorships and service learning activities are viewed as strengths and curricular demands may prevent many students from participating beyond required experiences; efforts to improve the technological support of learning are valued and there is a perception of insufficient resources to support learning; information management skills, critical reasoning and clinical problem solving are viewed as important skills and are infrequently offered, especially in the first year; the Colleges are viewed as a strong approach to pre-clerkship clinical skills instruction and students perceive insufficient opportunities to meaningfully interact with patients within the Colleges and in other settings.

The curriculum is perceived to be poorly integrated within and across years, and the relevance of content to clinical practice is often not clear or is not emphasized. Management issues, such as ineffective curriculum governance and inadequate faculty development, add to concerns.

**Identified strengths of the third and fourth year curriculum**

- Strong administrative support and core curricula in a number of clerkships that are transported well to all sites, especially the family medicine, internal medicine, pediatrics and neurology core clerkships;
- Diverse and highly valued clinical experiences available throughout the region;
- Dedicated and enthusiastic clerkship faculty;
- Frequent, close, one-on-one interactions with and supervision by attending physicians with students who complete clerkships in the region;
- Many opportunities for unique rural learning, such as the WRITE program;
• Opportunities provided by the state track programs.

Identified weaknesses of the third and fourth year curriculum

Content areas

• Inadequate emphasis in the following content areas:
  o Relevance of basic sciences to the practice of medicine;
  o Team-based care, team communication and interprofessional education;
  o Motivational interviewing;
  o Evidence-based care;
  o Patient-centered medical home model;
  o Error detection, quality improvement, and system-based learning
• Insufficient opportunities for continuity experiences, particularly in chronic illness and care.

Student experience

• Limited attention to the emotional status of students in relationship to events in clerkships;
• Inadequate attention on the presence and impact of the hidden curriculum;
• Insufficient attention on the continuum of education, particularly the ACGME competencies;
• Insufficient preparation for the demands of internship, especially multitasking, managing lists, and practicing efficiently; the capstone course is insufficiently rigorous for internship preparation;
• Insufficient opportunities for career exploration;
• Inadequate availability of subinternship experiences for all students.

Faculty

• Inadequate and insufficient faculty development related to teaching methods, competencies and evaluation,
• Insufficient rewards and recognition for high-quality teaching, including insufficient time carved out from faculty FTEs for teaching;
• Difficulty in attracting, developing and retaining clinical teaching sites due to increased clinical productivity demands;
• Insufficient understanding of community-based practice by UWSOM faculty.

The strengths of the third and fourth years reside in the clerkships, the diversity and one-on-one teaching of clinical experiences available throughout the region, and the strength of our clinical faculty. The weaknesses are perceived to be lack of attention to basic sciences in the clinical setting and to contemporary healthcare issues such as team communication, and inadequate preparation of our graduating students for the demands and responsibilities of internship training.

Assessment of existing data

PCRAC members examined several sources of existing data. The LCME Self-Study Report voices the experience and opinions of UWSOM constituents, including students, who served on subcommittees. The formal LCME accreditation report provides the perspectives of site visitors from outside institutions and final findings by the LCME. The AAMC Graduation Questionnaire (AAMC-GQ) provides the experience of graduating seniors. The Medical School Mission Management Tool compares six domains from the AAMC-GQ of UWSOM students with students nationally. End-of-year internal program evaluation surveys provide the perspectives and ratings of medical students in each year.
concerning both broad and specific areas within the curriculum during the past year. The USMLE Board scores are an objective measure of performance by which our students' performance can be compared to national means. Finally, comments from applicants who declined admission to the UWSOM for another school were reviewed.

The 2010 LCME Self-Study Report provides findings from individual subcommittees convened to analyze particular areas; through that report, additional strengths and weaknesses emerge. The Student Subcommittee cited as strengths the College system, the overall educational program, individual clerkships, and the quality of clinical instruction. Cited weaknesses include the dominance of lecture-based instruction during the preclinical years and variability of first-year WWAMI sites.

The Learning Environment Subcommittee cited several weaknesses: access to information on websites about coursework, lack of consistency concerning the Independent Investigative Inquiry (“III”) research experience, and the need to emphasize the diversity of patients and medical professionals.

The Preclinical Curriculum Subcommittee cited several strengths: student preparation for clerkships, repetition between preclinical courses to emphasize key concepts, and several specific courses: anatomy and embryology, introduction to clinical medicine, cardiovascular, pharmacology, and respiratory systems. Cited weaknesses include excessive and inefficient large-group lectures, poor student preparation for Boards, and variability and lack of standardization among WWAMI sites. Specific courses cited as weak include Systems of Human Behavior, Medical Information for Decision Making, Medicine, Health and Society, Biochemistry, Clinical Epidemiology, and Clinical Nutrition.

The Clinical Curriculum Subcommittee cited as strengths the required clinical curriculum, preparation for USMLE Step 2 and two individual clerkships: internal medicine and emergency medicine. Cited weaknesses include quality and fairness of feedback, disparities in quality of teaching across the WWAMI clinical sites, and the rehabilitation/chronic care clerkship.

LCME report findings: The key findings from the LCME final report, including strengths, weaknesses and citations, have been circulated widely and are well known. The UWSOM’s educational programs and/or setting were praised for effective leadership in creating a culture throughout the health system committed to the priority of the educational mission; dedicated medical education program administrators who successfully manage a complex and widely dispersed medical education system; the enthusiastic participation of medical school faculty; a student-focused educational program across diverse educational sites; the rich variety of curricular offerings that allows students to pursue areas of interest beyond the standard curriculum; opportunities for students to participate in research; and a high level of administrative responsiveness to student concerns and feedback related to the curriculum.

Weaknesses identified that are relevant to the educational program were: limited diversity among the faculty and department chairs; lecture-dependent basic science portion of the preclinical years with limited opportunities for students to engage in active learning, especially during the first year of the curriculum (this was not a final citation but was noted among citations in the preliminary review by the site visitors); limited opportunities for career exploration and lack of a consistent and systematic process to advise each student on choice of fourth year electives; higher than national average reporting of mistreatment by medical students; delays in receiving clerkship grades (noted as improving).

AAMC Graduation Questionnaire (GQ): The 2010 AAMC-GQ indicates strong similarities to the above data in comparison to the national mean. Ratings by UWSOM seniors were substantially below the national mean in use of sufficient illustrations of clinical relevance in basic science courses (although there was improvement from 2006 to 2011); areas of practice management and “real-world medicine” such as law and medicine (with improvement in 2011); and in several specific courses, including microbiology (improvement in 2011) and pathology. The UWSOM is substantially above the national mean in students being personally observed doing histories and physical exam in most required clerkships, usefulness of the fourth year of medical school, faculty mentoring, and several specific courses,
including introduction to clinical medicine, emergency medicine, psychiatry, and rehabilitation medicine. Interestingly, attention to professionalism is seen as excessive in comparison to the national mean.

In their open-ended comments about strengths and weaknesses, students cited as top strengths the variety/diversity of clinical experiences, excellent attending physicians, and the Introduction to Clinical Medicine course, and cited poor integration of basic sciences and clinical medicine as a top weakness. Other weak areas cited include: inadequate preparation for Step 1 Boards, variable education and clerkship quality across the region, and lack of standardization in course objectives, content and testing.

**AAMC Medical School Missions Management Tool 2011:** The AAMC Medical School Missions Management Tool 2011 provides comparative outcomes data from the AAMC GQ for accredited medical schools, with key measures across six domains. These are presented in customized tables showing percentile distributions based on all reporting institutions in comparison with UWSOM. The data represent the percent of graduates who rated these categories as “agree” or “strongly disagree” between 2008 and 2010. *The data are difficult to interpret in a meaningful way; while the UWSOM may look comparatively strong or weak based on percentile rankings, the differences in actual ratings are frequently relatively small. Therefore, data are to be interpreted with caution.*

Shown in the table below are categories in which the UWSOM mean was below the 50th percentile in comparison with the national mean. For evaluation of medical school clerkships, two clerkships were between the 50th and 60th percentile (family medicine and overall quality in other clinical clerkships) and between the 60th and 70th percentile for the internal medicine clerkship.

<table>
<thead>
<tr>
<th>Category</th>
<th>UWSOM</th>
<th>National</th>
<th>UWSOM percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic science course objectives were made clear to students</td>
<td>80.9%</td>
<td>85%</td>
<td>20-30</td>
</tr>
<tr>
<td>Basic science courses were sufficiently integrated/coordinated</td>
<td>72%</td>
<td>75.8%</td>
<td>40-50</td>
</tr>
<tr>
<td>Basic science content provided relevant preparation for clerkships</td>
<td>56.7%</td>
<td>66.7%</td>
<td>10-20</td>
</tr>
<tr>
<td>Fourth year was important for enhancing my clinical education</td>
<td>80.5%</td>
<td>82.3%</td>
<td>30-40</td>
</tr>
<tr>
<td>Overall, I am satisfied with the medical school education I received</td>
<td>86.7%</td>
<td>89%</td>
<td>10-20</td>
</tr>
<tr>
<td>Quality of educational experiences in pediatric clerkships</td>
<td>79.8%</td>
<td>83.3%</td>
<td>30-40</td>
</tr>
</tbody>
</table>

**End-of-year internal surveys:** End-of-year surveys completed by medical students identified several consistent strengths and weaknesses across all four years. Consistently rated as weaknesses are: fostering healthy skepticism of medical information, opportunities for hands-on learning (including in the clinical years), and addressing issues related to diverse patient populations. Promotion of critical thinking is rated highly in the clinical years. Third-year students highly rate the presence of role models and fourth-year students highly rate having faculty mentors and faculty advocates.

**USMLE Board scores:** USMLE Board scores for Step 1 have been below the national mean in many key areas of the basic sciences, including: biochemistry, microbiology and immunology, nervous system, nutrition, pathology, pharmacology, musculoskeletal, renal/urinary, cardiovascular, gastrointestinal, anatomy, and total score. UWSOM Step 1 scores are above the national mean in behavioral sciences, genetics and pass rate. It is important, however, that scores were always less than one standard deviation below the mean, and in most cases were less than .5 standard deviation below the mean, and in many cases were only slightly below the mean.
On Step 2 exams, UWSOM scores are below the national mean in pediatrics, surgery, renal, urinary and male reproductive systems, understanding mechanisms of disease, diagnosis, diseases of blood and blood-forming agents, nutritional disorders, and are slightly below the national mean in total score. UWSOM scores were slightly above the national mean in percent passing. Again, scores were always less than one standard deviation below the mean and in many cases were only slightly below the mean. UWSOM student performance on Step 2 Clinical Skills (CS) was higher than the national average in all areas: integrated clinical encounter, data gathering, patient note, communication and interpersonal skills and percent passing.

Comments from applicants who declined admission to the UWSOM: Students who decline admission for another school are asked to comment on why they chose not to come to the UWSOM. Comments from the most recent application year were reviewed to assess reasons. Although the comments are not systematic in having comments from all decliners, those received are helpful in identifying potential areas of concern in the curriculum.

One area identified was the ability to complete the preclinical curriculum elsewhere in a shorter time period, as well as the desire for longitudinal experiences. For example:

“I decided to go to Columbia University because I was accepted into the Columbia-Bassett program--a new program that focuses on longitudinal care. There are only ten of us in the program who will be traveling to Cooperstown for our major clinical year and receive personalized attention and our own patients (no fourth years or residents in between us and our attending physician)....Plus, I really liked the 18-month curriculum at Columbia, which gets me into clinicals earlier.”

Another was the lack of small-group teaching at the UW School of Medicine, along with the lack of a system-based curriculum:

“Strengths of UCSF include strong ethnic diversity (maybe the best in the country - about 33% underrepresented minorities), systems based curriculum, pass/fail for 2 years, more small group work, emphasis on early clinical experience, and more innovative and adaptive curriculum.”

An addition area raised by several respondents was the lack of active learning at the UWSOM:

reason for selecting another school was.... ] “Focus on problem based learning leading to more active learning and less time spent in lecture.”

“UCLA has a non-traditional curriculum with a systems-based approach, PBL and doctoring minimizing the number of hours spent in a lecture hall to 2 hours/day. This was a HUGE difference when compared to the traditional curriculum that UW has and was one of the major factors influencing my decision.”

“I did not like the curriculum at the University at Seattle. I am an active learner and I felt that the curriculum had too much lecture time. Also, I prefer curriculum that are more integrated and after talking to students the curriculum at the University at Seattle is not that integrated.”

The lack of flexibility and difficulty pursuing other degree programs were mentioned:

“In the end, I decided to attend the University of California San Francisco. While my final decision was between the UW and UCSF, I felt UCSF was a better fit for me personally and academically. The curriculum is presented differently at UCSF and the first and second years are graded pass/fail. Additionally, I was accepted into the PRIME program at UCSF, incorporating an MPH and support and coursework dedicated to a career in service to the urban underserved, how I hope to practice in the future.”
In summary, the data from existing sources as well as from interviews and meetings with faculty, staff, students and other constituents demonstrate the many strengths in our curriculum but also the many areas for improvement. The strengths and weaknesses are interrelated across multiple areas and components of the curriculum.

**Lessons learned from the last curriculum review**

We examined past curriculum reviews to understand what succeeded and what didn’t succeed in those processes. Because the last review in particular provided insight and has implications for directions and approaches that may be undertaken in the future, lessons from that review are summarized below.

The 1998-2001 curriculum review took the perspective that the UWSOM curriculum was well designed and well functioning. From the start of the review, the UWSOM was described as an excellent medical school with a contemporary curriculum and excellent students.

The charge specified a comprehensive approach to ensure full consideration of the range of factors that affect the effectiveness of the curriculum including: content issues; structural issues; integration of material across courses; faculty development and incentives to improve teaching and acknowledge teaching efforts; and skills development in areas like critical reading and efficient use of information systems.

The guiding principles specified that the curriculum review should: thoroughly examine course content and teaching methods; emphasize the introduction and appropriate use of contemporary information technology; ensure curricular continuity, with strong themes introduced in the first year and followed throughout the four years; and result in clear lines of responsibility and authority for the administration and management of the curriculum and its component parts.

The fundamental reason given to undertake a review in 1998 was the need to ensure that the curriculum would continue to serve our students well in the future in the face of a rapid pace of scientific discovery and the economic and social pressures changing the patterns of healthcare delivery. This created an important context for the assessment, or “discovery” phase of the curriculum review over the first year. The working assumption was that the assessment phase would:

1) elucidate opportunities to improve the administration of and infrastructure supporting the curriculum;
2) elucidate opportunities to enhance curricular content without changing basic structure; and
3) provide ideas for major innovations in the curricular content, structure, and administration with the potential to stimulate the learning and teaching process for students and faculty.

In short, the initial and continued focus was on identifying and implementing opportunities to improve on a good product. The 1998 curriculum review and revision perpetuated and established the foundation for the current curriculum. While there have been minor changes and adjustments since 2001, the curriculum remains by and large in place at this time. To that end, it is worth describing that curriculum review’s findings and resultant changes.

During the “discovery” year of that curriculum review, relevant factors identified as important for the physician of the 21st century included:

- The rapid pace of scientific discovery, especially in molecular biology;
- Economic pressures that were changing healthcare delivery and that would impact students’ careers;
- Advances in information technology;
- Expected changes in the “business of medicine”;
- Changing patient demographics, with more low income patients, more patients over age 65, and more patients from racial minorities;
- The expectation that physicians would emerge as members and leaders of teams in clinics and would need associated skills for those team settings.
Evidence confirming that the curriculum was doing well included:

- UWSOM medical student performance on the USMLE steps I, II, and III from 1991 through 1998 showed that UWSOM students performed at or above the national mean in total score and percent pass;
- Students successfully matched with desired residency positions; in the previous five years, the percentage of students matching in their top five choices ranged from a low of 82 percent to a high of 96 percent.

Overall needs identified in the discovery phase of the last curriculum review are included as Appendix A and recommendations approved from the curriculum review are included as Appendix B.

The last curriculum review resulted in several key innovations and changes. The College program was started with the goal of implementing and overseeing a comprehensive four-year integrated clinical curriculum and providing a consistent mentor and a year-long, preclinical introduction to clinical skills at the bedside for medical students. Other changes included: initiation of a required neurology clerkship; expansion of the required surgery and chronic care clerkships; formal skills assessment using standardized patients, simulations and structured clinical exams; introduction of a web-based professional skills portfolio for students to measure their progress against learning objectives and developmental benchmarks; a second-year capstone course on transitioning to clinical clerkships; a fourth-year capstone course on contemporary issues, refresher topics and pre-residency skills; modification of the research requirement; and modification of the curricular governance structure to its current form.

Many initial recommendations were not implemented, and no timelines or mechanisms for accountability for implementation and evaluation were put into place.

Many of the factors identified in the last review as needing work are still apparent (some have intensified) and still pertain to the current curriculum, student experience, and status of healthcare and scientific knowledge. This should be taken into account in the upcoming curriculum review/reform process, with mechanisms firmly in place for continued accountability and attention to the initial “discovery” findings related to curricular needs.

**Review of curricula at other medical schools**

The committee reviewed the curriculum of 14 medical schools, listed in Appendix D. These were chosen for their known innovations in medical education, use of regional campuses, and/or emphasis on meeting regional needs. In addition to the formal reports given for these schools, discussions were held about the following new medical schools: Hofstra North Shore and Virginia Tech Carilion.

**Curriculum themes:** Many of these medical schools consciously arrange their curricula around large themes: Genes to Populations (Vermont), Genes to Society (Johns Hopkins), Clinical Presentation (Calgary). These themes direct educational planning and provide an organizing framework for students. Other schools have used broader organizing principles, such as: integrating basic sciences with clinical sciences across the four years with basic science blocks during the clinical years (Rochester); competency-based curriculum, using the school’s own competencies related to program goals and objectives or using competencies adapted from the ACGME; and overt and intensive collaboration with the community in which education is conducted (Vermont and Northern Ontario). The themes direct overall organization and specific instructional units that cross one or more years.

**Curriculum structures:** A number of schools have moved away from the traditional “2 + 2” pattern of basic science and clinical work. Several schools complete the basic sciences in less than two years to allow earlier start of clerkships and/or preparation for USMLE Step 1. Some schools begin with intensive foundations blocks (two to four months) for core basic science concepts from biochemistry, physiology, information management, epidemiology, population-based medicine and evidence-based medicine. Foundation blocks are followed by integrated organ systems blocks.

20
Other schools have introduced one-to-two month blocks of intensive early instruction in basic clinical skills (history and physical examination) so that students may act meaningfully as members of the health care team during their first year. In all instances, efforts have been made to ensure that the basic sciences and clinical sciences are integrated across the curriculum, and that individual courses are taught by multi-disciplinary teams from appropriate clinical and basic science departments. Some schools have developed integrated longitudinal clerkships, continuity experiences that cross discrete clerkships, or introductory clerkships that focus on basics skills needed by clerks, such as writing notes and orders and giving oral presentations. A number of schools have reduced the amount of time for required activities so that students can graduate in less time (Calgary) or are able to pursue unique interests in either research, clinical or basic science instruction. In every instance, the number of distinct courses is significantly less than the number in the UWSOM current curriculum.

Pedagogy: Almost all curricula have reduced lecture-based presentations and increased small-group learning. These small groups utilize a variety of specific techniques, such as problem-based learning, team-based learning and/or case-based learning. The methods are used across the four years of instruction. Educational technology methods (podcasting, online resources, and synchronous and asynchronous communication) are used heavily to reduce lecture time and allow students to complete instruction when away from the main campus. Some schools emphasize collaboration between students and other health professionals. Assessment flows from competencies related to overall themes, with heavy use of simulations and integrative assessments.

Governance: The curricular governance and design are frequently directed by central principals and objectives determined by the school, and discussed and molded in a central curriculum committee. The central committees are elected or appointed as representatives of the various stakeholders in medical education and are responsible for general vision, design, oversight and evaluation of curricular outcomes. The curriculum is implemented by a combination of course committees that are distinctly separate from the central curriculum committee, with the assistance of academic support units.

In summary, the following themes where noted from the medical schools examined: 1) overall competencies (goals and objectives) for the entire curriculum were developed and then courses and clerkships were designed from those competencies; 2) a focus on integration of information into meaningful instructional units that cross clinical and basic science disciplines, with major emphasis on concepts and application rather than memorization; 3) teaching and learning methods with more independent and/or small group learning and less lecture time; 4) assessment methods related to overall objectives and themes of the curriculum; and 5) capitalize on the regional nature of a school while ensuring consistency of core learning goals and objectives.

Recommendations

Rationale for the next curriculum revision process

The University of Washington School of Medicine is considered one of the best medical schools in the nation. In education, the UWSOM is widely and highly regarded for its ability to focus on both primary care and research and for the landmark WWAMI program that provides training for a five-state region. That national status brings added responsibility to be self-critical, innovative while respectful of what works well, and dedicated to producing the best curriculum and best physician.

Since the last comprehensive curriculum review and revision, a number of changes have occurred in the healthcare environment, healthcare and learning technologies, use of learning theory in medical education, and assumptions within medical education. The pace of change and acquisition of new knowledge in medicine have increased even more rapidly over the past 10 years. In addition, the impending shortage of physicians nationally both aggravates the shortage of physicians in the underserved WWAMI region and points to the need among our constituents to train more health professionals for our five-state region in order to meet workforce needs. Finally, attention to changes in the
expectations of students has a strong impact on educational approaches. These factors are explored in more detail below.

Changes in healthcare that have influenced medical education over the past decade include: 1) an increasingly constrained financial climate that requires clinicians to focus on clinical productivity to the potential detriment of teaching; 2) changing requirements at the NIH and an increasingly competitive research environment that draw basic scientists toward increased research and grant-writing and away from teaching; 3) heightened focus on patient safety, quality and efficiency that creates a more constrained teaching environment in the clinical setting and in which students may be seen as potential hazards to patient safety; and 4) increased focus on team-based care and use of non-physician providers, such as nurse practitioners, physician assistants, care coordinators and dieticians.

Technology changes that have influenced medical education over the past decade include dramatic advances in the ability to disseminate information electronically, with applications for teaching (i.e., simulation, anatomy resources), evaluation (i.e., curriculum evaluation systems), health care (i.e., electronic medical records), and teaching and learning methods (i.e., podcasts, live distance multiple-setting learning capabilities, and smaller, more efficient computers, handhelds and smart phones).

Assumptions in medical education nationally and internationally have also changed, some in response to the above factors and others in response to more sophisticated use of learning theory and pedagogy. Contemporary assumptions and recommendations include: 1) heightened focus on competencies (initiated with development of the ACGME competencies) that illustrates the value of integrated, longitudinal, competency-based education, starting with medical school and continuing into the GME environment and beyond into lifelong learning; 2) recognition that active learning provides better understanding and retention than passive learning; 3) increased focus on contextual learning, with use of clinical examples and case-based learning for better understanding, retention and imprinting; 4) focus on concepts rather than facts; 5) understanding that learning styles differ; 6) awareness of “the hidden curriculum” in which students may learn negative habits, biases, and attitudes from their teachers, residents, role models, and others in spite of formal learning in the classroom and on the wards.

As an impending healthcare professional shortage has been identified, the desire of our WWAMI partners to expand the numbers of medical school and residency trainees for their states and regions has increased. At the same time, there must be physical and resource capacity to accommodate all students in Seattle during their second year. The large classrooms in Seattle are barely accommodating the current 220 students per class enrollment. Concerns have been raised about insufficient potential clinical rotation positions throughout the region to accommodate expanded numbers of students. Expansion in the numbers of medical students must be part of any discussion about curriculum change at the UWSOM, including attention to providing the second year at regional sites rather than in Seattle.

In the past, the fact that our medical education program extends across five states has been a rationale for curricular conservatism and for resistance to change. The assumption was frequently stated that large-scale change is difficult to implement across a region. However, prompted by successful examples at other branch and satellite campuses nationally, discussions have increasingly considered the opportunities to pilot and/or undertake different teaching approaches at different sites, so long as standardized objectives and outcomes are documented and achieved. The change is also partly the result of an increased collaboration among medical educators across the WWAMI region and the high quality and sophistication of educational leaders WWAMI-wide. The regional nature of our program is broadly seen to provide the potential for considerable innovation and collaborative sharing of methodology and content.

Student expectations ultimately influence education, and the changes seen among the current generation of students are having a broad impact on medical education. With heightened reliance on electronic resources, today’s students are frequently more technologically adept than their teachers. Classrooms are frequently populated with open laptops, with students multi-tasking. Many students access lecture materials online at home or in the library rather than in the classroom, and ask for even more capacity to do so. One consequence is the call by students for more active learning modalities as they “vote with their feet” by not attending lectures.
The current generation is also very focused on social responsibility and asks to contribute to the greater social good. Unlike the baby boom generation, the current generations in medical school want and expect to combine their interest in socially responsible activities with actual learning in service learning settings.

These factors lead to the need for a different approach and process than in previous reviews. Where the last curriculum review started with the premise that the overall curriculum was in good shape, the discovery phase of the current pre-review process has posed the question, “What works well in the current curriculum and what can be improved?” In addition, Dr. Ramsey has stated that the impending curriculum evaluation and improvement will not occur over a finite period of time but rather will be a continuous, proactive and self-reflective process which is more suitable to a constantly changing healthcare and educational environment.

**Approach to a curriculum review and ongoing curriculum improvement**

The PCRAC members believe the upcoming curriculum review and reform should take the form of a continuous curriculum strategic planning process that encourages innovation, collaborative thinking and planning, assessment of outcomes, and creativity. Sustaining review and change on a continuous improvement basis will provide the opportunity to continually monitor progress and success, adjust goals and timelines as needed, assess evidence-based outcomes, and ensure that all areas in which changes are needed are addressed, including those not immediately identified but that may surface later.

As the healthcare system continues to undergo rapid change and as the amount of medical knowledge continues to expand, the curriculum must be sufficiently fluid and flexible to respond thoughtfully and appropriately. As needed changes are identified, pilots can be developed, implemented, measured and assessed. In identifying potential revisions, it will be important to assess which potential changes are “low hanging fruit” with reasonable and achievable budgets and resources and which potential changes require greater expenditures of time and financial investment. While time and financial investment should not be factors that impede development of an excellent curriculum, schedules related to curricular change must provide reasonable expectations of when changes can occur and if and how funds can be developed for needed change over time.

An ongoing, iterative curriculum strategic planning process permits latitude and room for experimentation. Several areas of the curriculum may undergo change simultaneously; modifications can be piloted and improved over time, with outcomes monitored using best available metrics. As these are successful and impact the curriculum, the modifications may generate further curricular changes. There also may be opportunities for more dramatic changes in the curriculum, such as modifying the current organ-system approach to a different approach or assuming an overriding thematic approach to the curriculum. The process should therefore consider ongoing, iterative changes that can be undertaken sequentially and also consider potential large-scale changes that reflect a fundamentally different approach to medical education.

**Context for a successful strategic curriculum planning process**

The curriculum strategic planning process should be inclusive of all stakeholders, including School of Medicine faculty and participants across the continuum of educational programs, the WWAMI region, regional and community representatives, students, graduates, and practicing physicians. The curriculum review process should be transparent, with frequent communication within and among the broader School of Medicine community and stakeholders.

The support of senior leadership—the dean, vice deans, and the Medical School Executive Committee—for development of an outstanding and contemporary curriculum is essential for the success of curricular changes and refinement. To that end, we ask leadership to communicate commitment to the faculty.
Two enduring values of the curriculum should remain unchanged and unchallenged in all present and future endeavors. These are: 1) students’ understanding and action upon that understanding that shared responsibility for patient welfare comes first, including before students’ own educational needs; 2) the School of Medicine is committed to a learner-centered educational environment that respects students, acts in their best interests, protects them from harm and negative experiences, and provides meaningful and positive learning experiences. Working with and for patients and students is an honor that must be respected. Similarly, faculty must be valued for their commitment and their contributions as care providers and teachers.

**Guiding principles**

Guiding principles are defined as “any principles or precepts that guide an organization throughout its life in all circumstances, irrespective of changes in goals, strategies, type of work, or the top management.” [Definition taken from http://www.businessdictionary.com/definition/guiding-principles.html](http://www.businessdictionary.com/definition/guiding-principles.html) The PCRAC identified the following guiding principles for the upcoming curriculum strategic review and planning process:

- Curriculum strategic planning should consider current and future **patients**, including the diseases and conditions most likely to require considerable medical attention, the cultural and socioeconomic factors that influence patient lifestyles, health and disease (including health disparities and inequalities), and the need for patient safety;
- Curriculum strategic planning should consider the **characteristics and needs of current and future students**. These include the qualities and cultural and generational attributes that define, limit and guide our students, and existing knowledge about how they learn and what will help them best adapt and learn in a constantly changing world;
- Curricular strategic planning should consider the structure and requirements of current and future **healthcare systems**, including learning opportunities and constraints inherent within the system(s); how the healthcare system incorporates and works with the interprofessional healthcare team; its financial structures, constraints and opportunities; and the environments in which health care is and will be provided.
- The curriculum strategic planning should consider current and future **information and medical technologies**: how these technologies influence healthcare services and settings and how they can best serve our WWAMI region for learning and to optimize clinical care.
- Curriculum strategic planning process must consider the educational and cultural richness inherent in our **geographically dispersed WWAMI regional education system** and embrace that breadth and depth as an opportunity; different educational settings can learn from one another and share best methodological practices, while striving towards standardized, common objectives and outcomes
- Curricular strategic planning should consider the knowledge and understanding of **pedagogy and learning theory** to ensure that teaching and learning are consistent with the best information and approaches available. This involves respecting what works well in the curriculum while improving or changing what does not work well. It also involves acknowledging where our curriculum leads in innovation and working to make those innovations known to a broader audience; scholarship and involvement in national education organizations thus become key activities.
- The curricular strategic planning should consider **communities of practice** as an effective educational and collaborative model. Communities of practice characterize two of the School of Medicine’s most successful and satisfying innovations: the Colleges program and the WWAMI medical education program. Communities of practice build identity and develop community among and within students and faculty, as well as foster collaboration, reflection, and efficiencies. The ongoing curriculum strategic planning process should look for ways to incorporate communities of practice to enrich student learning and experience and to develop, build and enrich faculty teaching, learning and experience.

**Areas Identified for change**
In our discovery work, several areas have surfaced repeatedly from multiple constituent groups; these should receive early and frequent attention and will be foundational to curriculum reform. They include: 1) developing more and better active learning opportunities for medical students in the pre-clinical phase of their education; 2) developing mechanisms for balancing curricular content and reducing student contact hours; 3) increasing the integration of the curriculum vertically (across years) and horizontally (within a year) and 4) creating flexibility in the curriculum to allow students to individualize their training.

Active learning can take different forms in different courses. Focusing solely on one teaching modality (e.g., problem-based learning, team-based learning) for all courses probably does not provide the advantages of a hybrid approach. In addition, many active learning approaches require more teachers than may be available; therefore, approaches to active learning must realistically consider available resources. Some use of lectures can provide a dynamic process so long as lectures are thoughtfully prepared, provide clinical correlations, and work to engage students in active thinking and learning. Case-based learning should be possible in most, if not all, settings, and will benefit from collaboration between basic scientists with clinicians to develop or identify optimal clinical cases.

Balancing curricular content and reducing student contact hours will permit students to better engage in their learning, provide more flexibility for activities such as service learning, preceptorships and interprofessional education, allow time for students to reflect on their learning and refine their self-learning processes; avoid creating competition among different components of the curriculum that forces students and faculty to choose options for suboptimal reasons; and permit time for critical new areas in medical knowledge to emerge and assimilate into the curriculum.

Integration of the curriculum horizontally (within courses in a year) and vertically (across years) provides the type of “spiral” learning and integration of learning that educational theory advocates; students are better able to build upon existing knowledge and skills and deepen their understanding over time in a continuous process. Integration also builds critical thinking abilities and an understanding of the “whole” as opposed to the parts. Focusing on integration early and often in the curriculum strategic planning process also permits the potential development over time of different approaches to the curriculum at a “macro” level.

Creating flexibility in the curriculum will allow students to individualize their training as they decide the course their future career will take. Students may decide to complete an MPH during medical school, they may participate in a significant research project over the course of a year or two, or they may decide to spend a significant amount of time doing international work or they may decide. Allowing flexibility in the curriculum provides students the opportunities to maximize their learning and enhance their ability in improving the health of the public.

A tool that will help to advance the points noted above is undertaking comprehensive curricular mapping of course and clerkship content in order to identify all topics and concepts being covered across the curriculum. This will identify repetition, duplication and dissemination of topics, as well as identify topics not covered. Ultimately, curricular mapping will enhance integration, collaboration, and an understanding of developmental progression within the curriculum.

Keeping these areas as a foundation of recommendations, we propose that the curriculum strategic planning process should be broad in scope, include all years of the curriculum but with a particular focus on the preclinical years, and incorporate the following:

Focus on Objectives and Outcomes

- Define expected outcomes prospectively, evaluate outcomes at each stage of training and each point in the curriculum with the best metrics available, define and evaluate success, and set future directions based on progressive achievement of outcomes;
- Incorporate the six ACGME competencies into the undergraduate setting; these could serve as the foundation for benchmarks across the four years;
Focus explicitly on critical thinking skills and the integration of basic science and clinical practice throughout the curriculum;
Integrate knowledge and skills across disciplines within courses or blocks. (for example, integrate content from pathology, physiology, anatomy, and pharmacology in the study of organ systems and their diseases, or microbiology, immunology, pharmacology, physiology, and public health in the study of infectious diseases);
Increase the combined leadership and participation of clinical faculty in basic science courses and basic science faculty in clinical settings;
Build on the work done in the Colleges in development and use of benchmarks for knowledge and skill development, incorporating this approach to all levels of training and coordinating benchmarks from first through fourth year;
Focus on helping students achieve the core knowledge, skills and attitudes they need while providing flexibility for individual student interests, learning styles, and needs.

Advance a Continuum

- Work to integrate the continuum of training from pre-medical education to undergraduate preclinical to undergraduate clinical to graduate training, and through lifelong learning;
- Include early and meaningful clinical experiences for medical students, including inpatient and outpatient experiences, and incorporate continuity experiences;
- Support and enhance the Independent Investigative Inquiry (III) to provide all students the opportunity to complete a scholarly project;
- Provide a meaningful and relevant transition to residency education during the fourth year and more productively use time in the fourth year.
- Incorporate evidence-based medicine principles into the curriculum.

Acknowledge the Broader Context of Medicine

- Incorporate the social determinants of health and the clinical context of health, disease and the practice of medicine into the curriculum;
- Incorporate important scientific, professional, interpersonal, cultural and social aspects of medicine into the curriculum;
- Provide practical skills in critical thinking, scientific methods, management and evaluation of information and problem solving;
- Support and expand service learning opportunities to provide contextual learning related to the social aspects of medicine.

Implement New Training Modalities that Address Present and Future Healthcare Needs

- Support and expand use of simulation for all phases of medical education, from preclinical to clinical;
- Support and expand interprofessional training;
- Focus on information management and evaluation;
- Create flexibility in the curriculum to allow students to individualize their training.

Support Faculty

- Provide appropriate faculty development opportunities for teachers locally and regionally;
- Implement a teaching academy for basic science faculty to support teaching efforts or a teaching academy that focuses on integration of basic and clinical sciences faculty;
- Ensure that relevant teaching experiences are considered and utilized in promotion criteria, annual performance reviews with chairs, and compensation packages and ensure that credit and financial reimbursement for...
teaching and course leadership are affiliated with appropriate administrative/departmental units, including ensuring linking credit and financial reimbursement more directly to teaching and course leadership responsibilities.

**Update the Curricular Governance**

Implementing these areas of recommendations will require a fundamentally different governance structure. Ensuring efficient and successful ongoing curriculum improvement will require effective and highly functioning curricular oversight. Therefore, determining and enacting changes to the governance structure should be an immediate undertaking of the curriculum strategic planning process.

As a first step, the PCRAC recommends development of a visioning oversight committee. That committee, in collaboration with the Faculty Council on Academic Affairs and the Vice Dean for Academic Affairs, should be responsible for assessing and addressing the overall governance structure. The visioning committee should include representatives from major School of Medicine constituencies with broad perspectives on the education of physicians. This will include appropriate deans, faculty with key educational roles, and professional education staff. The group may be appointed or elected, and may have formal reporting responsibility to the elected Faculty Council on Academic Affairs and the Vice Dean for Academic Affairs. The visioning committee will be responsible for a high-level visioning of the overarching goals, objectives and outcomes of the curriculum with a robust mechanism for continuous monitoring and adjustments of content, education practices and outcomes. The committee will have the responsibility for oversight of the curriculum and the authority to direct the activities of other governance committees.

In discussions, the PCRAC examined possible governance structures and offers the following structure as suggestions to be considered:

- Conceptualize and implement a governance structure that includes the authority and responsibility for curriculum design and that includes visioning, designing, developing, implementation, evaluation and managing;
- Develop clear policies and/or bylaws that describe responsibilities and authority granted to each governance committee, and that describe relationships between the committees and to the faculty as a whole.
- Consider establishing a system that embodies the functions of the curriculum, as follows:
  - Intermediate-level committees responsible for overall coordination and intermediate tasks. For example, there may be a committee responsible for oversight, development and implementation of the first and second year course and another for the third and fourth year courses. Committees may report to these committees representing a segment of the curriculum (for example, there may be a committee specifically for the first year). These committees may comprise representatives from the various course committees as well as appropriate educational professionals, deans, and administrative staff.
  - There may also be a series of block/course/clerkship committees to implement and manage the curriculum, separate from the activities listed above. At the smallest level, these committees may consist of course or clerkships committees comprised of representatives in appropriate disciplines, clinical and basic science, interprofessional groups and students.
  - An evaluation committee that supports the evaluation activities of individual course and segment committees and that coordinates evaluations for the curriculum as a whole.

While the PCRAC recognizes the governance structure may vary from what is suggested above, committee members emphasize the importance of developing a structure that optimizes integration, continued dialogue, self-reflection, and appropriate action.

The diagram for the curriculum design/management process is included as Appendix E. The diagram for a possible governance structure is included as Appendix F.
Recommendations for implementing the second year of medical school in the WWAMI region

The subcommittee charged to examine regional expansion started from the premise that there are insufficient numbers of medical school graduates to meet the workforce needs of the WWAMI region and that Seattle cannot accommodate larger numbers of students due to limited physical facilities. In addition, the size of the current second-year class in Seattle (220 students) already stresses available resources and is an impediment to small-group teaching.

In general, the subcommittee proposes that a pilot program providing second year of medical education in the region start with the 2013-4 academic year at one or more WWAMI sites, depending on availability of funding. The pilot second-year class would consist of 16 to 24 students at a site. Each class would populate a College. The pilot program would be a regional campus with the same curricular goals and objectives as the Seattle campus. A common syllabus would contain the core content for each course. Common final exams would be used between the pilot site(s) and the Seattle site. The faculty at the pilot site(s) could utilize the teaching methods they feel are most appropriate to teach the core course content. This will allow taking advantage of small-group settings to employ active learning modalities rather than using a primarily lecture-based model. The subcommittee envisions that the majority of contact time would be spent consolidating and integrating knowledge in the small-group setting rather than using lecture-based content delivery, with an overall reduction in contact time.

While some specific lectures or sessions might best be delivered using remote connections with Seattle-based instructors, the subcommittee does not envision a pilot as primarily a “distance learning” model. Certain topics will require specific content experts who can be either locally based or Seattle based. Some second-year sites may have less access to local content experts than others. Therefore, innovations within a pilot program can be utilized in other sites without the full range of local content experts.

Some key points related to a pilot include: the need for identical examinations across sites given at the same time; sufficient videoconferencing infrastructures at both Seattle and pilot sites, with large and small classrooms at the pilot site outfitted for synchronous videoconferencing with Seattle; faculty at pilot sites working with Seattle-based course chairs to adapt existing course content to a small-group model and incorporating faculty development; adequate support staff, personnel and student services at pilot sites; and careful program evaluation to ensure equivalent educational outcomes and to evaluate innovations that may be applicable to other sites including Seattle.

Conclusions and looking ahead

The School of Medicine is entering an exciting educational period. There is widespread acknowledgement that the UWSOM curriculum needs both foundational and specific changes, particularly in the pre-clinical phase.

Overall in the proposed curriculum strategic planning process, undertaking change should be ongoing, iterative and strategic. Rather than a curriculum review and reform that occurs over a defined time period, the proposed process is similar to the UW Medicine strategic planning process in its continuous improvement approach.

The WWAMI program has entered what some refer to as “WWAMI 2.0,” a new generation in which WWAMI consists of eight integrated sites, including Seattle; that integration is an essential, rich, and vital part of the curriculum. Expansion of WWAMI and plans for second-year pilots introduce exciting opportunities to innovate region-wide. Piloting second year at regional sites provides opportunities to test innovative teaching approaches and track them closely, with the potential for incorporating them at other settings, if successful and as relevant to other settings. However, it is not necessary to have duplicate teaching models and curricula at all sites; one of the very exciting opportunities is the ability
to vary curricular and teaching approaches at different regional sites, depending on the needs of the sites, while maintaining standardized objectives and outcomes.

The appointment and impending arrival of our first vice dean for academic affairs to be recruited to the UWSOM from a different setting will provide a stimulus for change and fresh leadership, ideas, and approaches. Dr. Cosgrove has led key curricular innovations in her career at University of New Mexico School of Medicine and will bring tremendous insights and leadership to the strategic curricular planning process.

Overall, the pre-curriculum advisory committee members look ahead with hope and enthusiasm, as do the members of our community with whom the committee interacted. It is time for change. The UW School of Medicine has always been a national leader, and we are ready to lead the nation to a new era of curricular excellence with a strong focus on the needs of the WWAMI region.

The committee members have appreciated the opportunity to closely examine the strengths and needs of the UWSOM curriculum. Providing the committee with the resources to focus on the curriculum for a sustained period of time has resulted in a creative and collaborative process involving hundreds of individuals and groups throughout the region. We welcome the opportunity to discuss this report broadly and to participate in the processes that result from its findings and recommendations.
TABLE 1: MEDICAL SCHOOL CURRICULUM 2011-2012

<table>
<thead>
<tr>
<th>YEAR I</th>
<th>YEAR II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hubio 510 P-Microscopic Anatomy: Histology 6</td>
<td>HuBio 540 P-Cardiovascular System 6</td>
</tr>
<tr>
<td>Hubio 511 P-Gross Anatomy and Embryology 13</td>
<td>HuBio 541 P-Respiratory System 4</td>
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<td>Hubio 513 P-Introduction to Clinical Medicine I 3</td>
<td>HuBio 542 P-Introduction to Clinical Medicine II 4</td>
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<tr>
<td>Hubio 514 P-Biochemistry I-A 4</td>
<td>HuBio 543 P-Principles of Pharmacology I 5</td>
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<tr>
<td>Hubio 516 P-Systems of Human Behavior 5</td>
<td>HuBio 547 P-Pathology II A 5</td>
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<td>HuBio 590 P-Medical Information for Decision Making 1</td>
<td>HuBio 548 P-Cases in Clinical Ethics 1</td>
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<td>HuBio 512 P-Mechanisms in Cell Physiology 5</td>
<td>HuBio 562 P-Urinary System 4</td>
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<tr>
<td>HuBio 522 P-Introduction to Clinical Medicine I 4</td>
<td>HuBio 530 P-Clinical Epidemiology and Evidence-Based Medicine 2</td>
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<tr>
<td>HuBio 523 P-Introduction to Immunology 2</td>
<td>HuBio 550 P-Introduction to Clinical Medicine II 5</td>
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<td>HuBio 567 P-Skin System 2</td>
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<td><strong>Total Credits Year I</strong> 73</td>
<td><strong>Total Credits Year II</strong> 78</td>
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| HuBio 597/595 Independent Investigative Inquiry 8 |
| Non- Clinical Selectives Stand alone first and second year requirement 4 |

<table>
<thead>
<tr>
<th>Required Clinical Clerkships Year III *</th>
<th>Required Clerkships Year IV and Clinical Electives *</th>
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<tbody>
<tr>
<td>Family Medicine 12</td>
<td>Emergency Medicine 8</td>
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<tr>
<td>Internal Medicine 24</td>
<td>Rehab Medicine/Chronic Care 8</td>
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<td>Obstetrics/Gynecology 12</td>
<td>Neurology 8</td>
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<td>Pediatrics 12</td>
<td>Surgery Selectives 8</td>
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<tr>
<td>Psychiatry 12</td>
<td>Clinical Electives 32</td>
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<tr>
<td>Surgery 12</td>
<td>Capstone II 2</td>
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<td><strong>Total Credits Year III</strong> 84</td>
<td><strong>Total Credits Year IV</strong> 66</td>
</tr>
</tbody>
</table>

*One week of a Required or Elective Clinical Clerkships = 2 Credits

**TOTAL MINIMUM CREDITS REQUIRED TO GRADUATE** 313


Hodges BD. A Tea-Steeping or i-Doc Model for Medical Education? Acad Med. 2010; 85:S34-S44.


Mallon, WT, Jones, R. How Do Medical Schools Use Measurement Systems to Track Faculty Activity and Productivity in Teaching? Acad Med. 2002; 77:115-123.


APPENDIX A

RECOMMENDATIONS FROM DISCOVERY PHASE OF 1998-2001 CURRICULUM REVIEW

Preclinical:

- Reduce the hours of lecture-based course material;
- Introduce more case-based material;
- Increase the emphasis on history and physical in Introduction to Clinical Medicine;
- Increase the use of PBL, including cross-discipline PBL;
- Have small group sessions in the first two years that provide the opportunity to assess communication skills;
- Address concerns identified about number of hours devoted to anatomy and histology and relevance of pharmacology materials.

Clinical:

- Increase the focus on case presentation skills and feedback in clerkships;
- Assign and coordinate specific areas of the history and physical within the context of each clerkship based on the most common clinical problems seen in those areas;
- Increase the use of clinical modeling, feedback and clinical presentations in the clerkships;
- Increase integration of basic science into the 4th year;
- Emphasize clinical decision-making throughout 4th year;
- Provide more counseling to students in selecting 4th year electives;
- Emphasize clinical decision-making throughout the fourth year curriculum;
- Provide more structure and administrative oversight of electives offerings;
- Examine the impact of structural issues such as quarterly tuition and financial support for WWAMI-based clerkships;
- Develop a subinternship or “boot camp” near end of fourth year, emphasizing clinical exam skills, technical procedures, teamwork and leadership skills, basic medical record management skills, basic order writing, and lifelong learning skills;
- Address concerns identified about limited exposure to surgery, absence of a neurology rotation, structure of the chronic care clerkship and absence of requirement for ACLS certification.

Crosscutting:

- Ensure that the environment (quantity of material, stress levels, etc.) provides room for active learning;
- Ensure that the evaluation system rewards active learning rather than passive memorization;
- Ensure that each course has clear performance expectations;
- Increase emphasis on critical reading and information acquisition skills;
- Increase direct observation of the clinical and analytical skills of students;
- Recruit and develop “master teachers” to coordinate skills training across the curriculum;
- Increase the interaction of course faculty and of HuBio and clerkship faculty;
- Increase direct observations of the clinical and analytic skills of students;
- Ensure a balance of teaching modalities;
- Ensure that each course has clear performance expectations;
- Develop/require a performance-based evaluation and feedback;
- Develop guidelines for learning goals and objectives, clinical experiences and teaching materials;
- Make increased use of tools like the web to conduct peer reviews of content;
Promote self and peer review among students as preparation for lifelong learning;
Increase use of objective, standardized performance-based testing for clinical skills and synthesis-based testing (OSCEs, SPs, videotaping);
Require continuity of care preceptorships, continuity clinics, and family health experiences;
Enhance the vertical advising system;
Add specialty counseling opportunities;
Increase the availability and quality of mentoring;
Examine the physician assistant curricular approach;
Increase the use of interdisciplinary teams;
Use JAMA series to track, develop and reinforce skills over time;
Increase didactic training in epidemiology and related disciplines;
Incorporate use of computers in all aspects of the courses/clerkships;

Curriculum oversight and faculty development

Provide a more hands-on approach in existing or restructured curriculum committees;
Increase/enhance communication among and between faculty who are actively engaged in teaching;
Organize faculty development around goals and objectives of the curriculum;
Require peer evaluation of course chairs and faculty to complement the student evaluations of courses;
Ensure that methods of evaluation reinforce the curricular goals and objectives;
Use key word system to perform a content analysis of the curriculum;
Develop guidelines for learning goals and objectives, clinical experiences and teaching materials;
Create recruitment and/or training strategies to foster integrated teaching of basic sciences and their clinical applications;
Assess the alignment of resources and incentives to enhance and reward teaching skills, including where teaching is expended and how it is compensated, erosion of teaching time due to clinical/research productivity requirements; incentives at the department and course chair level to support teaching effort and systems and structures such as mission-based budging or a “teaching practice plan” to determine if such systems would lead to more appropriate compensation and promotion credit for teaching effort and excellence;
Provide consistent technical and staff support for managing course logistics and preparing course materials;
Require peer evaluations of course chairs and faculty to complement the student evaluations of courses;
Appendix B
Approved Recommendations from Last Curriculum Review for Changes to the Curriculum

As a consequence of the “discovery phase,” a set of recommendations was approved for planning in the second year, with the third year to be devoted to implementation. The recommendations made are summarized below.

Pre-matriculation

Entering students will be expected to possess a basic level of computer literacy and to obtain training prior to entry if there are deficiencies. This will change the focus of the new student orientation session on informatics to discovery and use of information (information literacy).

Year One

Assignment of all entering students to one of five “colleges” to provide a consistent student/faculty relationship throughout the students’ tenure in school; to provide a better sense of student identity within the student body; and to provide a core faculty focused on enhancing continuity of curricular content and student experience throughout the students’ medical student years

Use of a web-based Professional Skills Portfolio for students to establish and measure progress against learning objectives and developmental benchmarks (SOM-defined and self-defined) throughout the four years of medical school: The Portfolio will incorporate developmental objectives in five areas – professionalism and ethics, communication, clinical reasoning, diagnostic skills, and information literacy – for each year of medical school. It also serves as a key element of the foundation for student interactions with their college faculty member.

Students will be required to complete a community-based clinic continuity experience of one-half day per week for three quarters in either their first or second year of medical school. Although there will be no recommended changes in the HuBio courses in the first or second year, students can expect to see more use of clinical examples and an increased emphasis on critical thinking and integration of material.

Year 2

The ICM 2 course will serve as the foundation for the intensive phase of the “college” experience. The ICM 2 course will be taught by 30 college faculty at six Seattle-area hospitals. Each of the colleges will have six faculty and thirty-six 2nd year students. Thus, each faculty member will work intensively with a cadre of six 2nd year students throughout the year. There will have been contact between the faculty member and these six students in the first year, and the relationship between the faculty member and these six students will continue throughout the third and fourth years through personal contact and web-based dialogue around the Professional Skills Portfolio.

Students will complete the first of two formal OSCE-style skills assessments in the spring quarter of the second year. These assessments will be “station exams” that make use of standardized patients, simulations and structured clinical exams designed to provide a comprehensive assessment of student progress. The results of the exam will provide an important basis for dialogue and planning between the student and their college faculty mentor.

Toward the end of spring quarter, students will participate in an informatics workshop to prepare them to use clinical information systems they will encounter in their clerkship years. The focus will be on the UW clinical digital library for patient care questions and remote connectivity at non-UW locations and alternative information systems. The content would include topics such as finding and appraising evidence, using electronic medical records, coding, problem lists, and security issues and access control.
Required Clerkships

The clerkship years will include several new and expanded courses, including:

- A required four-week Neurology clerkship;
- An expanded Surgery clerkship with additional emphasis on the surgical sub-specialties and outpatient evaluation of patients.

Students will have access to a web-site to support their decisions regarding elective clerkships. This site will include recommended curricula from each clinical department, an overview of the learning objectives and content each elective clerkship, and evaluative information from students for each elective.

Fourth year

Students will complete the second of two formal skills assessment periods in fall or winter quarter. This will provide a foundation for dialogue with their college faculty, including steps required to remediate any problems identified in the exam.

All students will be required to participate in a “capstone course” held during the two weeks preceding Match Day. The first week will focus on a range of topical issues (e.g., risk management, health care finance, ethical issues) and refresher topics such as clinical pharmacology. The second week will concentrate on pre-residency skills such as technical procedures (IV’s, NG tubes, etc.), medical record management, note and order writing, and stress management. During the two weeks, there will be an opportunity to obtain ACLS certification for those students who have not obtained their certification in the Emergency Medicine clerkship.

Faculty perspective

The major enhancements from the faculty perspective will occur in three areas:

- More direct involvement in, and accountability for, the management and oversight of the curriculum;
- Enhanced support for course chairs;
- Increased support and recognition for teaching quality and effort.

Management and oversight

The existing structure of a HuBio and Clinical Clerkship Curriculum Committees will be replaced by four committees – Year 1, Year 2, Required Clerkships, Elective Clerkships & Year 4. These committees will be comprised primarily of course chairs, including WWAMI representatives, and will be chaired by a faculty member appointed by the dean for a specific (e.g., 3 year) term. These committees will be charged to:

- Establish learning objectives for their phase of the curriculum;
- Evaluate student and course performance against those learning objectives; and
- Implement change in response to the evaluation results.

The goal is to achieve a continuous quality improvement (CQI) approach to curriculum management and oversight by increasing the authority and responsibility of the course chairs in the process.
The appointed chairs of the four curriculum committees will comprise a Curriculum Oversight Committee that will be responsible for addressing crosscutting or vertical issues within the curriculum. The members of the Curriculum Oversight Committee will also serve as ex officio members of the Faculty Council on Academic Affairs.

**Support for course chairs**

Additional support for course chairs, clerkship directors, and faculty will include three key components. First, a basic “how to” manual will be developed describing the budget process, sources of evaluative information, and other basic services key to the routine administration of courses. Second, core resources will be provided to assist faculty in placing course material on the web. This will include:

- Assistance in integrating course materials into a common set of software (e.g., PowerPoint);
- Maintenance of the website and server that links the course, administrative functions, curriculum management, and analytic tools;
- Student orientation and training in the common software.

Third, each basic science course and clinical clerkship will be required to have an active course committee that includes basic science and clinical members. The course committees will serve as a resource to the course chair to develop integrated material (e.g., clinical cases for HuBio courses) and achieve an appropriate balance between content and critical thinking in teaching methods and exams.

Administrative accountability at the course level will remain with the departments for the discipline-based HuBio courses and the clerkships. However, the administrative accountability for the interdisciplinary organ system courses will be lodged in the Dean’s office.

**Support and recognition for teaching**

Faculty development course offerings will be organized around a common set of topics including:

- Effective skills and techniques for large group lecture, small group leadership & facilitation, and laboratory-based teaching;
- Effective use of technology;
- Effective teaching of critical thinking, and professionalism and ethics;
- Tools and techniques for providing effective feedback & evaluation; and
- Effective use of simulations in teaching.

These topics will be organized in recommended tracks corresponding to the level of teaching involvement as follows:

- Track 1 (volunteer clinical faculty and regular faculty with limited teaching responsibilities)
- Track 2 (regular faculty with substantial teaching responsibilities)
- Track 3 (educators responsible for training and mentoring other faculty in educational processes and techniques)

These tracks are intended as guidelines and not limitations. Faculty should feel free to access the course offerings they feel are appropriate to their needs and interests.

The course material will be delivered through a variety of media including web-based and/or computer-based (CD/ROM) modules, recurring workshop series with accompanying written modules (WWAMI-based and UW-based), and video-conferences between faculty development course teachers and regular faculty groups (WWAMI-based or UW-based). A more comprehensive structure will be developed to provide evaluation and feedback to faculty on teaching and course effectiveness. The current evaluative information (e.g., student evaluation of courses, USMLE scores, AAMC graduation surveys) will be supplemented with a peer evaluation component and student/faculty interactive feedback to provide a more robust and balanced assessment.
Finally, teaching effort and effectiveness will be treated on a par with other academic contributions in the promotion process. This will require that departments and the Appointments and Promotion Council adopt standards and procedures to rigorously evaluate teaching contributions of faculty.
APPENDIX C

Questions Utilized for Interviews

Basic science, clinical faculty and faculty council members were given the following two sets of statements to review and were asked which statement(s) resonated with them and why. The first set of statements was taken from a paper in the October 19, 2010 issue of *Annals of Internal Medicine* titled, “The Affordable Care Act and the Future of Clinical Medicine: The Opportunities and Challenges” by Drs. Kocher and Emanuel. The second set of statements was taken from the overarching principles for the joint AAMC-HHMI Committee investigations by the Scientific Foundations for Future Physicians (brief summary of selected issues) found at www.aamc.org/scientificfoundations. These are included below:

Future of Clinical Medicine: In the near future, physicians will need to be able to provide care to patients and communities in a practice of medicine that includes the following major changes (selected):

- Focusing care around **exceptional patient experience** and shared clinical outcome goals.
- Expanding the use of **electronic health records** with capacity for drug reconciliation, guidelines, alerts, and other decision supports.
- Redesigning care to include a **team of nonphysician providers**, such as nurse practitioners, physician assistants, care coordinators, and dietitians.
- Proactively managing **preventive care** – reaching out to patients to assure they get recommended tests and follow-up interventions.
- Engaging in **shared decision-making** discussions regarding treatment goals and approaches.
- Incorporating **patient-centered outcomes research** to tailor care appropriate for specific patient populations.

Overarching Principles for the joint AAMC-HHMI Committee investigations the Scientific Foundations for Future Physicians (brief summary of selected issues)

Medical education must foster:

- Grounding in scientific principles and knowledge;
- Understanding how current medical knowledge is scientifically justified;
- Curiosity, skepticism, objectivity, and the use of scientific reasoning are fundamental to the practice of medicine;
- Ability to synthesize information and collaborate across disciplines;
- Ability to acquire, understand, and apply scientific knowledge;
- Attention both to the patient as an individual and in a social context;
- Recognition that medical decision making involves uncertainties and risks.

The following table lists specific questions asked groups:

<table>
<thead>
<tr>
<th>Common questions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• What is good about the curriculum?</td>
</tr>
<tr>
<td>• What can be improved in the curriculum?</td>
</tr>
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</table>
Clinical faculty specific questions:
- What qualities and characteristics are you looking for in a future partner in your practice setting?
- Are graduates of the University of Washington School of Medicine the sorts of physicians you would want as partners in the future?

1st, 3rd and 4th year WWAMI student specific question:
- What are your thoughts on having second year of medical school offered in the region?

Residency program directors specific questions:
- Is the current UW medical student curriculum adequately training students for internship?
- Should a subinternship be required for each fourth-year student?
- How can we integrate UME and GME?
- What interaction/integration should we have of public health and medicine and in what form?
- What specific things could be done to prepare the physician of the future?

Basic science chairs/committee member specific questions:
- Is the UW School of Medicine turning out competent medical students?
- Is there enough coverage of the basic sciences in our current curriculum?

School of Medicine Senior Leadership Retreat:
- How would you suggest we integrate basic science and clinical medicine across the curriculum?
- How can we better train our medical students in management of clinical and basic science information and in evidence-based medicine? (asked of basic science and clinical chairs)
- Teaching is a key activity for which our hospitals and clinics are a key venue. Yet clinical duties for faculty and staff are becoming busier over time and there are increasing concerns about safety issues that may limit student involvement in the clinical arena. How can we ensure that medical students have a meaningful role in clinical settings and receive the participatory education they need while respecting clinician schedules and safety concerns? What can hospitals and clinics do to help make this happen? (asked of hospital and other administrators)
- What should the theme, if any, be for our next curriculum? (asked of educational leaders)
- What is a reasonable, doable approach to regional expansion that we can pilot in the next two years? (asked of educational leaders)
- How can we make our curriculum more active and dynamic? (asked of education leaders)
- What are some feasible, practical ways to better integrate UME and GME and build into medical education a strong focus on lifelong learning? (asked of GME leaders)
- The medical school has several key financial needs: scholarships for students, expanded space, (optimally a new building in Seattle) and funding for a pilot second year in one or two regional sites. What approaches are best to use in meeting one or more of these needs for funding from the perspective of donors, media, community outreach, and/or marketing? (asked of communications and advancement leaders)
Columbia University
Duke University
Florida State University
Johns Hopkins University
McMaster University
New York University
Northern Ontario School of Medicine
University of Alabama at Birmingham
University of Arizona
University of Calgary
University of California San Francisco
University of Medicine and Dentistry of New Jersey
University of Pennsylvania
University of Rochester
University of Vermont
University of New Mexico
University of Minnesota
APPENDIX E

Curriculum Design and Management Process

- **Visioning**
  - Determining needs
  - Establishing goals, outcomes
  - Educational philosophy and principles

- **Managing**
  - Maintaining process of teaching and learning after Development

- **Designing**
  - Establishing broad outlines and components of curriculum

- **Evaluating**
  - Initial assessment of success leading to on-the-fly changes

- **Developing**
  - Developing materials, schedules, presentations, activities

- **Implementing**
  - Starting the process of teaching and learning
Possible Governance Structure

**Vision & Design Committee**
Responsible for establishing broad curriculum goals, determining educational principals and curriculum components, curriculum outcomes. Includes stakeholder representatives from school who have a broad view of physician education, Deans and professional staff.

- **Visioning**
  - Determine need; establish goals, outcomes; incorporate educational philosophy and principles

- **Designing**
  - Establish broad outlines and components of curriculum

**Curriculum Committee (Phase I, II, III)**
There is one for each phase of the curriculum. Responsible for developing, implementing and managing courses within its phase, and communication/integration with other phases. Include representatives from Visioning and Design committee, course or clerkship directors, students, Deans and professional staff.

- **Developing**
  - Develop materials, schedules, presentations, activities

- **Managing**
  - Maintain process of teaching and learning after development

- **Implementing**
  - Start the process of teaching and learning

**Evaluation Committee**
Responsible for evaluation of all curriculum committees, individual course, and the curriculum as a whole. Includes representatives from other committees as needed.

- **Evaluating**
  - Initial assessment of success leading to changes