

CEP INTERNAL CURRICULUM REVIEW SUBCOMMITTEE GROUP AND TEAM REPORTS

JUNE 14, 2016

CEP INTERNAL CURRICUUM REVIEW SUBCOMMITTEE

Faculty	Title	Department
Lavjay Butani, MD (Chair)	Faculty	Pediatrics
John Payne, MD	Faculty	Physiology
Craig Watson, MD	Faculty	Neurology
Melody Hou, MD	Faculty	OB-GYN
Sam Clarke, MD	Faculty	Emergency Med
Aaron Danielson, MD	Faculty	Emergency Med
Aimee Moulin, MD	Faculty	Emergency Med
Kristin Olson, MD	Faculty	Pathology
Brian Pitts, MD	Faculty	Anesthesiology
Deborah Ward, PhD, RN	Faculty	Nursing
Medical Students		
Leona Shum	MS-3-4	SOM
Ashley Clark	MS-3-4	SOM
Kristin Cutler	MS-3-4	SOM
Talin Arslanian	MS-3-4	SOM
ian Kim	MS-2-3	SOM
Residents/Fellows		
Adam Dougherty, MD	Resident	Emergency Med
John Javien, MD	Resident	Medicine
Olivia Campa, MD	Resident	Medicine
James (Jake) Becker, MD	Resident	Surgery
Nick Sawyer, MD, MBA	Fellow	Emergency Med
Health Sciences Library		
Amy Studer, RN, MSN, MSLIS	Health and Life Sciences	Blaisdell Medical Library
OME OSLER		
Joanna Arnold, PhD	Director-OSLER	OME
OME Curriculum		
John Drummer	Acad Coordinator	OME
Ryan Traynham	Director-Curriculum	OME
Polly Latow	Manager-Clinical Curriculum	OME
Susan Gardinor	Manager-Preclinical Curriculum	OME
Carol Howle	Analyst	OME

**CEP Internal Curriculum Review
Subcommittee Group and Team Membership,
Questions, Data Sources**

Subcommittee Website

<https://mycourses.ucdmc.ucdavis.edu/portal/site/ab07b27a-804c-47fb-a175-dc715f02a9c8/page/6c90cf4b-f676-4a43-a3b2-afd8db464fab>

Group 1: Goals and Objectives

Sam Clarke, MD (Group
Leader) Ian Kim, M2
Talin Arslanian, M3
John Drummer, OME Staff

Questions

1) How well do the stated goals and objectives of the program match the real and/or perceived need for the program?

Data Sources

Published Mission(s) of the School, 2013 LCME self-study, 2015 AAMC GQ, Interviews with Leaders: Dean Freischlag, Mark Servis (Senior Associate Dean for Medical Student Education), Edward Callahan (Associate Dean for Academic Affairs), Lee Jones (Associate Dean for Student Affairs), Mark Henderson (Associate Dean for Admissions), Darin Latimore (Associate Dean for Student and Resident Diversity), Frank Sousa (Assistant Dean for Admissions), Peter Franks (Chair, Admissions Committee), Saul Schaefer (Director, Physician Scientist Training Program), Tonya Fancher (Director, TEACH-MS, ACE-PC, SJV Prime), Suzanne Eidson-Ton (Director, Rural Prime)

Groups 2 and 3: Resources and Environmental

Support Craig Watson, MD (Group Co-Leader)

Brian Pitts, MD (Group Co-Leader)

John Payne, PhD (Group Co-
Leader) Aaron Danielson, MD

Lavjay Butani, MD

Sam Clarke, MD

Kristin Olson, MD

Olivia Campa, MD

Ashley Clark, M3

Kristin Cutler, M3

Susan Gardinor, OME

Staff Ryan Traynham,

OME Staff John

Drummer, OME Staff

Questions

1) How adequate are the resources available (space, money, personnel, equipment, etc.) in relation to meeting the program's stated objectives?

2) How well does the environment support the students/faculty/staff/administrators in accomplishing the program's goals and objectives (funding, support)?

Data Sources

2015 AAMC GQ, SOM Budget, 2015, SON Budget, 2015, SOM Website, Level 2 Course Review Data, 2012-2016, Interviews Leaders/Managers: Mark Servis (Senior Associate Dean for Medical Student Education), Roy Rai (Assistant Dean for Medical Education), Ryan Traynham (Director of Curriculum and Education Technology), Brian Pitts (Director of Online Learning). Online Education Workgroup Report (2013), Center for Curricular Innovation Proposal(2016)

Group 4: Program Design

Joanna Arnold, PhD (Group Leader)
John Payne, PhD
Melody Hou, MD
Lavjay Butani, MD
Jake Becker, MD
Leona Shum, M3
Polly Latow, OME Staff

Questions

- 1. How well based is the program design in relation to sound educational theory (adult learning, cognitive load theories etc.) and practice (integration, clinical relevance, block structure of courses, LIP versus block clerkships) and in relation to student wellness?*
- 2. How effective is the process for on-going monitoring and quality improvement for the curriculum as a whole?*

Data Sources

Educational literature, UC Davis graduation competencies, course syllabi, materials from small group/TBL sessions, assessment tools, summary documents including the IOR Milestone Survey (2012- 13), Competency Assessment (LCME 2014), Competency Subdomain Milestone Report (LCME 2014), individual interviews with selected faculty and IORs, and focus groups with first-fourth year medical students.

Group 5: Competency Teams (Six Teams)

5.11: Patient Care

Melody Hou, MD (Team Leader)
Aaron Danielson, MD
John Javien, MD
Talin Arslanian, M3
Ryan Traynham, OME
Staff Polly Latow, OME
Staff

5.22: Knowledge

Craig Watson, MD (Team Leader)
Kristin Olson, MD
Aaron Danielson, MD
Jake Becker, MD
Ian Kim, M2
Amy Studer, Library
Susan Gardinor, OME Staff

5:3: Communication Skills
Olivia Campa, MD (Team Leader)
Lavjay Butani, MD
Deborah Ward, PhD, RN
Ashley Clark, M3
John Drummer, OME Staff

5.44: Professionalism
Kristin Olson, MD (Team Leader)
Lavjay Butani, MD
Jake Becker, MD
Kristin Cutler, M3

5.55: Systems-based Practice
Adam Dougherty, MD (Team
Leader) Aimee Moulin, MD
Nick Sawyer, MD
John Drummer, OME Staff

5.66: Life Long Learning
Joanna Arnold, PhD (Team Leader)
John Payne, PhD
Brian Pitts, MD
Lavjay Butani, MD
Leona Shum, M3
Amy Studer,
Library
John Drummer, OME Staff

Questions

TEAMS: For each competency, what is the plan for targeted instruction to ensure mastery and how is mastery being assessed and documented?

GROUP AS A WHOLE: How well is instruction/assessment balanced across all six competencies throughout the curriculum as a whole (eg. are there competencies/assessment that are over or under emphasized?)

Data Sources

Educational literature, Graduation Competencies and Milestones, IOR Milestone Survey (2012-13), Competency Assessment Grids (LCME 2014), Competency Subdomain Milestone Report (LCME 2014), 2015 AAMC GQ, 2013 AAMC GQ, surveys of third year and EM IORs, reports of subgroups and task forces (eg. Systems science group, Curriculum Review Subcommittee), consultations with curriculum groups and leaders (eg. Block Liaisons, Director of Professionalism, Doctoring Steering Committee, TEAM-PEACE), curriculum inventories (eg. system-based practice), course descriptions, syllabi/learning materials, student assessment tools, individual interviews with selected faculty and students and a Doctoring 4 focus group.

Group 6: Outcomes

Lavjay Butani, MD (Group Leader)

Melody Hou, MD

Aaron Danielson, MD

Deborah Ward, PhD, RN

John Javien, MD

Olivia Campa, MD

Talin Arslanian, M3

Susan Gardinor, OME

Staff John Drummer,

OME Staff

Questions

How well have learners in the program accomplished the learner outcome objectives (and are the data gathering tools that we use in the School adequate to assess this on an ongoing manner)?

Data Sources

AAMC GQ 2015, Level 1 and 2 reports/data, Focus group reports, CBSE scores, Step 1 and 2 scores/pass rates and content analyses; step 3 pass rates, CPX/PBLI student performance, Mean scores on preclinical courses and shelf exams (year 3) with % failures in each course, course assessment strategies, CSP input re. student struggles, Match data, Practice data on UCD Graduates.

**ICRS Group 1 – Mission and Objectives - Summary Report
March 13, 2016**

Objective: How well do the stated **goals and objectives** of the (School of Medicine) program match the **real and/or perceived need** for the program?

Process: We have focused our energy on 1.) clarifying the mission of the SOM, 2.) assessing the alignment of the curriculum with that mission, 3.) identifying the major strengths, weaknesses, opportunities and weaknesses of the SOM, and 4.) identifying the future direction of the school’s curriculum.

- We conducted a SWOT (strengths, weaknesses, opportunities and threats) analysis of the SOM curriculum based on the results of the 2013 LCME self-study and 2015 AAMC graduate questionnaire.
- We interviewed leaders across the SOM regarding the school’s mission statement, alignment with that mission, and future direction.
- We developed survey items intended for current SOM students and faculty, should the ICRS decide to conduct such a survey.

Summary of Findings, and Group Recommendations:

I. SWOT Analysis of 2013 LCME Self-Study and 2015 AAMC Graduate Questionnaire Results

The group performed a SWOT (strengths, weaknesses, opportunities, threats) analysis based on review of the 2013 LCME student analysis and the 2015 AAMC GQ report, both of which reflect student satisfaction with the curriculum. The group updated this analysis based on individual members’ awareness of changes that have been made during the last two to three years to correct problems. **Additional surveys of students are needed to support a comprehensive and up to date SWOT analysis.**

MS Year	Strengths	Weaknesses	Opportunities	Threats
MS1/MS2	<ul style="list-style-type: none"> • Brain/Behavior • Neurology • Neuroanatomy • Pass/Fail grading • OSLER center 	<ul style="list-style-type: none"> • Micro • Doctoring organization • Faculty diversity • USMLE prep by preclinical courses 	<ul style="list-style-type: none"> • Integration with Step 1 • Better clinical integration, organ-system base • Connection between student run clinics and SOM admin • Increased 	<ul style="list-style-type: none"> • Lack of medical contracts for primary care and specialty clinics

MS Year	Strengths	Weaknesses	Opportunities	Threats
			elective time/clinical exposure • Better AV	
			support for non-UCD sites (e.g. Rural PRIME)	
MS3/MS4		<ul style="list-style-type: none"> • Clinical prep • Grading-criteria for honors • MS4 planning and advising 		

II. Interviews with SOM Leadership:

Interviews were conducted with the following: Dean Freischlag, Mark Servis (Senior Associate Dean for Medical Student Education), Edward Callahan (Associate Dean for Academic Affairs), Lee Jones (Associate Dean for Student Affairs), Mark Henderson (Associate Dean for Admissions), Darin Latimore (Associate Dean for Student and Resident Diversity), Frank Sousa (Assistant Dean for Admissions), Peter Franks (Chair, Admissions Committee), Saul Schaefer (Director, Physician Scientist Training Program), Tonya Fancher (Director, TEACH-MS, ACE-PC, SJV Prime), Suzanne Eidson-Ton (Director, Rural Prime)

See **Appendix** for details of interviewee responses

Interview Prompts for UC Davis School of Medicine Leadership (ICRS Group 1)

The UC Davis School of Medicine has two mission statements, one that applies to the M.D. program as a whole, and one that is focused specifically on the curriculum:

A. From the MD Program Website- Mission

<http://www.ucdmc.ucdavis.edu/mdprogram/mission/>

To provide excellent learner-centered education to a diverse body of medical students and graduate students; cultivating in them the passion to improve lives and transform the health of the communities they will serve as physicians, scientists and health care leaders.

B. From the MD Curriculum Website:

<http://www.ucdmc.ucdavis.edu/mdprogram/curriculum/overview.html>

The educational mission of UC Davis School of Medicine is to train competent and compassionate physicians who will address the health care needs of individuals, families, and communities through collaborative approaches to patient-centered care.

- 1. Taking these two statements as a composite, how well are we meeting this mission? What evidence demonstrates this?**
 - a. Should the school of medicine have a single mission statement? If so, do you believe one of the mission statements to be more representative of the SOM mission? Should the other statement be removed, or a clearer delineation (e.g. school of medicine versus health system) be created?
 - b. Would you be in favor of revising the mission statement of the school of medicine?
- 2. What are the major strengths of the educational program in the UC Davis School of Medicine? What are the major weaknesses?**
- 3. How does the leadership of the School of Medicine and the UC Davis Health System promote its educational mission?**
- 4. How confident are you that graduates of the UC Davis School of Medicine are prepared to enter post-graduate training in the residency of their choice?**
- 5. What is your vision for the future of medical education at UC Davis?**
 - a. What should the curriculum look like in 2025?
 - b. Does the current mission statement of the school of medicine reflect that vision?

Summary and Recommendations:

1. Regarding the SOM mission statement, there is a range of opinions as to the value of a mission statement, and which of the two currently associated with the SOM is more representative of its mission. However, there is general agreement that there should only be *one*. A number of statements were made in favor of revising the school's mission statement to place emphasis

on the following themes: *leadership, populations (in addition to communities), diversity, patient-centered care, social justice and equity, transformation and innovation*. Some respondents look unfavorably on the use of the word "*competent*" in the current mission statement, given the difficulty in defining and assessing competency. Multiple interviewees expressed positive feelings about the term "compassionate physicians" as part of the mission statement.

With regards to the current alignment of the SOM curriculum with its mission, there are a range of opinions. Interviewees expressed the need for clarification of the SOM's mission, and one pointed to a disconnect between the "informal" curriculum (student-run clinic experiences, lunchtime and evening talks) which are oriented towards healthcare disparities and community engagement, and the "formal" curriculum which is overwhelmingly focused on basic science and pathophysiology of disease.

Recommendation: It is time for the SOM leadership to clarify the mission(s) of the school and to revise its mission statement. Once this step has been taken, focus should be placed on the alignment between the SOM curriculum and its stated mission.

2. Regarding the major strengths and weaknesses of the SOM curriculum and resources, the following were listed as *strengths*:

- Social justice
- Population health
- Clinical training
- Culture in medicine course
- Ethnic and socioeconomic diversity of the student body
- Track programs (e.g ACE-PC, Rural Prime)
- OSLER center
- Master clinical educators program
- Partnerships with external training sites
- Student-run clinics
- Emphasis on regional (Northern California) primary care
- Collaborative environment within the SOM and health system
- Emphasis on student leadership and community involvement

The following were listed as *weaknesses*:

- Need for greater diversity in the SOM faculty
- Need for more longitudinal integration of clinical experience
- Lack of vertical integration within the curriculum
- Lack of centralization and consistency within the curriculum (i.e. too much control left with individual IORs rather than SOM leadership)
- Need for greater emphasis on healthcare disparities, cultural competence and humility, awareness of sexual diversity
- Overemphasis on basic sciences within the curriculum

- Overemphasis on traditional didactic lectures
- Inadequate number of clinical sites for pediatrics, psychiatry and primary care
- Lack of robust student evaluation system in the 3rd and 4th years
- Misplacement of some milestones compared to the expected trajectory of student performance, and failure to assess and measure based on the milestones that we have established

Recommendations: There is a need for greater longitudinal and vertical integration within the SOM curriculum, and the curriculum would benefit from more centralized control. There is also a need for better integration of longitudinal clinical experience spanning the preclinical and clinical years. Finally, the SOM should devote resources to examining and strengthening its mechanisms for assessing student progress at all levels.

3. There is general agreement that OME and the SOM leadership promote the educational mission of the school. Multiple interviewees expressed the view that the health system (as opposed to the SOM) could do more to promote the educational mission of the school.
4. There is general agreement that UCDSOM graduates are clinically well prepared to enter residency. The opinion was expressed that the preclinical curriculum should do more to prepare students to succeed on the Step 1 exam. One interviewee also expressed the opinion that while the majority of students are prepared to enter their next phase of training, the SOM continues to promote a small number of students who have demonstrated that they are *not* prepared. The opinion was also expressed that greater attention should be paid to students' progression through the Milestones rather than using "one size fits all" approaches to preparation for residency such as a pre-graduation "internship boot camp."

Recommendations: Greater attention should be paid to integrating Step 1 preparation into the preclinical curriculum. Student promotion through the clinical curriculum and preparation for residency training should be guided by the Milestones set in place by the SOM.

5. Several suggestions were put forth regarding the future direction of the SOM curriculum. The following are the major themes and ideas:
 - Transition to a more flexible curriculum (e.g. 3 years with an optional 4th for students who are struggling or who wish to participate in a special track)
 - More centralization in the control of the curriculum, and greater longitudinal and vertical integration
 - Stronger emphasis on service and community engagement, health care disparities, unconscious bias

IV: Suggested areas of inquiry for the External Curriculum Review committee.

1) Early clinical experience: What are best practices and outcomes at other medical schools in providing early clinical experience?

2) Community-based curriculum: What are best practices and outcomes in learning experiences based in local community organizations and service providers? Emphasis on “getting outside the ivory tower”. (The closest analog here at UCDSOM would be the Student Run Clinics, but the learning goals and outcomes are not systematized and not part of the formal curriculum, aside from some required Doctoring 1 H&P notes).

3) Assessment of progress in 3rd and 4th years: While the Graduation Competencies appear to describe a progression in skills and knowledge over 4 years, the assessments we use do not reflect any measurement of many of the Milestones in that progression. What are best practices at other schools for actually assessing progress along key Milestones, especially when it comes to things like communication skills, clinical reasoning, physical exam skills, etc. (in other words, in areas not currently measured by shelf exams)?

CURRICULUM REFORM
UC DAVIS SCHOOL OF MEDICINE

Internal Review Subcommittee

A Report from the Resources and
Environmental Support Working Groups

INTRODUCTION

Project Overview and Goals

The overall purpose of the internal curriculum review subgroups is to assess the strengths and gaps within the medical school curriculum so that areas for improvement can be identified. This report summarizes the findings and recommendations of the resources and environmental support subgroups. The review process consisted of four meetings that occurred over three months. Project management software (Basecamp) was used to reduce the number of in-person meetings while still allowing members to contribute to the final evaluation.

Key stakeholders and target audience

The primary target audience for this report is School of Medicine administrators responsible for the strategic vision of curriculum reform. Secondary stakeholders include medical students, teaching faculty, administrative support personnel, and patients.

EVALUATION FRAMEWORK

Key Evaluation Questions

The key questions the subcommittee sought to answer include the following:

1. How adequate are the resources available (space, money, personnel, equipment, etc.) in relation to meeting the program's stated objectives?
2. How well does the environment support the students/faculty/staff administrators in accomplishing the program's goals and objectives (funding, support)?

Evaluation team

Environment and Support (group
3)

John Drummer Ryan
Traynham

John Payne, PhD (co-lead)

Brian Pitts, MD (co-lead)

Sam Clarke, MD

Kristin Olson, MD

Olivia Campa, MD

Kristin Cutler

Resources

(group 2)

Craig Watson,

MD (lead)

Lavjay Butani,

MD Aaron

Danielson, MD

Ashley Clark

Susan Gardinor

Evaluation method

The evaluation process began with each group defining what they believed to be the key relevant questions related to curriculum reform. Questions were answered through data collection and stakeholder interviews. Using SWOT analysis (Appendix 1), strengths, weakness, opportunities, and threats were identified across key groups including 1) students, 2) faculty, and 3) staff. Results from the SWOT analysis were used to identify important themes related to resources and support in the medical school curriculum. From these themes, opportunities for growth were identified, and recommendations for future improvement were developed.

Data Sources

- AAMC Graduate Questionnaire, 2015
- SOM Budget, 2015
- SON Budget, 2015
- SOM Website
- Level 2 Course Review Data, 2012-2016
- Interviews: Mark Servis, Roy Rai, Ryan Traynham, Brian Pitts
- Additional Reports: Online Education Workgroup Report (2013), Center for Curricular Innovation Proposal (2016)

QUESTION 1

How adequate are the resources available (space, money, personnel, equipment, etc.) in relation to meeting the program's stated objectives?

Training Sites. The School of Medicine has affiliate agreements with over 50 training sites outside the main hospital, which provides medical students with diverse and unique training opportunities. Currently, affiliates participate in the teaching program without compensation, which places us at a disadvantage when compared to our competitors. Drexel, Northstate, and other international programs offer compensation to affiliates. As a result, consistency and accountability in maintaining high quality educational experiences may be compromised. When we completed the training site questions as part of our most recent accreditation, the issue was masked by the inconsistent way in which our affiliates accept students. We have a large pool of outpatient sites, but many of them are selective as to when they will take a student, and very few will take a student every 4 weeks. Increasing the number of sites is an ongoing process and is not easy to accomplish. Given the pressures on providers to increase clinical revenues and improve efficiencies, teaching is often seen as an obstacle. We have few tools available to us to increase

our presence at our affiliates. Alumni are typically our best ally in securing new opportunities. Within our own system, hospital leadership has limited where we can send our students.

Funding. In order to better understand how funds are used in the School to support the educational mission, the Chief Administrative Officer, Roy Rai, and Senior Associate Dean of Education, Mark Servis, were interviewed. Group members submitted questions in writing, and participated in a financial update presentation (Appendix 2). As a means of comparison, the group also reviewed the School of Nursing Funding model (Appendix 3). Key summary points related to SOM funding are included below.

Student Fees

- Total revenue of \$17 million received from student fees is distributed as follows: student financial aid (31%), School of Medicine funding (31%), UCD Campus funding (28%), and Others (10%).

The amount returned to UCD Campus (\$4.6 million) is not available for funding medical education (see below).

- SOM receives a total of \$5.73 million from professional fees, but that amount is dependent on student enrollment. The school loses approximately \$500K per year when fourth year medical students take spring quarter off.

State-Funded FTE

- The school receives about \$40 million in 19900 Instruction-Research FTE funding from the state, 50% of which should be used for education.
- The department chairs administer these funds.
- There is little or no relationship between teaching effort by a department and the allocation of FTEs.

Actual Revenues/Expenses

- The \$8.9 million SOM budget covers curriculum-related expenses such as IOR stipends, dean salaries, staff salaries, benefits, and operational expenses. This is partially funded by the \$5.7 million allocated to the SOM from student professional fees. Thus, there is a shortfall of approximately \$3.2 million that must be funded by the Deans Office and hospital. The mandatory fees returned to the UCD Campus would more than cover this deficit if they were made available for medical education. The Deans Office is continually engaged in negotiations to recover some fraction of these fees.

- There have been very significant increases in faculty/staff benefits in recent years, adding to the

budgetary pressure.

- OME tries to make programs more cost-efficient through consolidation of staff and alternative funding sources when possible.
- Alternative funding sources include grants that are used for special programs (e.g., ACE-PC), student research (e.g., T32), and scholarships.

Faculty Support Mechanisms

- The funding model to support IORs was developed by a task force in 2008. IOR stipends for Year 1-2 IORs are based on individual student contact hours, including on-line lectures.
- Clerkship IORs receive 25% FTE (AAMC average salary/benefits). Doctoring small group facilitators receive \$750-2,000/year, depending upon the course and block.
- These stipends are transferred to the departments that sponsor the courses, and the funds are administered by the chairs. There is no central tracking of how these funds are distributed within the department. Because IORs do not receive notice from the SOM of the transfer, they may or may not receive the stipend. OME could increase awareness by sending individual letters to the IORs informing them of stipends and the date of disbursement. Additionally, the school should encourage departments to make the accounting and distribution of funds for teaching transparent. The departments of Emergency Medicine, Pediatrics, and Psychiatry may serve as models for this type of accountability.
- The use of contact hours provides an incentive for departments to maintain control of hours in their courses and is a disincentive for reducing classroom hours.
- The formulae for stipends do not include a factor for "quality." However, the Senior Associate Dean may provide extra funding for course development, and may also recommend that IOR funding be removed for very "low-performing" IORs.
- Centralized programs, such as the Master Clinical Educator (MCE) program, are funded out of the OME budget. MCEs receive a stipend based on actual salary.
- Departments that sponsor fourth-year electives do not receive central funding. This was eliminated several years ago due to budgetary pressures, and in recognition that sponsoring departments already have a strong incentive to support these electives.
- System-wide discussion is needed to re-evaluate the current system of faculty support.
- The merit-promotion system must be changed to reward excellent teaching, including educational scholarship.

Additional Issues and Comments

- Technology support is provided by IS-MED (Dan Cotton). This unit is responsive to a variety of other needs besides the MD program (SON, academic departments, etc.), and lacks the resources to meet all needs. OME must negotiate for services.
- Educational technology and instructional design: There is no designated faculty leadership for educational technology and instructional design, and minimal resources exist for education technology staff. Funding is inadequate to support substantial development. UCDHS has not made the commitment to create a centralized unit to support educational technology across the health system.
- The school should consider adopting an external curriculum management software program (e.g. Ilios). These programs have extensive capabilities for curriculum mapping, calendaring, tracking educational hours, and making curriculum content easily searchable across courses. These capabilities would likely strengthen the SOM's efforts towards vertical and horizontal integration of the curriculum.
- The Deans Office has been very supportive of new resources that have been developed over the last eight years, with increases in funding to support programs such as OSLER.

Technology Support and Integration

Technology that supports effective instructional models is an essential component in any educational program. To better understand how educational technology is implemented at the School, the resources were explored: 1) published findings from the 2013 UCDSOM Online Education Workgroup (Appendix 4), 2) interview with Ryan Traynham, the Director of Curriculum and Educational Technology, and 3) interview with Brian Pitts, Director of Online Learning. Commissioned in 2013 by CEP, the Online Education Workgroup identified key areas for improvement that have not yet been addressed.

The UCDHS contains numerous resources to support online education. For example, the Center for Health Technology provides state-of-the-art video production and screen casting available to faculty members in the School of Medicine. Faculty can currently utilize this resource to record video lectures and screen casts, although the current utilization is very limited. Although geographically separate from the School of Medicine, the UC Davis main campus provides resource experts in the areas of curriculum design, multimedia production, and technology services. CEE, The Center for Educational Excellence, is an example of one group that is available

to work with School of Medicine faculty for course improvement. However, because funding for

CETL is separate from that the School of Medicine, initial consultations likely require additional funding support. The Veterinary school has a small technology team that is working on several smaller projects aimed at improving the curriculum. Recent technology enhancements involve the development of histology teaching slides that are zoomable and interactive. Both the School of Nursing and Medical Informatics program (in conjunction with UC Extension) have an active online presence, but at a smaller scale than the School of Medicine. Great opportunity exists to collaborate and share resources and information to further the interprofessional education mission around online technology. Web technologies implemented at UCDSOM include the Sakai course learning management platform. Branded as "mycourses" and managed by the School's IT group, this LMS serves as the workhorse for course delivery for medical students. Recently, the UC Davis main campus, through its LMS discovery workgroup, chose Canvas as its new LMS. It is anticipated that the School of Medicine will similarly transition from the Sakai-based LMS to Canvas sometime in 2017. Although this transition is a great opportunity to introduce future learning technologies (i.e., learning analytics and mobile learning), significant investments in training, development, and support will be required for success.

QUESTION 2

How well does the environment support the students/faculty/staff administrators in accomplishing the program's goals and objectives (funding, support)?

A key element of any educational program is faculty development. In order to identify the available faculty development opportunities that might support faculty in teaching and spur innovation, a web search was conducted on the UC Davis School of Medicine site. The results can be divided into four categories: teaching scholars programs, faculty development workshops, educational journal clubs, and online resources.

Teaching Scholars Programs

The UC Davis Interprofessional Teaching Scholars Program (ITSP) is an initiative recently re-launched in 2013 as a collaborative effort between the UC Davis Schools of Nursing and Medicine (1). Offered to 11 faculty each year (7 SOM, 4 SON) after an application process, the program offers diverse topics over several months including instruction on teaching and learning methods (including educational technology), educational scholarship, leadership, interprofessionalism, and health equity. Session resources were not available to non-participants on the program website.

Faculty Development Workshops

The School of Medicine Faculty Development Program is available to all faculty in the School of Medicine (2). Of the thirty-four 1-2 hour noon offerings, only one involved enhancing teaching skills (“How to Give Effective Feedback”) and was part of a broader Early Faculty Development series aimed at career development. Thus, only 3% of faculty development hours are devoted to teaching methods.

Another faculty development opportunity involves various ad-hoc Educator Development Workshops offered by the Office of Medical Education. For example, one titled “Writing NBME-Style Multiple Choice Questions” was offered as a lunchtime workshop for 2 hours on March 28, 2016. In 2014, a similar type of workshop was offered on “Simulating Engaged and Active Learning in Large Groups.” Unfortunately, these workshops tend to be offered once, and resources do not appear to be available on the school website (personal communication).

Education Journal Clubs

The Simulation Education Series session is offered each month at the Center for Health Technology (3). Topics follow a journal club type format around simulation scholarship primarily related to residency training.

Online Resources

The Health Sciences Online Journal Club is a monthly blog on various health sciences education topics written by UC Davis faculty (4). Taken from the literature, recent topics have included learning communities, longitudinal integrated clerkships, reflective practice, and lifelong learning. All topics are examined in the context of the School's needs, and contributions from all faculty are encouraged. Because the website is hosted on the UCDHS intranet, its accessibility and reach is limited, however.

Online resources for teaching and learning were curiously absent within the School of Medicine website. It is projected that faculty development using online learning will grow in the coming years (5,6). Reasons cited include 1) personalized and on-demand learning, 2) convenience, and 3) lower cost compared to face-to-face workshops. Examples of useful resources for educators to quickly learn about various teaching methods include the Vanderbilt Center for Teaching site (<https://cft.vanderbilt.edu/teaching-guides/>) and the Academy for Excellence in Teaching (<https://medschool.vanderbilt.edu/aet/>) which provide forums to foster higher levels of participation and promote excellence and scholarship in the delivery of education to health professionals. Although the UC Davis campus offers some online resources and faculty development offerings through the

Center for Educational Effectiveness (<http://cee.ucdavis.edu>), these have primarily focused on undergraduate education.

The relative paucity of faculty development around improving teaching skills does not reflect the faculty need or demand for such offerings. In a recent survey from the Teaching Scholars Needs Assessment Survey (2013), faculty ranked "Evaluation/assessment of learners and programs" (94%), "Curriculum & Syllabus Development" (92%), and "Providing effective feedback" (95%) as top areas of needed faculty development (7). Additionally, 78% of respondents indicated that they preferred a "Hybrid approach (in-person and on-line)" over just "periodic in-person sessions" (34%) (7). Numerous studies have demonstrated that without effective and persistent faculty development support, change is greatly restricted (8,9,10). The challenge of technology integration into the curriculum appears to be an even greater challenge (11).

CONCLUSIONS AND RECOMMENDATIONS

Recommendation 1: Faculty Development

Current faculty development opportunities around improving teaching, course development, and technology integration are severely limited both in terms of offerings and availability. It is recommended that a comprehensive faculty development program be created aimed at 1) providing convenient and effective educational offerings aimed at improving measurable learning outcomes and 2) promoting innovation and experimentation around developing and implementing new educational strategies. Relevant topics delivered both online and in-person should be high quality and readily available. Examples of relevant topics include: 1) Active Learning Strategies to Promote Collaboration, 2) Creating and Analyzing Multiple Choice Questions, 3) Universal Design for Learning: Reaching Learners with Diverse Needs by Creating Flexible Courses, Activities, and Assessments, 4) Digital Devices and Distraction: Dealing with Disruptive Technologies during Class, 5) Teaching Large Lecture Classes – Is High Quality Learning Possible in Big Classrooms.

A system that recognizes or rewards completion of such faculty development programs should be also be developed in order to encourage educational scholarship and professional faculty development.

For some courses, less experienced faculty are assigned IORship with little preparation or knowledge of the duties of course directors and the resources available for the position. It is

recommended that courses consider using co-IORships, where a mentor-mentee pair is used.

Here, an experienced senior educator is paired with a less experienced educator to run the course. Additionally, OME should consider providing an orientation seminar for all new IORs.

Recommendation 2: Development of a Center for Curricular Innovation

The need for the Center arises from the rapid and changing demands to train physicians capable of providing patient-centered care. Although the School of Medicine has made many positive transitions away from the medical school model pioneered by Abraham Flexner nearly 100 years ago, great opportunity exists to continue that change. The “two plus two model” in which medical students receive basic science training often in the form the lectures followed by two years of clinical work is no longer adequate in today’s healthcare environment. The rapid expansion of medical knowledge along with the public’s demand for accountability and patient-centered medicine demands that today’s educators have the knowledge and skills to teach effectively. However, busy clinical faculty tend to default to the most familiar forms of teaching, which are often passive and didactic in nature. This teacher-centered format tends to emphasize content, memorization, and testing rather than understanding, application, and exploration. Because the current infrastructure and resource support available to faculty available to School of Medicine faculty is limited, there is great opportunity to enhance the online educational offerings and faculty development in this area.

A full program proposal for a Center for Curricular Innovation is provided in Appendix 5. Briefly, the primary objective of the Center is to enable faculty to identify the actions required to create new ideas, processes, or curriculum that lead to positive and effective learner change. Long-term goals include: 1) providing a central website to serve as a hub of inspiration and information, 2) creating a convenient physical location that allows faculty to explore ideas and consult with experts in the fields of instructional design and education, 3) offering faculty development workshops aimed at enhancing teaching skills, and 4) Promoting best-practices through interactive and engaging public relations efforts. It is recommended that School leadership explore the current organizational structure and strategic educational technology vision in order to support faculty development and technology integration. Educational technologies such as mobile learning, video-based learning, and learning analytics will represent major future needs medical education.

Recommendation 3: Teaching Space and Resources

The Education Building provides the majority of teaching space for the pre-clinical years (years 1 and 2). Consisting of both large lecture halls and small group rooms, the space represents a transition in teaching paradigms from that of lectures to small group activities. New teaching

space

should take into account and support activities that promote problem-solving, teamwork, interpersonal communication, simulation, and interprofessional education. Currently, several schools share space in the education building (i.e., SON, SOM, Graduate School), which can make finding room to conduct small group discussions challenging. With the opening of the Betty Irene Moore School of Nursing Building adjacent to the Education Building, this stress is anticipated to be reduced.

Recommendation 4: Student Academic Support

As the School of Medicine has diversified student admissions, there is great variability in preparedness of our matriculants. This leads to great difficulty for the IORs, especially in the pre-clerkship curriculum in structuring their courses to provide for a differentiated educational experience— that is, it can be quite challenging to meet the needs of the students at both ends of the spectrum in a particular educational session (some students don't understand the basic principles, while other students are bored). The result of our current policy is taxing for both the student and teaching faculty as both feel unsupported. The School needs to develop a better mechanism to identify applicants who are at academic risk, and such assessment must occur prior to matriculation. The Admission Committee is best prepared to perform this function. If such "academic risk" applicants matriculate, then there must be a mechanism to provide such students with support (academic and advising) to maximize their chances of success. Support could come in the form of an intensive tutoring program during the first year provided by content experts and/or an opportunity for the students to decelerate the pre-clinical curriculum.

Recommendation 5: Student Assessment

Currently, the School is underutilizing the ExamSoft software and its dashboard functionality for student assessment. The School should make better use of it by "tagging" all multiple choice questions so that students can see patterns of strengths and weaknesses across courses and over time in their knowledge base. The School should consider creating a committee that oversees the writing and editing of pre-clerkship exam questions and encourages the use of both multiple choice and short answer questions that promote problem solving and critical thinking and lessens simple recall/memorization. This would benefit IORs, as faculty are often better at content delivery than they are at the nuances of writing "good" exam questions. Furthermore, this would allow for a more consistent assessment of the students.

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Educational Theory & Curricular Design— Team Summary Report

UC Davis School of Medicine Internal Curriculum Review Subcommittee
(ICRS) May 13, 2016

Question:

1) How well based is the program design in relation to sound educational theory and practice?

Background:

The *UC Davis School of Medicine Graduation Competencies* acknowledges that medical professionals are required to draw upon multiple, integrated dimensions of competence in their care of patients.¹ Development of this competence requires professionals at all levels of training to engage actively in the processes of learning and self-reflection. In focusing on competency development, this document emphasizes educational outcomes rather than specifics related to curricular design, educational strategies or learning formats. Educational literature, however, clearly identifies five theoretical strands related to educational programs that seek to develop professional competence in learners. The goal of this sub-committee was to articulate key elements of each of these educational theories, review UCDSOM's existing curricular design and implementation and identify strengths, weaknesses and areas for change or development with regard to this body of educational literature.

Process and Data Sources:

The sub-committee began by reviewing educational literature related to competency-based education. Based on this review, the sub-committee identified five relevant theoretical strands: competency based learning, active learning and engagement, self-directed learning, situated cognition and cognitive load theory. Literature within each of these domains was reviewed to identify key concepts, implications for learners, instructors, assessment and learning environment. This review is summarized in the table at the end of this report.

After key elements and implications from each theory had been identified, a variety of materials and resources related to the curriculum were reviewed. Resources included UC Davis graduation competencies, course syllabi, materials from small group/TBL sessions, assessment tools, summary documents including the IOR Survey (2012-13), Competency Assessment (LCME 2014), Competency Subdomain Milestone Report (LCME 2014), individual interviews with selected faculty and IORs, and focus groups with first-fourth year medical students. The extent to which the current curricular design and implementation aligns with educational theory related to competency-based education was assessed.

Competency Based Learning – Defining the Framework for Learning

Competency based learning is an outcomes based approach organized around the array of abilities, skills, knowledge and attitudes that comprise professional practice. The goal of competency based curricula is to structure educational environments and activities to facilitate the development of abilities in each domain to the level required for professional practice.² The design of competency based curricula requires that educational outcomes be clearly defined, explicitly stated and developmental in nature. Broad curricular components are designed and logically sequenced to foster the acquisition of

skills. Learning activities and assessment are organized around the identified competency domains and each educational activity is evaluated to ensure that it contributes to the identified outcomes.³

Competency based learning focuses on the end point of an educational program rather than specific teaching methods or philosophies. However, implicit in an outcomes based approach are certain core elements related to learners, teachers, assessment and the learning environment.⁴ Focus on competencies, which are holistic in nature, requires a cross-disciplinary approach that cuts across traditional institutional and departmental boundaries. Competency based education is inherently student centered and emphasizes the learner's role in monitoring progress toward stated goals and choosing activities that will contribute to developing and improving competence. The focus on developing learners' abilities must acknowledge that individuals may progress faster or slower than their peers in a given curricular component. As a result, curricula must be flexible, allowing learners to progress at their own pace. The instructor's role is to structure opportunities for practice, model approaches and provide feedback. In seeking to develop learner competence, this approach places greater emphasis on formative than on summative assessment.⁵ Assessments must provide information related both to the expected level of achievement and the characteristics of more advanced levels of achievement. Finally, rather than being imposed on the learner, assessments in competency based learning involve active participation by the learner.

Areas of Alignment/Strength

1. Identified domains of competence, objectives and milestones described in CEP's *Graduation Competencies* demonstrate institutional commitment to curricular design rooted in competency based learning and outcomes.
2. Various activities in years 1 and 2 (case discussion groups, AMP, preceptor visits, clinical reasoning exercises) and in the year 3 clerkships provide opportunity for learners to develop competence in multiple domains.
3. A variety of assessment opportunities and tools addressing multiple domains exist throughout the curriculum (clerkship evaluations, pbli exercises, end of year 2 clinical exams, clinical reasoning exercises, physical exam checklists).
4. New curricular activities/approaches have been developed (e.g. "core-cluster" physical exam format) that provide opportunities for repetitive practice and on-going feedback associated with development of competence in various domains.

Areas of Disconnect/Challenge

1. Incongruence of assessments, milestones, course goals and objectives across the curriculum indicates a "retro-fit" relationship of competencies and milestones to existing curricular activities with competencies/milestones being mapped onto existing activities rather than elements being systematically planned, sequenced and implemented to achieve milestones/competencies. In the words of one IOR, "Everything we have can probably be mapped to some competency or milestone. But it wasn't necessarily designed that way."
2. Stated milestones are somewhat developmental in nature but larger curricular structure, learning opportunities and assessments do not always follow the same developmental plan.
3. While a variety of activities in years 1 and 2 address domains other than medical knowledge, assessment overwhelmingly emphasizes medical knowledge. The primacy of medical knowledge is further emphasized by discipline/department based courses

which results in most domains other than medical knowledge being assessed primarily and sometimes exclusively in the Doctoring curriculum.

4. Lack of longitudinal relationships, with small group facilitators, clinical preceptors and faculty make assessment and feedback challenging and give students the feeling that they are “starting over” with each new course/clerkship rather than working toward developing competence in various domains.
5. Lack of a formal, established tool for documenting and tracking assessments and feedback, self- reflection, and improvement plans and on-going development across the curriculum exacerbates the problem of limited longitudinal faculty/student relationships. Because there is not an on-going means of documentation, students are unsure of how to carry plans forward into the next phase of their learning and feel that they “start” over with each new clerkship/course. Students feel that when information is formally passed forward it is punitive and remedial rather than a structured part of learning and development.
6. Lack of opportunities, particularly in years 1 and 2, for repetition and practice of skills associated with developing competence. Students cited instances in doctoring small groups where they had the opportunity to practice and receive feedback once before a summative assessment took place as an example of limited opportunities for practice.
7. Lack of flexibility in curriculum makes it difficult/impossible for students who need additional time to reach a given milestone to adapt their curriculum accordingly and sends the message that competence is determined by time rather than the ability to demonstrate desired knowledge, skills and attitudes.

Situated Cognition – Defining the Context for Learning

Situated cognition focuses on learning as a process of constructing knowledge and skills through active participation and engagement in authentic tasks and contexts.⁶ Learning is optimized when learners are immersed in contexts in which knowledge and skills to be acquired are actively applied. This theory places instructors in the role of cognitive coaches who model skills, provide opportunities for learners to practice skills and offer feedback as learners engage in practice. From this perspective, longitudinal relationships between teachers and learners are essential. Instructors must have sufficient knowledge/experience with the learner’s abilities and needs to match the learner with appropriate opportunities for practice and to engage in appropriate, on-going feedback and coaching. The learning environment must be one in which students can engage in authentic practice. Assessments follow naturally from this engagement and take place in real time in the work environment.⁷

Areas of Alignment/Strength

1. Immersion of students in clinical context throughout year 3.
2. Attempts to incorporate clinical contexts and situated learning in years 1 and 2 through activities such as small group case discussions and preceptor visits indicates recognition of need/importance of “authentic” contexts in learning and application.
3. Opportunities for authentic, workplace assessments exist throughout the curriculum. These include the clinical reasoning experiences in years 1 and 2, end of year 2 clinical skills exams, pbli exercises, CPX exam, clerkship evaluations and a variety of practical exam opportunities in year

Areas of Disconnect/Challenge

1. In spite of efforts to implement small groups, preceptor visits, etc. students have limited exposure to authentic contexts and practices prior to clerkship. Students identify student run clinics as a primary site of authentic participation and practice during years

- 1 and 2 but site lack of consistent goals and feedback as problematic.
2. Lack of longitudinal relationships prevent faculty from being able to match students with learning experiences of an appropriate level of challenge.

3. In spite of multiple opportunities for assessment in authentic/situated contexts, commensurate opportunities for practice/feedback in these contexts do not always exist.

Active Learning – Defining Learner Engagement

Fundamental to theories of active learning is the view that knowledge is constructed through interaction, practice and engagement with others.⁸ Active learning involves engaging students in performing the tasks (e.g. clinical reasoning, problem solving, etc.) we want them to learn, providing experiences where students can observe real practice and supporting students' critical reflection on their knowledge, skills and practice.⁹ While passive learning perspectives assume that knowledge can be transmitted, active learning perspectives assume that knowledge is experiential and constructed by the learner. As a result, active learning shifts emphasis from attempting to cover all pertinent material to providing in-depth experience with defining concepts. Instructors are required to build learning activities around "critical tasks" that will help learners to identify deficits or misunderstandings while learners are required to participate in active and intentional processes to build meaning and skills from information and experience. Included in these intentional processes are self-reflection and assessment and intentional planning for improvement. Assessments must focus on deep understandings rather than superficial knowledge and be designed to reflect procedural knowledge in addition to content knowledge.

Areas of Alignment/Strength

1. Demonstrated commitment by IORs in all years to include active learning, in a variety of forms, in all courses.
2. Specific modules/elements of courses that incorporate all elements of active learning – example/model of practice, assessment, feedback – and could be used as examples for other faculty/courses. Frequently cited examples include General/Systemic Pathology TBLs and core- cluster physical exam format.

Areas of Disconnect/Challenge

1. Lack of common definitions/practice related to active learning. Active learning is described by faculty as everything from "Office hours where students can talk to me about their questions" to "case discussions" where students are presented with a patient case and faculty provide a summation of key elements of the case with limited student engagement to TBL experiences that contain every educational element of active learning. Poorly executed examples of active learning may contribute to student discontent and dislike of active learning approaches in general.
2. Emphasis on broad coverage rather than in-depth practice with fewer, representative examples may reduce opportunities for students to engage in practice, repetition and assessment.
3. Lack of time within the curriculum and/or scheduling issues that prevent students from being able to engage effectively in all elements of active learning. For example, when calendar/scheduling limitations dictate that a case discussion related to specific content happens 1 hour after the lecture presenting that content students feel that they do not have adequate time to review content prior to attempting to use it.

Self-Directed Learning – Defining the Role of the Learner

Self-directed learning is inextricably linked to theories of active learning. Self-directed learning emphasizes the role of the learner in monitoring current levels of understanding and practice,

explicitly considering approaches and strategies, identifying weaknesses and making a plan for continued learning

and self-improvement.¹⁰ In order for students to engage in self-directed learning, the learning environment must provide clear, specific goals and objectives so that learners understand expected outcomes and can identify learning needs and develop and implement appropriate plans to achieve the desired outcomes. Students must identify and utilize multiple sources of feedback, develop individualized learning plans, implement appropriate strategies and participate regularly in reflection and self-assessment. While students play a primary and central role in self-directed learning and increasingly take responsibility for learning, the use of the term “self” can be somewhat misleading. All of the activities associated with self-directed learning, particularly for early or novice learners, take place with explicit guidance and feedback from instructors. Instructors are responsible for providing models and examples against which students can measure their progress and regularly and routinely engage students in assessment conversations about learning goals, progress, needs and plan. In addition, instructors are responsible for challenging learners to move beyond their current level of development and providing accountability and follow-up related to learning goals.

Areas of Alignment/Strength

1. Existing materials within courses/clerkships (e.g. on-line cases in Pediatrics, Pathology TBLs) that support students as they engage in the cycle of learning, assessing/reflecting, planning.

Areas of Disconnect/Challenge

1. Assumption by some that students should be able to engage in self-directed learning with little structured input/guidance from faculty.
2. Lack of structured opportunities and support for students as they learn to engage in effective self-assessment/reflection and planning
3. Lack of structured/consistent feedback on plans that students develop gives impression that planning is an activity to be checked off rather than a meaningful part of learning/development.
4. Lack of a single, cohesive “developmental roadmap” that allows students to compare what they can do presently with what they should be able to do in the future makes self-reflection and assessment and planning challenging, particularly for early learners.

Cognitive Load Theory – Defining the Elements that Support or Hinder Learning

Cognitive Load Theory focuses on the cognitive elements and the mental effort required for learning tasks.¹¹ This theory identifies three different types of cognitive load: intrinsic load, extraneous load and germane load. Intrinsic load is defined as the cognitive effort associated with a task. Intrinsic load depends on the proficiency of the learner, the number of information elements associated with a task and the extent to which these elements interact with each other. Extraneous load is the cognitive effort required to negotiate how the task, information or problem is presented. Extraneous load depends to a large extent on how cognitive tasks are structured and is heavily influenced by instructional strategies. For example, providing insufficient structure for learners attempting to solve a problem or presenting early learners overly complicated patient cases can greatly increase extraneous load. Finally, germane load is the mental effort required for processing information, constructing and automating schemas. The ability of an individual to effectively learn, retain and apply concepts in novel situations depends on the interaction of these three types of cognitive load. Effective educational environments seek to optimize germane load while decreasing extraneous load and managing intrinsic load. Instructors optimize germane load through a variety of instructional strategies including appropriate scaffolding and task variability. Appropriate scaffolding ensures that

learners have models and guidance when encountering new tasks. Task variability ensures that as learners become more adept, the task becomes progressively more complex. This allows learners to focus cognitive effort on acquiring and using knowledge rather than navigating the procedural elements of the task. Intrinsic load can be managed by progressing from

low to high fidelity problems or cases or by moving from low to high conceptual interactivity. Extraneous load can be decreased through strategies such as initially limiting task switching and split attention, providing first repetitive then variable practice and limiting interruptions.

Areas of Alignment/Strength

1. Early introduction of concept/practice with illness scripts in ACE-PC provides concrete example of ways to reduce cognitive load by focusing on organization of various signs and symptoms into one construct.
2. Early introduction of physical exam skills as core-cluster components that can be grouped, practiced and connected to evolving knowledge of pathophysiology as opposed to one head-to-toe physical exam.
3. Recent shifts in block 2 (ENRG followed by Microbiology and Immunology) to a more consolidated, integrated block structure allowing students to focus on fewer topics at one time.

Areas of Disconnect/Challenge

1. Multiple factors, particularly in years 1 and 2 that contribute to extraneous load including task switching (e.g. a series of four lectures in a day in which students learn about citric acid cycle, Wiggers diagram, and the peritoneal cavity), lack of strong conceptual integration, and lack of repetitive practice.
2. Efforts to address weaknesses or otherwise enhance the curriculum sometimes results in elements that appear to students as "add-ons" without a clear relationship to other curricular components. Attempts to determine how the pieces "fit together" increases extraneous load.
3. Lack of explicit presentation of cognitive strategies/approaches for early/novice learners.
4. High-fidelity cases being presented to learners early and without clear examples/structure.

Summary and Recommendations

A review of educational literature identified 5 theoretical strands relevant to UDSOM current curriculum. Elements of all theories can be seen in the existing curriculum but a cohesive, theoretical foundation linking outcomes, assessments and activities is sometimes difficult to discern. Competency domains and milestones have been mapped onto existing courses but there is not a single, clear developmental roadmap documenting the relationship of various curricular elements to desired outcomes. Multiple, sometimes conflicting assessments further complicate learners' understanding of desired outcomes. While year 3 provides on-going opportunities for situated practice and assessment, opportunities in years 1 and 2 are more limited. There is a demonstrated commitment to active and self-directed learning but varying definitions and a lack of clear practice models and objectives may hinder effective implementation. Relatively brief interactions with large numbers of faculty further complicate many aspects of feedback, assessment and student development. Finally, a number of issues may be unnecessarily increasing extraneous cognitive load and hindering effective learning. Assuming that there is agreement that competency based learning should be the framework, the following recommendations should be considered:

1. Any efforts to renew/revise the curriculum should utilize a systematic, backward design process rooted in educational theory and best practices to identify outcomes, structure curricular components and ensure alignment of competencies, milestones, course goals and other elements of educational practice.
2. A single, centralized body should assume responsibility for mapping course goals and

objectives to competency domains and milestones to identify areas of inappropriate redundancy, misalignment or omission.

3. Curricular design should consider and incorporate flexible, alternate pathways for learners who require more or less time to achieve desired levels of competence in various domains. Within this planning, the role of year 4 in helping students to achieve desired outcomes should be carefully examined.
4. Curricular renewal should include ways to provide early, on-going exposure to the situated contexts that provide opportunities for engaged practice and application of knowledge.
5. Curricular renewal should address ways to provide and support longitudinal relationships between students and faculty.

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Educational	Key Concepts	Implications for Learner	Implications for Teacher	Implications for	Implications for
Competency Based Learning	An outcome based approach to learning organized around the array of abilities and domains that comprise physician performance. The goal of competency based learning is to facilitate the development of abilities to the level required for optimal practice in each domain.	<ul style="list-style-type: none"> • Learners are required to monitor progress toward stated goals • Learners must choose activities that will contribute to competence • Learners must reflect on performance 	<ul style="list-style-type: none"> • Function as cognitive tutors modeling and providing feedback to assist learning in achieving outcome • Structure opportunities for problem focused practice 	<ul style="list-style-type: none"> • Greater focus on formative than summative assessment • Feedback provides comparison to both expected level of achievement and more advanced learner (developmental) • Assessment is “work- based” and involves active 	<ul style="list-style-type: none"> • Authentic contexts for practice of component skills (cognitive, social or motor) required for developing competence • Variable contexts required for practice to ensure transfer of competence • Outcome achievement requires flexibility not necessary for
Situated Cognition	Learning is a process of constructing knowledge through participation and interaction in authentic contexts. Learning occurs when learners are engaged in the activities of a community of practice. Primary resource for learning is access to	<ul style="list-style-type: none"> • Modify learning strategies to address challenges presented by learning environments 	<ul style="list-style-type: none"> • Longitudinal relationships required in order to match needs of learner with opportunities for practice • Activities/tasks are selected to match responsibility 	<ul style="list-style-type: none"> • Consistent performance of tasks in authentic environment makes formal “abstract” assessment less relevant 	<ul style="list-style-type: none"> • Authentic contexts in which learners can engage as members of a community of practice • Continuity of learner/teacher relationship fosters opportunity for

Self-Directed Learning	Learner, with guidance of external others, takes primary responsibility for identifying learning needs, creating a learning plan, implementing learning plan and engaging in critical self-reflection.	<ul style="list-style-type: none"> • Use multiple sources of feedback to develop personal learning plans • Implement appropriate strategies to achieve learning goals • Make reflection and self-assessment a regular part of learning routine 	<ul style="list-style-type: none"> • Routinely engage learners in dialogue about learning goals, progress, self-assessment and learning plan • Challenge learners to work outside of current comfort zone • Provide routine follow-up and accountability to 	<ul style="list-style-type: none"> • Feedback processes (formative, self-assessment, critical reflection) must be highly systematized and guided, particularly during early experiences 	<ul style="list-style-type: none"> • Clear, specific curricular “road map” must be available to learners to help in identifying learning needs, creating and implementing learning plan
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Educational	Key Concepts	Implications for Learner	Implications for Teacher	Implications for	Implications for
Active Learning	Focuses on learning as an intentional process of constructing meaning from information and experience. Learners work to integrate new knowledge with prior knowledge and understanding in order to facilitate application and transfer to new contexts.	<ul style="list-style-type: none"> Engage in active and intentional processes to construct meaning from information and experience 	<ul style="list-style-type: none"> Engage in “diagnostic teaching” in order to help learners articulate prior knowledge Provide scaffolding necessary for learners to achieve next level of knowledge/skill/ practice Build learning activities around critical tasks that can help to elicit 	<ul style="list-style-type: none"> Assessment must focus on deep understanding rather than superficial knowledge 	<ul style="list-style-type: none"> Proximal and distal goals/objectives must be clearly articulated In-depth coverage of key concepts replaces superficial coverage of all topics Sufficient cases of in- depth study provide opportunity to identify and work with “defining concepts” in an
Cognitive Load Theory	Cognitive load is the mental energy required to develop a framework (germane load), overcome the inherent complexity of a concept in order to develop understanding (intrinsic load) and grasp meaning as a result of the way something is presented (extraneous load).	<ul style="list-style-type: none"> Seek help when feeling overwhelmed 	<ul style="list-style-type: none"> Demonstrate frameworks Think “out loud” to make frameworks visible Identify and decrease sources of extraneous load Provide developmentally 	<ul style="list-style-type: none"> Assess use of knowledge with framework and context 	<ul style="list-style-type: none"> Implement systems that promote effective and efficient task completion Construct environments and tasks that focus rather than split attention

CEP INTERNAL CURRICULUM REVIEW SUBCOMMITTEE GROUP 5

COMPETENCY TEAM REPORTS

**PATIENT CARE KNOWLEDGE
COMMUNICATION SKILLS
PROFESSIONALISM SYSTEMS-
BASED PRACTICE LIFE LONG
LEARNING**

Internal Curriculum Review Committee

Competency: Patient Care (Use of core clinical skills to deliver effective, evidence based and patient centered care)

Data sources: IORs of Doctoring and survey data from EM rotation and 3rd year clerkship IORs (no responses received from Ob, Psych and Surgery)

Location in the curriculum:

- 1) Explicit patient care curricula appears to be almost exclusively taught by the doctoring courses, as is perhaps appropriate
- 2) Implicit teaching occurs in the clinical years (again as it should), especially specialty specific, with some explicit teaching modules (online cases such as the Med-U cases, didactic sessions on the undifferentiated patient and on procedural skills in EM and simulated sessions on pediatric resuscitation and LP skills in Peds)

Strengths:

- 1) Use of standardized patients in Doctoring, that permits standardized teaching in a near-authentic manner/environment
- 2) Active engagement of Doctoring and 3rd year IORs in continuous curricular improvement
- 3) Very high facilitator to student ratio in small group Doctoring sessions
- 4) Vertical integration between the Doc 1 and 2 courses
- 5) The addition of the EM rotation as a required 4th year rotation: the course has instituted direct observation of learners in its assessment strategy in a very effective manner

Weaknesses/Gaps:

- 1) As things have evolved, it has become unclear what the intent/emphasis of Doctoring curricula are/should be and Doctoring has often been looked at as a place where everything that is not covered elsewhere and needs to be covered (for LCME purposes) is added; this has confused learners and created an existential crisis for the course as a whole. This is especially true of Doctoring 3 that seems not to be well linked and integrated with the 3rd year core clerkships.
- 2) Assessment of patient care competencies, as a whole, is weak link. Much, if not all, of the learner assessment occurs using global rating forms used by preceptors across various courses, with limited ability to ensure rater consistency (due to limited reach and availability of faculty development efforts on assessment) and with very infrequent objective assessment strategies (such as direct observation in real and simulated settings-exceptions are the CPX/PBLI sessions during the 3rd/4th year, the end of EM rotation simulated encounter and the Doc clinical assessments. However, these are too infrequent and not robust for summative purposes). Log books and checklists exists in many/all clerkships pertaining to exam and presentations skills, but it is not possible to ascertain if preceptors use them appropriately and with the degree of thoughtfulness that is needed to promote learner growth. Faculty development is decentralized and there no methods to ensure that these are aligned with each other and with the SOM's competency framework.

3) Curricula pertaining to patient care documentation in the actual patient chart (via EHR) are still weak and not practical enough for learners, especially in preparing them for entry into the clinical years. It is unclear if there are ANY curricula for handoffs that are being used to teach students. This is such a critical need and an area where standardized and validated teaching and assessment tools do exist, albeit at a residency level, that could be easily adapted (e.g. iPASS curricula).

4) Some milestones related to patient care are unrealistically ambitious for learners and need to be comprehensively revisited and revised (the billing documentation requirements)

5) Specialty specific milestones are needed such that patient care competencies and EPAs that are felt to be important for ALL graduating students are effectively integrated into curricula across the 4 years.

Recommendations:

1) CURRICULAR issues-these need to be addressed not by the individual courses but at a broader SOM level:

a) Clearly articulate EPAs related to patient care competencies, including specialty specific (such as geriatrics, pediatrics, Obstetric, surgical, psychiatric etc) and integrate them into the fabric of the entire 4 years of the curriculum in a meaningful longitudinal manner.

b) Re-conceptualize Doctoring based on learner needs and EPAs and clearly articulate the goals and objectives of these courses, within the framework of the School's overall competency framework

c) Revisit and revise the milestones to make them more realistic, relevant and important

d) Address major gaps: EHR documentation and handoffs

2) ASSESSMENT: A centralized effort at the SOM level is needed to re haul the assessment strategies (both formative and summative) used to assess learner competence. This needs to happen frequently across the curriculum (for formative purposes), in a more robust and authentic manner (using standardized valid assessment tools in a directly observed setting) and with comprehensive and ongoing centralized faculty development (with the ability to hold faculty accountable for participating in these activities)

3) FACULTY DEVELOPMENT: see above

Knowledge Competency Group Report (5/20/2016)

Members: Craig Watson, Kristin Olson, Aaron Danielson, Susan Gardinor, Ian Kim, Jake Becker

Question: How well is knowledge taught and assessed throughout the medical student curriculum?

Discussion of the scope of the question

The Knowledge Competency is subdivided into two Subdomains: Principles of Scientific Discovery and Fundamental Knowledge and Clinical Reasoning.

After much discussion, the group felt that the Principles of Scientific Discovery subdomain is taught and assessed at multiple levels throughout the curriculum, ranging from journal clubs in Block one to preparation for clinical rounds in years three and four.

The group also felt that the Fundamental Knowledge subdomain is taught and assessed at virtually every level throughout the curriculum. Furthermore, there was little appetite for considering each milestone in the Knowledge Competency one-by-one.

One of our early "approaches" was to focus on Clinical Reasoning as a possible deficit in Knowledge education. However, after speaking with Ian Kim, the student member of our group, in detail, it appeared that clinical reasoning is being presented and taught much better due to changes in Doctoring-2 and with the MCE sessions. In addition, many of the year 2 courses include a significant number of clinical reasoning sessions.

Data Sources and Approaches

Block Liaisons of the preclerkship curriculum were then interviewed with the intent of discovering opportunities to improve the content, flow, and basic science/clinical science integration of the knowledge-based courses in Blocks 1-4 for the first two years (i.e., the preclerkship years). The following section outlines, in very broad terms, our suggestions concerning a framework for beginning such a discussion. It should be mentioned that some of these ideas are being instituted as joint pilot proposals of Block Council and a few course IORs.

Suggestions

Block 1 – Foundations (20 weeks)

During Block 1, the truly "foundational" aspects of a number of basic science and clinical science disciplines should be introduced to the students. These would include most of Gross, Developmental, and Radiological Anatomy (CHA 400), Molecular Medicine (BCM 410), Immunology, Genetics, Ethics, and perhaps Microbiology. In addition, the "foundational" aspects of Physiology, Pharmacology, Histology, and Pathology should be introduced.

Block 2 – Organ System Biology and Pathophysiology I

Once the basic and clinical science foundation is established in Block 1, the students would move through the organ systems of the body studying the normal and abnormal physiology, histology, and pathology of the organ system under consideration; moving on to clinical disorders and their treatment and management (e.g., pharmacology, surgery, etc.), in as logical, systematic, and integrated fashion as possible. Periodic, brief, focused reviews of Block 1 disciplines should be encouraged to foster further vertical integration.

This procession of organ systems might begin with Musculoskeletal and Dermatology in order to benefit from their proximity to gross anatomy and immunology, followed by Gastroenterology and Nutrition, and, finally, Reproduction and Endocrinology.

Block 3 – Organ System Biology and Pathophysiology II: Brain and Behavior

The Brain and Behavior Block is currently tightly integrated and would continue to include the disciplines of Neuroanatomy, Clinical Neurosciences, Neuropharmacology, Neuropathology, and Psychiatry.

Block 4 – Organ System Biology and Pathophysiology III

Block 4 would include Cardiology, Pulmonary, Nephrology, Hematology, and Oncology.

Communication Skills Group Report

Subdomains for competency:

- 1) Collaborative Relationships
- 2) Information Sharing

Data sources:

- 1) SON leadership
- 2) Doctoring IORs
- 3) PBLI/CPX outcomes data
- 4) Curriculum database search

Strengths:

- 1) Some efforts at IPE with SON and some collaboration with Vet Med and Law Schools.
- 2) Doctoring efforts at Steering committee level to redo its goals and objectives

Gaps:

- 1) Early immersion in interprofessional teams is lacking such that robust and substantial IPE does not occur
- 2) Longitudinal mentorship and formative feedback
- 3) Lack of consistent frameworks to teach and assess communication skills, especially when there are so many that are widely available
- 4) Missed subdomains of communication-leadership, etc (information sharing with team/community), shared decision making and threats to it
- 5) Overall communication competency performance of learner (based on CPX) marginal- many potential threats to it, as emphasis seems to be shifting towards physical examination
- 6) Doctoring is where the majority of communication skills are being taught in a structured way. The current competencies are repetitive.

Weaknesses and Opportunities:

- 1) Higher level collaboration with the SON such that logistic issues such as learner schedules (which are a main barrier to IPE) can be addressed. Use clinical sites that are models of interprofessional work (such as Oncology and in-patient rehab) to learn from their successes and embed learners into these.
- 2) Take advantage of other professional schools/learners: social work, pharmacy, law school, vet med school, to a much greater extent
- 3) Utilize Sim center for communication skills teaching and assessment

- 4) Introduce peer assessment across the SOM for communication skills (will also serve as a useful assessment for professionalism)
- 5) Need for faculty development such that ONE uniform communication framework is used across the years and across preceptors (assemble a team of educators who can champion this work) and not address this competency solely in Doctoring
- 6) Develop the much needed portfolio system and coaches/mentors who can provide longitudinal teaching and assessment of competencies, including ICS
- 7) Some subdomains are not well addressed, at least explicitly: establishing and maintaining therapeutic relationships with patients and peers, shared decision making, leadership styles/conflict management

Professionalism in the UCDSOM Curriculum

Professionalism Sub-Domains

- Altruism and Humanism
- Cultural Competence
- Accountability
- Ethical and Legal Understanding

Data Sources:

- Syllabus of each course reviewed/Curriculum database review
- CRS data: not very revealing at all
- Team PEEAC input

SUMMARY

Strengths:

- Integration of professional competencies within many “medically focused” Doctoring cases
- Cultural competency and Ethics curricula seem robust

Gaps:

- First two years of medical school has more of an “undergraduate college” atmosphere with students attending many sessions voluntarily, coming late, leaving early, deciding whether to participate or not in class, etc., often with little or no feedback from faculty. Accountability is undermined by the hidden curriculum.
- Lack of robust (and longitudinal) assessment of professional competencies, both formative but especially summative - workplace based (current assessments are mainly global evaluations)
 - Peer evaluations would add greatly, but need culture change to do that, and should be done across all the years
 - Can PBLI/CPX be used to assess some of the subdomains
- Need for longitudinal structures (like portfolios) and processes (using reflection, effective use of mentors) to optimally promote

professional identity formation, especially in the clinical years using learner-centric curricula

- 4th year - lost opportunity for furthering professional development
- Many professionalism domains are less well addressed - altruism and accountability/advocacy (most emphasis is on cultural competency/ethical-legal understanding) and self-humanism

Task: For each competency, what is the plan for targeted instruction to ensure mastery and how is mastery being assessed and documented?

Introduction

To thrive in the complex and rapidly changing US Healthcare System, medical school graduates must be well versed in the basics and nuances of health care delivery. Understanding this, in 2012 UC Davis SOM established System Based Practice (SBP) as one of six core graduation competencies. This was an excellent first step, however, currently no standardized, robust curriculum exists to ensure students leave medical school with an understanding of the disjointed and chaotic environment in which they are about to practice. In the setting of ongoing healthcare reform, increased demands for resource optimization, and changing medical economics, undergraduate medical education has a duty to adequately educate future physicians on these subjects. Our team was tasked with surveying the current SBP competency curriculum and yearly milestones, to identify gaps, and to offer recommendations to ensure competency mastery.

Resources

- 1) System Science Workgroup: Preliminary Report on Curriculum Wide Recommendations for Enhancing Healthcare System Science Education
- 2) AAMC Graduate Questionnaire 2015 – Interprofessional Education
- 3) AAMC Graduate Questionnaire 2013 – Health Care Systems & Economics
- 4) UCDSOM SBP Curriculum Inventory, 2014-2016
- 5) UCDSOM MS1-MS3 SBP Milestone Map, IOR Survey 2012-2013
- 6) SBP Competency Assessment Grid
- 7) Course descriptions and curriculum materials

Strengths

UCD SOM is uniquely situated in our state's Capitol and provides an array of potential opportunities not possible at other medical schools in our state and, in fact, most of the country. As all UCD SOM students should be given the foundational knowledge required to successfully navigate our health care system, some may choose to engage further. Given our multiple contacts in the State Capital, we are excellently situated to foster students interested in health systems sciences and hope to develop a number of future physician leaders. Examples of current opportunities available to medical students include:

- Health Care for Underserved Populations (MS1)
- Health Policy Lecture Series (MS1-MS2)
- Certificate in Health Care Improvement (MS1-MS3)
- MS4 special studies modules
 - Improving Quality in Health Care
 - Enhancing Patient Safety in Health Care
 - Health Policy Analysis and Translation
- Membership opportunities in state and national physician leadership groups:
 - American Medical Association (AMA)
 - California Medical Association (CMA)
 - American Medical Student Association (AMSA)
 - Sierra Sacramento Valley Medical Society (SSVMS)
 - Latino Medical Student Association (LMSA)
- Summer Legislative Internship at the State Capitol
- Access to leaders in government, policy, health system management at the State Capitol and UC Davis undergraduate/graduate campuses

Gaps

While SBP education for medical students is critically important, it may be the most neglected competency in the current curricular structure. UCD SOM's AAMC Graduate Questionnaire in 2013 and 2015 showed that graduates did not feel adequately prepared in health system concepts, and the current level of instruction does not align with the UC Davis School of Medicine Mission statement's goal of *'cultivating...health care leaders.'* Moreover, our team is concerned that in assessment of SBP milestones, faculty members themselves may not have adequate understanding of these concepts. Our team has identified the following challenges:

- Graduating students' perception of inadequate instruction in health care systems, medical economics, and policy
- Lack of an independent longitudinal course in system sciences
- Impacted curriculum in our traditional medical education structure
- Lack of faculty experience in SBP concepts

Summary Recommendations

Our team offers the following incremental plan for targeted instruction:

Near-term goals

1. Create a new Systems Science course spanning across the first two years of medical school aiming to ensure SBP milestones are met
2. Fund an Instructor of Record, Instructor(s), and administrative requirements
3. Redefine the QI/Community Project in the current curriculum and SBP Health Care Delivery System subdomain to include opportunities in Policy, Advocacy, and Health Care Management

4. Expand Doctoring/Problem Based Learning Cases to include health care system sciences information. This information can be embedded in current cases.

Long-term goals

1. Faculty development such that optimal system based practices are integrated into every day teaching during clinical rotations
2. Structure interprofessional educational hours. Health care professionals face many of the same problems, but we all approach these issues through the lens of our own profession. Many medical schools across the country are breaking down these professional silos and encouraging interprofessional approach to problem solving. It is time UCD SOM does the same. Interprofessional learning groups would include:
 - a. Nursing
 - b. Nurse Practitioner students
 - c. Physician Assistant students
 - d. Law students
 - e. Graduate School of Management students
3. Create a formal Leadership Track for students applying to UCD SOM. Similar to PRIME, students will be recruited to take part in the UC Davis School of Medicine Health Policy and Advocacy Pathway. The aim of the pathway is to develop future physician leaders that have a keen understanding of the US Health Care System and US Political System and thus have the unique skill set needed to guide health policy decisions at the highest levels.

Life-Long Learning (LLL): Critical Reflection and Self-Improvement— Team Summary Report

UC Davis School of Medicine Internal Curriculum Review Subcommittee
(ICRS) May 3, 2016

Competency: Life-Long Learning: Critical Reflection and Self-Improvement
Subdomain (LLL: CRSI)

Learning objective:

- 1) Uses critical reflection and feedback from multiple sources and engages in appropriate learning activity to improve knowledge, professional skills and attitude.

Background:

A curriculum that provides self-directed learning experiences and allows students to develop the skills of life-long learning is specified in the LCME *Function and Structure of a Medical School*.¹ While the LCME document does not specify educational or curricular activities that meet this goal, self-directed learning, life-long learning and the educational strategies associated with these outcomes are well described in the educational literature²⁻⁴. Distinct from models that emphasize knowledge acquisition, educational programs designed to develop self-directed and life-long learning incorporate three key elements: opportunities for active learning, opportunities for assessment and feedback, and opportunities for self-assessment and self-reflection.

Active learning emphasizes curricular experiences that engage learners in performing authentic tasks, observing/imitating real practice and applying knowledge to new or unique problems.

Through these processes, learners are able to identify and address gaps in knowledge or skills, reflect on understanding, process and approach and plan future learning⁵.

Feedback and assessment are structured processes designed to make knowledge, skills and practice visible so that learners can engage in self-reflection, planning and

improvement⁶. **Self-assessment and self-reflection** are processes related to monitoring current levels of understanding and practice, explicitly considering approaches and strategies, identifying weaknesses and making a plan for continued learning and self-improvement. In a curriculum designed to promote self-directed and life-long learning, each of these elements, particularly for early or novice learners, is highly structured and involves close guidance, interaction with and support by more experienced experts and peers⁷.

Data sources:

Review of course materials in UC Davis School of Medicine curriculum including course syllabus, materials from small group/TBL sessions, assessment tools; review of key summary documents: IOR Survey—Life-Long Learning milestones (2012-13), LLL Competency Assessment (LCME 2014), Competency Subdomain Milestone Report (LCME 2014); individual interviews with selected faculty and IORs; and focus groups with first-

fourth year medical students.

Location in the curriculum:

Course resources, faculty surveys and student focus groups indicate that opportunities for developing the skills associated with Life-long learning exist throughout the curriculum. In years 1 and 2, opportunities for active learning can be found in small group sessions, TBL sessions, Doctoring 1 and 2 small groups, clinical skills encounters (aka Master Clinical Educator Sessions), preceptor visits, and student run clinics. Data sources generally demonstrate that assessment and feedback in years 1 and 2 heavily emphasize knowledge acquisition without systematically addressing students' approach to problems or application of knowledge/skills in a particular context. Structured opportunities for self-assessment and self-reflection are extremely limited in the first year. No formal, shared, on-going method for collecting assessments and feedback and documenting reflection, plans and future learning exists.

Year 3 with its consistent engagement and "embeddedness" in clinical environments and clinical practices was identified by all sources as having the most regular opportunities for active learning experiences associated with life-long learning. Assessment and feedback in year 3 was identified as emphasizing process and practice but students indicated that it was not always conducted in a way that facilitated self-reflection or self-improvement. As in years 1 and 2, opportunities for self-assessment and self-reflection are limited or not structured in a way that supports on-going improvement. Like years 1 and 2, no formal means for tracking learning, development and plans for improvement across the year exists.

Fourth year students cited the fourth year as "a series of missed opportunities" related to life-long learning. Students felt that their role and the activities in year four were well suited to all of the elements associated with life-long learning but that a lack of structure, lack of systematic and consistent feedback and assessment, lack of structured opportunities for critical self-reflection and lack of follow-up on plans resulted in this portion of the curriculum contributing little to development of life-long learning.

Strengths:

- 1) The general commitment of IORs to include active learning, in a variety of forms, as a significant component of courses.
- 2) Core and Cluster format of physical exam teaching in Doctoring 1 – consistent example of process (exam videos) and repetition of core with each subsequent exam provides excellent opportunities to practice, get feedback (formally and informally) and engage in self-reflection.
- 3) General/Systemic Pathology TBL format – consistent example of "modules" that facilitate life-long learning skills. Behavioral objectives provide expectation/models for thinking, lecture/reading assignment provides necessary knowledge, IRAT provides practice and immediate feedback (answer explanations), case discussions provide practice with immediate feedback (instructor summary/debrief).
- 4) Process oriented assessments such as end of year 2 clinical skills exam, PBLI exercises, CPX already exist within the curriculum and offer opportunities to

support development of skills associated with life-long learning.

- 5) Activities, structures and resources within clerkships support (e.g. "Game Changer" exercise in Internal Medicine clerkship, structure of mid-point assessment in OBG clerkship, on-line materials/cases in Pediatrics clerkships) aspects of Life-long learning.

Challenges/Gaps:

- 1) Lack of a formal, established tool for documenting and tracking assessments and feedback, self-reflection, and improvement plans and on-going development across the curriculum. Because there is not an on-going means of documentation, students are unsure of how to carry plans forward into the next phase of their learning and feel that they "start" over with each new clerkship/course. Students feel that when information is formally passed forward it is punitive and remedial rather than a structured part of learning and development.
- 2) Limited explicit examples/models of process and approach (e.g. how to approach a clinical problem) and widely varying expectations result in student effort being spent on "trial and error learning" rather than a more systematic approach that allows for self-assessment, self-reflection and improvement.
- 3) Lack of structure for some active learning opportunities (e.g. case discussions, labs, TBLs) leaves students unsure of the goal, uncertain of how to interpret feedback and not sure of what to consider when engaged in self-assessment.
- 4) Activities associated with life-long learning require time – time to build knowledge, time to engage in process, time to reflect and develop plan – and repetition. Particularly in years 1 and 2 the time necessary to engage in this process is often not available (e.g. content to be used in an active learning session is presented in the hour immediately prior to the active learning session).
- 5) Feedback is essential for developing the skills associated with life-long learning. Feedback is often absent (e.g. no model for how to think about a clinical problem in small group discussions), not well structured (e.g. non-specific, too much, too little) or inconsistent (e.g. four small group facilitators over the course of four weeks).
- 6) Assessment tools are not always well aligned (e.g. Doc 1•Doc 2•end of year 2 clinical skills, CPX self-reflection/improvement plan) or are not designed to provide sufficient information to promote reflection and planning for improvement.
- 7) Constant evolution/revision of courses without review/revisions of previous, concurrent and subsequent courses, results in inconsistent expectations, processes, and assessments related to life-long learning competency.

Recommendations:

- 1) Engage in a systematic, backward design process to identify and align appropriate milestones and opportunities for instruction and assessment related to life-long-learning across the four years of the curriculum including explicit instruction in self-reflection, assessment and planning.

- 2) Develop and implement a portfolio or similar tool for students and faculty to use in documenting assessment and feedback, self-reflection and improvement plans and progress.

- 3) Use an evidence based approach to outline consistent structures, schedules and approaches for active learning opportunities (e.g. case discussions, TBL sessions, etc.) to facilitate opportunities for student engagement in practices associated with life-long learning.
- 4) Incorporate sufficient time with the curriculum for students to engage effectively in all elements of the life-long learning competency – active learning, assessment and feedback, self- assessment and reflection and improvement planning and implementation.
- 5) Identify opportunities and resources to ensure that individuals providing feedback have on- going, longitudinal relationships with students and training in using tools and providing effective feedback.

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Competency: Life-Long Learning: Evidence-Based Medicine Subdomain (LLL:

EBM) Learning objectives:

- 1) Identifies clinical questions in patient care and identifies, appraises, assimilates, and applies scientific evidence from the literature to the care of individual patients.
- 2) Applies clinical evidence and epidemiology appropriately in patient care.

Background:

A curriculum that supports the development of life-long learning skills, including “students’ self- assessment of learning needs; independent identification, analysis, and synthesis of relevant information; and appraisal of the credibility of information sources” is specified in the LCME *Function and Structure of a Medical School*.¹ Evidence-based medicine (EBM) has been well described in the literature, and epidemiology and knowledge management are two of many foundational skills required for the EBM process.²⁻⁴ Knowledge management includes the ability “to identify learning needs, know and understand what resources to use, how to access and critically appraise the information, and how to apply it.”⁵ Concepts that are related to or overlap knowledge management include information literacy^{6,7} and clinical informatics⁸.

Data sources:

Review of course materials in UC Davis School of Medicine (SOM) Curriculum, including the knowledge management curriculum; review of key summary documents: IOR Survey—Life-Long Learning milestones (2012-13), LLL Competency Assessment (LCME 2014), Competency Subdomain Milestone Report (LCME 2014), and AAMC Graduation Questionnaire Extract (2014); and, individual interviews with selected faculty and students, plus an informal Doctoring 4 focus group.

Location in the curriculum:

Foundational epidemiology, biostatistics, and knowledge management content is formally taught in Doctoring during the first two years, with Doctoring 1 AMP cases, ENRG cases, Molecular Medicine journal clubs, and Doctoring 2 MCE sessions providing opportunities to practice skills. During third year, EBM skills are formally addressed in Transition to Clerkship, Doctoring 3, and the Family Medicine Clerkship. Other clerkships provide opportunity for EBM practice and formative assessment (e.g. OB-GYN interactives).

Strengths:

- 1) Multidisciplinary experts, including IoRs, SOM faculty with epidemiology expertise, education specialists, and health science librarians, are currently involved in the LLL: EBM curriculum effort.
- 2) There is a structure in place in SOM curriculum committees, including the Block Council, for working through challenges of coordination and integration of various curriculum threads, including LLL: EBM.
- 3) Well-established epidemiology and biostatistics curriculum content, with assessment components, is already in place in Doctoring 1 and 2. (The home for this content may be changing in 2016-17.)
- 4) Formal knowledge management content (implemented 2013-14; revised 2015-16), well-received by students and supported by SOM IoRs, is ready for strengthening and further development by a committed librarian.
- 5) After formal instruction, which by design has been inserted in the curriculum at highly relevant points in the first three years, ample opportunities exist for students to practice knowledge management skills in a variety of classes, woven into active learning modalities such as PBLs and small group case activities. During clerkships, point-of-care learning needs and more formal assignments provide meaningful context for beginning EBM practice. Some of these assignments already include a formative assessment component (e.g. OB- GYN Clerkship).

Challenges/Gaps:

- 1) Because the LLL: EBM subdomain overlaps significantly with Knowledge and Patient Care graduation competencies, it is difficult to identify its unique curricular role and footprint. In some courses, EBM-related assignments are linked to the Knowledge competency only.
- 2) LLL: EBM competency-related learning objectives and milestones are necessarily defined broadly, with multiple processes collapsed into a single milestone (e.g. defines clinical questions, accesses appropriate resources..., and applies findings to patient care). In addition, related course- or session-level learning objectives are often absent. One result is that granular analysis of how the current curriculum addresses each step of the EBM process is challenging and the level of desired mastery unspecified. For example, based on conversations with IoRs, high proficiency in critical appraisal is not expected; however this is not clear from the LLL: EBM milestones or course learning objectives.
- 3) Recognized EBM teaching strategies are often informal. Straus and colleagues identified three modes of teaching EBM⁴: Role modeling evidence based practice, weaving evidence into clinical teaching, and targeting specific skills of evidence based practice. It is difficult to quantify student exposures to EBM coaching and role modeling and assess the quality of instruction and learning.
- 4) Assessment strategies are developed inconsistently for the knowledge management and EBM content, in part related to #1 and #2. In addition, some instructors may benefit from additional support/training in assessment.
- 5) Since foundational LLL: EBM content is currently hosted within the first three years of Doctoring, LLL: EBM may be vulnerable as the Doctoring curriculum changes over time.
- 6) The current learning objectives for LLL: EBM may be interpreted to focus primarily

on the care of individual patients. While this is an essential application, it may be overly narrow

given the increased interest in systems science and evidence-based practice or evidence-based health care.

Recommendations:

- 1) Adopt more granular learning objectives, at least on the course level, borrowing EPA 7 functions from the AAMC's *Entrustable Professional Activities for Entering Residency*⁹ to lend clarity to LLL: EBM curriculum development and direction to formative assessment strategies.
- 2) EBM formal instruction is best timed in the context of highly relevant assignments and developmental events (e.g. T2C); historically, stand-alone knowledge management instruction has not been well-received by students when it is offered outside of meaningful context. This will require participation and coordination with the instructors and IoRs who teach or host the various components.
- 3) A spiral¹⁰, longitudinal EBM curriculum should be offered, with attention paid to appropriate developmental progression, incorporating whole task activities¹¹, using active, engaged learning and robust assessment approaches.
- 4) Provide support for instructor development in active learning and assessment strategies. Explore best practices in online instruction to support self-paced learning.
- 5) Should an enhanced systems science curriculum be adopted, consider revising the LLL: EBM competency to reflect the need for knowledge management skills related to evidence-based practice, evidence-based healthcare, and evidence-based public health.
- 6) If a transition to residency program is implemented, consider including a whole task LLL: EBM activity.

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Data sources reviewed

- 1) AAMC GQ 2015
- 2) Level 1 and 2 reports/data
- 3) Focus group reports
- 4) CBSE scores
- 5) Step 1 and 2 scores/pass rates and content analyses; step 3 pass rates
- 6) CPX/PBLI student performance
- 7) Mean scores on preclinical courses and shelf exams (year 3) with % failures in each course and course assessment strategies
- 8) CSP input re student struggles
- 9) Match data

Strengths:

- 1) IORs when committed and strong leaders can make all the difference to student learning
- 2) Active learning; ARS, TBL (when done effectively and in small groups is much appreciated and very effective)
- 3) Learning climate created by faculty preceptors
- 4) Community activities/service learning opportunities and culture
- 5) PBLI activities and their successes in leading to improved PE skills (testament to what resources can achieve when provided)
- 6) IPE, when done well and effectively, is impactful (Vet Med as example)

Gaps (not in order of priority):

- 1) Faculty/preceptor and site variability
 - a. Adequately support financially and in a transparent manner (and hold accountable) all educators (VCF/front line teachers) and course directors
 - b. Centralized faculty development related to curriculum development, adult learning, assessment etc
 - c. Establish consult service related to medical education that can be used by any IOR/faculty: faculty teaching observation/improvement programs, course content changes, assessment support, CBME related support, etc. perhaps via Academy of master educators-'merit' based: clinical + preclinical
 - d. Centralized oversight in appointment of course directors (with required faculty development)
- 2) Curricular structural changes
 - a. Structures to facilitate longitudinal relationship building between coaches and learners (faculty development and support)
 - i. Early longitudinal clinical experiences (across the 4 years)

- ii. Portfolio for tracking learner progression and identity formation
 - 1. Consolidate existing learner projects in longitudinal manner (reflections, home visits, QI projects) and not as course based
 - iii. Early identification of learners in need to additional help
 - b. Courses need to be competency-based (will need to redirect funding) and not department based
 - i. Needs financial restructuring and political/climate change, ensuring that Departmental support is not adversely affected
 - ii. As a first step current structure can remain but course content should be developed and controlled by Block Council (big picture view of the block) and should be re conceptualized as a BLOCK CURRICULUM
 - iii. Recognize student achievements in pre-clerkship courses (redesign MSPE to give weight to these in a substantially greater manner)
 - c. Educational tracks/scholarly concentration pathways: (should be linked to our mission to a certain extent, while allowing student individuation)
 - i. Research
 - ii. Education
 - iii. Service
 - iv. QI
 - d. Curricular oversight structures need to be made more robust
 - i. Central oversight (policies, procedures and structures) for substantive curricular changes (should not be permissible by individual courses) so that the 'big picture' view of the curriculum as a whole is not forgotten (will make integration efforts far more effective). Standalone entities such as team PEACE, Doc3 steering committee, etc., all need to have more/better/centralized and direct oversight and reporting to a curriculum committee.
- 3) Curricular content changes
- a. Clinical relevance to be central in pre-clerkship courses: disease based instructional thread
 - i. All pre-clinical courses to have clinical co-IOR
 - b. ALL clinical teaching (in preclinical years) to be longitudinal experiences/mentorships with perhaps intersessions (across all 4 years)
 - c. Need to consider the reality of step 1 and focus some attention towards it in the educational content/assessment strategies used in the pre-clerkship courses
 - d. Meaningful IPE needed: Law School (Ethics/legal curriculum), Vet Med (Immuno, Micro as potential areas), Nursing School, Pharmacy School, Social Work students
 - e. Faculty development on formal curriculum development needed
- 4) Learner assessment systems need overhaul

- a. Need for assessment committees to develop assessment tool, policies, procedures and strategies (as opposed to course IORs). Will improve consistency across courses and allow comparability
 - b. Robust and meaningful assessment tools/strategies that are not only exam based
 - c. Map student performance across courses into meaningful content domains (milestones) to identify gaps and early deficits/interventions (tagging of questions etc): need competency committees
 - d. Much greater direct learner observation especially in the 3rd and 4th years
- 5) Professionalism assessment as a glaring gap that is worthy of stand-alone attention
- a. Milestone based assessment: need for global oversight and accountability of students
 - b. Culture change in the SOM to promote early identification of lapses
- 6) Program evaluation processes are inadequate
- a. Level 1 reviews need to be re-conceptualized
 - i. Questions need to be looked at in a very thoughtful manner to make sure they are yielding data that are of utility
 - ii. Do not currently give a big picture view of individual courses since they are shared as 'stand alone' reports with IORs and Chairs. Without additional learner outcome data, they are not balanced and give a very one-sided view of things and lead to pressure on IORs to make changes purely to please (fear of being labelled as mistreating students if course rankings low).
 - iii. Re think who these are shared with and how they will be used
 - b. Need to collect data on post-graduation performance