Use of Curriculum Mapping Tools to Identify Learning Opportunities and Deficiencies II: KnowledgeMap

> Josh Denny, MD, MS March 7, 2013

### **The Flexner Report**

- Medical education in the United States and Canada, 1910
- Set the foundation for modern medical education
- Current pressures challenge this model:
  - "publish or perish" (researcher)
  - Demand on throughput (clinician)





- LCME and ACGME require increasing documentation of curriculum objectives, coverage, and student patient experiences
- Accreditation standards specific content, competencies, amount of training, etc. for periodic reviews
- ED-2:

"The institution that offers a medical education program is required to establish a system to specify the types of patients or clinical conditions that medical students must encounter and to monitor and verify the medical students' experiences with patients so as to remedy any identified gaps."

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### **Guiding questions**

- Faculty: "I am teaching about congestive heart disease what have students already learned about this?"
- **Students**: Studying immunoglobulins, need to find relevant prior concepts like splicing
- Administrators: Where do we cover large concepts, like geriatrics?

## **Traditional Solutions**

- Web pages for courses
- Course management software (Blackboard, WebCT)
- Finding what is taught where:
  - Curriculum committee meetings
  - Emails
  - Manual logs
  - External, manually maintained curricular databases such as CurrMIT

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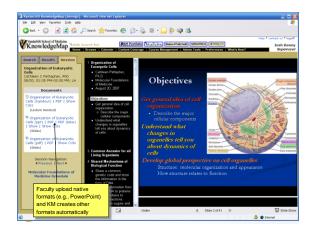
### **An Informatics Model**

- Let learners access work at their own rate (finding old and new data)
- Use multiple methods to delivery content
- Faculty are busy focus on easing content capture, and create tools to accurately capture
- Provide robust searching tools across the entire curriculum

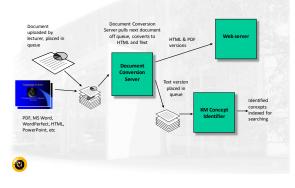
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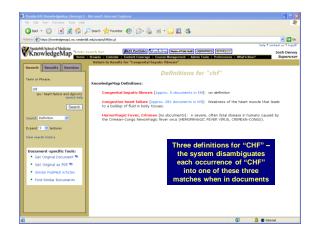


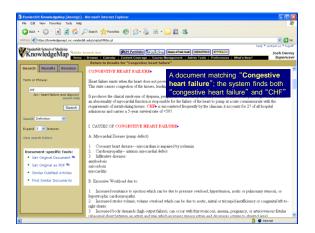




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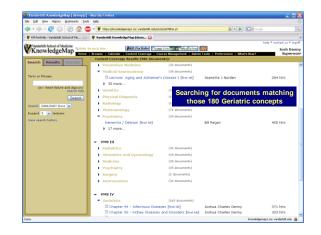


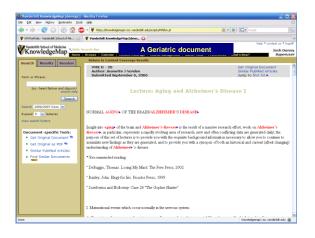
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# How well does KM find metaconcepts?

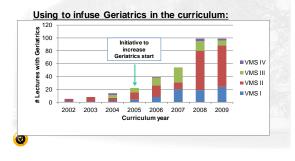
- Identified gold standard set of 380 documents as containing high, medium or low relevance to each topic
  - Used KM to generate a variable number of subconcepts for each broad concept and calculated a relevance score for each document.

Торіс	ROC area
Genetics	0.98
Women's Health	0.93
Dermatology	0.95
Radiology	0.97

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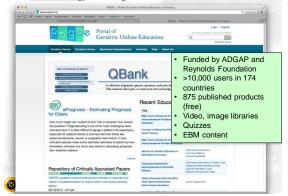
### Finding broad curricular topics

• Used for LCME, creating/rearranging courses, revising curriculum





POGOe.org, a free geriatrics site based on KM



#### Part #2: Assessment in Clinical Years

- Testing based: USMLE, NCLEX, Residency Board Exams
- Experience Based:
- ACGME and RRC
- Nursing requirements
- Both current methods tend to aggregate at high levels
- Experience is an important part of competency

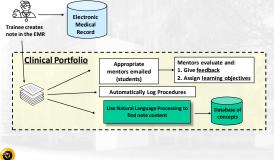
### **Components of "Learning Portfolio"**

We will focus on

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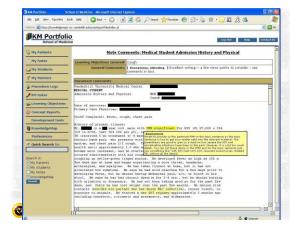
- Clinical notes
- Mentor feedback on notes and other documents
- Logs of procedures/patients
- Reflections
- Tests/academic work
- Essays and other documents

### Learning Portfolio – leveraging EMR to capture experience



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	2007-05	Internal Medicine Clinic Visit	2007-05-23
👗 My Program	2007-05	Outpatient History and Physical	2007-05-23
	2007-05	Internal Medicine Clinic Visit	2007-05-23
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	2007-05	Internal Medicine Clinic Resident Acute Clinic Visit	2007-05-23
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My Students	2007-05-	Outpatient History and Physical	2007-05-02
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My Students Notes	2007-04	Outpatient History and Physical Internal Medicine Clinic Visit	2007-04-25



#### RCT evaluation of mentor feedback on student notes

Survey of Residents and Attending physicians

Compared with prior rotations:	Electronic	Paper	
"I reviewed more notes"	40%	12%	0.014
"I provided more feedback"	40%	12%	0.010
"I was more satisfied with feedback given"	33%	10%	0.045

#### Analysis of student write-ups

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• Evaluated 142 write-ups using 13-point rating scale

- Performance on "Assessment and Plan" ratings
- improved in electronic feedback group (p=0.036)

Spickard et al. J Gen Int Med. 2008;23(7):979-84

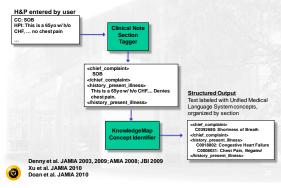
Tracking	experience	e: Vanderbilt
Core Cli	nical Curric	ulum (VC3)

#### 25 Core Clinical Problems (CCP)

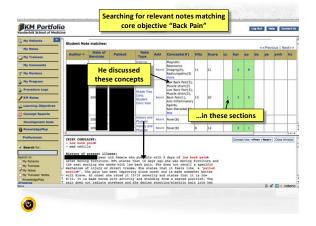
Abdominal pain	Headache
Abnormal uterine bleeding	Jaundice
Abnormal vaginal	Loss of consciousness
discharge	Obesity
Abnormalities of mood	Pelvic pain
Altered mental status	Pharyngitis
Back pain	Rash
Breast disease	Seizures
Chest pain	Shock
Cough	Shortness of breath
Dysuria	Substance abuse
Fever	Trauma
GI bleeding	Weight loss

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Procesure Loge	K	PGY4	4/5	8/3	23/5	1	4/5	0	4/3	0/5	1	0/5	3/3
KM Notes		PGY4 PGY4	6/5	1/3	24/5	1	12/5	0	17/3	0/5	2	95	5/5
		PG/3	0/2	0/3	17/5	2	7/5	0	8/3	0/5	2	-	6/5
Learning Objectives		PGr3	0/5	10/3	11/5	0	8/5	0	13/3	9/5	0	9/5	5/5
Concept Reports		PGY3	1/5	0/3	21/5	0	8/5	0	15/3	0/5	0	0/5	4/5
	- 6	PGY3	5/5	8/3	17/5	1	11/5	0	7/3	5/5	1	05	19/5
Development tools		PGY3	0/5	0/3	11/5	1	2/5	0	24/3	0/5	0	0/5	9/5
KnowledgeMap		PGY3	0/5		4/5	0	1/5	0	9/3	0/5	0	05	1/5
	- 2	PGY3	1/5	0/3	2/5	0	2/5	0	2/3	0/5	0	0/5	.0/5
Proferences		PGY3	2/2	1/4	29/5	3	9/3	0	3/3	C/3	2	9/3	12/5
Search for:		PGY3	8/5	2/2	15/5	1	5/5	0	6/3	0/3	7	9/3	2/8
		PGY3 PGY3		0.0	17/5	0	7/5	0	30/3	4/5	0		12/5
Search In:	8	PGY3	-	0.0	28/5	0	10/5	0	30/3	0.0	2	-	1473
My Patients	8	PGY3		0/3	13/5	2	1403	0	18/3	0.0	0	100	8/5
My Trainces	8	8073	0.5	0/3	20/5	0	9/5	0	2/3	015	3	44	0/5
My Notes	8	80/3	9/5	0/3	12/5	0	5/5	0	7/3	6/5	0	0.5	7/5
My Trainees' Notes		8073	3/5	10	16/5	0	8/5	0	6/3	210	3	645	12/5
KnowledgeMap		1003	6/5	0/3	21/5	0	8/5	0	7/3	210	3	05	2/5
Search		PGY3	0/5	1/3	22/5	1	9/5	0	18/3	0/5	1	0.5	7/5
Search a Population	2	PGY3	2/5	0/3	17/5	0	8/5	0	4/3	0/5	0	0/5	4/3
		PGY3	2/5	8/3	28/5	0	2/5	0	27/3	0/5	0	0,5	7/5
		2GY3	0/5	0/3	4/3	6	0/3	0	3/3	0/5	0	0/3	4/3
		PGY3	5/5	1.02	27/5		1.0.0		5/3	0/2	0	-	7/5

### Extracting "knowledge" from clinical notes

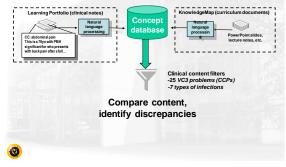


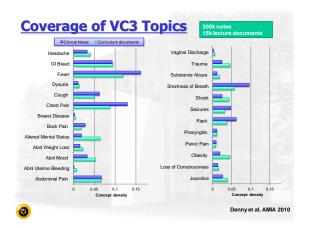
	Mapping of a note to a VC3 topic happens <b>manually</b> and <b>automatically</b> for high scoring documents.		
🦞 My Patients 🔤	Learning Objectives		
My Notes	Learning Objective	Date Recorded	Event Recorded
7 My Mentors	Abdominal Pain [Find matching notes]	10/17/2008 11/1/2008	Pediatric Surgery Consultation Note Medical Student Admission History and Physical
My Reflections	Altered Mental Status		None recorded
Procedure Logs	Back Pain [Find matching notes]	10/17/2008	Return Clinic Visit Progress Note
KM Notes	Breast Disease     Chest Pain	5/9/2008	None recorded Medical Student Admission History and Physical
Learning Objectives	[Find matching notes]	5/23/2008 10/19/2008	Medical Student Admission History and Physical Medical Student Admission History and Physical
W KnowledgeMap	Coma		None recorded
	Cough [Find matching notes]	10/20/2008 10/20/2008	Medical Student Admission History and Physical Medical Student Admission History and Physical
Preferences	Depression [Find matching notes]	11/2/2008 11/2/2008	Medical Student Progress Note History and physical
Search for:	[Find matching notes] [Find matching notes]	11/2/2008 11/2/2008 11/2/2008 11/2/2008	Pediatric Infectious Disease Initial Consultation Medical Student Admission History and Physical Clinic Visit
My Patients	Fever [Find matching notes]	10/17/2008	Medical Student Admission History and Physical Progress Note Daily Progress Note
My Notes My Trainees' Notes KnowledgeMap Rearch	Gastrointestinal Bleeding [Find matching notes]		None recorded
	Heart Murmurs		None recorded
	Jaundice [Find matching notes]	11/2/2008 11/2/2008	History and physical Progress Note Daily Progress Note
	Menstrual abnormalities		None recorded
	Mood Disorder		None recorded
	Pelvic Pain		None recorded



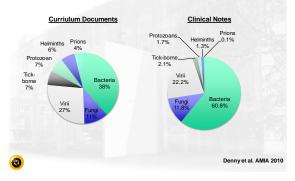
### Part #3: Evaluating and integrating

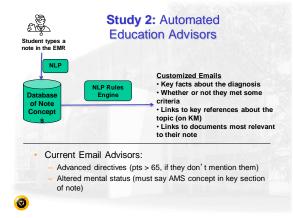
### Study 1: Curriculum vs. Notes

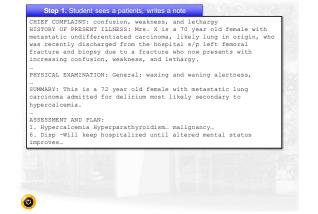




### Coverage of Infectious Diseases







#### Step 2. Portfolio finds AMS concepts found in not

CHEP 2. FUNCTION THATS AND COLLECTS TOUR THILDE CHEF COMPLAINT: confusion, weakness, and lethargy HISTORY OF PRESENT ILLNESS: Mrs. X is a 70 year old female with metastatic undifferentiated carcinoma, likely lung in origin, who was recently discharged from the hospital s/p left femoral fracture and biopsy due to a fracture who now presents with isocracing confision unatherer and letharge increasing confusion, weakness, and lethargy.

PHYSICAL EXAMINATION: General: waxing and waning alertness,

... SUMMARY: This is a 72 year old female with metastatic lung carcinoma admitted for **delirium** most likely secondary to hypercalcemia

0

ASSESSMENT AND PLAN: Hypercalcemia Hyperparathyroidism... malignancy... Disp -Will keep hospitalized until altered mental status

improves.

ale with Step 3. Portfolio finds related curriculum metastati origin, who An example of the student or status of a project to improve your understanding of altered mental status. This email is generated based on your note: Medical Student Admission History and Physical, written on 2011-01-15 19:42-15. Key facts about Altered Mental Status: The differential diagnosis of altered mental status is extensive including dementia, delirium, substance included, drug side effects, infection, intracranial lesions or strokes, trauma, and metabolic entities such as liver disease or hypoglycemia. Alzhiemer's disease, vascular dementia, and dementia with Lewy bodies are the most common form
of degenerative dementias seen in late life. KM documents most like yours: w documents most new yours: Tryical Laboratory Results in the Differential Diagnosis of Hypercalcerria | Joshua Charles Denny | Ferratarica Review Sylabua (Genatrics) Hypercalcerral : Natasha Janele Schneider | Outpatient Medicine Curriculum (Core Lecture Series) Fund Management for Students | Kyle Bertram Brothers | Pediatrics (VMS III) Phamracological Concepts | Joseph Akwad | Phamracologi (VMS II) Fluid Managem Other searches that may be relevant to this patient: "Differential diagnosis of metobolic (liver ds, electrolytes, glucocse abnormalities) as causes of AMS. (4 overlapping concepts) "Differential diagnosis of delerium as a cause of AMS. (2 overlapping concepts) "Signs and symptoms of AMS (2 overlapping concepts) "Evaluation of AMS (1 overlapping concepts)

HIEF COMPLAINT: confusion, weakness, and lethargy

### **Acknowledgements**

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