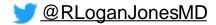
Modern Day Medicine Meets Modern Day Learning

Your Smartphone as a Resource for Lifelong Learning

R. Logan Jones, MD (He/Him) Assistant Professor of Medicine – Dept of Internal Medicine Division of Hospital Medicine | OHSU <u>ACP Oregon 2020 Annual Meeting</u>



Disclosures

I have received past compensation (> 12 months ago) from the following sources:

- VisualDx Medical Advisory Board
- Figure1 Brand ambassador



Objectives

--Briefly review educational state of Electronic Health Information Education

--Discover various electronic resources for asynchronous learning & clinical practice

--Explore how smartphone applications can specifically help clinicians in their personal lifelong learning

The "What"

"Electronic Health Information"

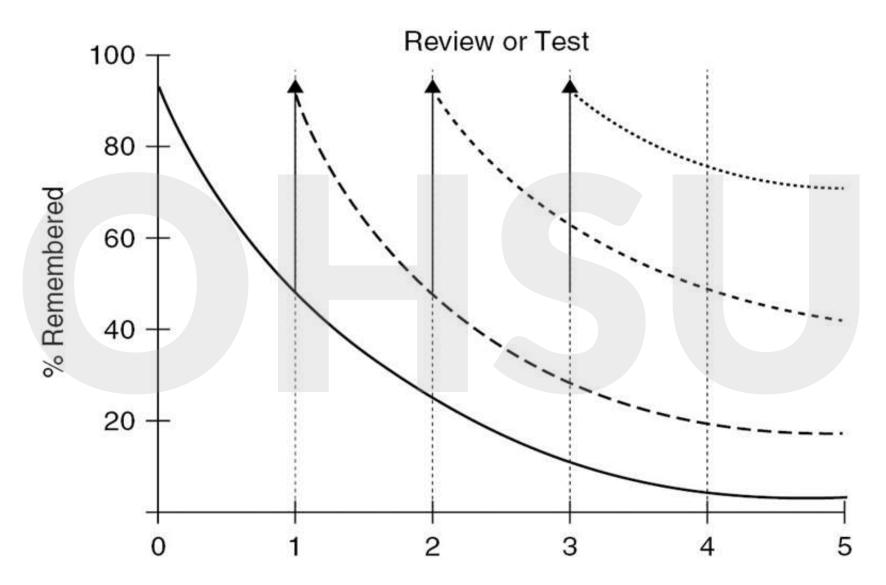
A Blanket term to describe electronic clinical resources

- The Promise: reliable, timely, and evidence based answers to clinical questions.
- Can be accessed through computer, tablet, or smartphone
- Today's Focus:
 - Smartphone based resources
 - "Clinical Decision Support Software"
 - "There's an app for that"
 - Podcasts



Time To Double Medical Knowledge Is Decreasing 60 50 years 50 Time (years) Medical 40 knowledge will double 30 every 73 days 20 by 2020 10 7 years 3.5 years 0.2 years 0 2020 1950 1980 2010 Graphic source, NCBI, "CHALLENGES AND OPPORTUNITIES FACING MEDICAL EDUCATION" Peter Densen, MD, 2011

Ebbingaus' Forgetting-Curve



Schell, R., et al. Education in Anesthesia: How to Deliver the Best Learning Experience (pp. 212-217).doi:10.1017/9781316822548.018

Extrinsic Motivation



The "How"

There is a WRONG way...

Introduction: The study objective was to determine the accuracy of answers to clinical questions by emergency medicine (EM) residents conducting Internet searches by using Google. Emergency physicians commonly turn to outside resources to answer clinical questions that arise in the emergency department (ED). Internet access in the ED has supplanted textbooks for references because it is perceived as being more up to date. Although Google is the most widely used general Internet search engine, it is not medically oriented and merely provides links to other sources. Users must judge the reliability of the information obtained on the links. We frequently observed EM faculty and residents using Google rather than medicine-specific databases to seek answers to clinical questions.

Methods: Two EM faculties developed a clinically oriented test for residents to take without the use of any outside aid. They were instructed to answer each question only if they were confident enough of their answer to implement it in a patient-care situation. Questions marked as unsure or answered incorrectly were used to construct a second test for each subject. On the second test, they were instructed to use Google as a resource to find links that contained answers.

Results: Thirty-three residents participated. The means for the initial test were 32% correct, 28% incorrect, and 40% unsure. On the Google test, the mean for correct answers was 59%; 33% of answers were incorrect and 8% were unsure.

Conclusion: EM residents' ability to answer clinical questions correctly by using Web sites from Google searches was poor. More concerning was that unsure answers decreased, whereas incorrect answers increased. The Internet appears to have given the residents a false sense of security in their answers. Innovations, such as Internet access in the ED, should be studied carefully before being accepted as reliable tools for teaching clinical decision making. [West J Emerg Med. 2011;12(4):442–447.]

But No Agreed Upon "Best" Way

Cochrane Database of Systematic Reviews

Interventions to increase the use of electronic health information by healthcare practitioners to improve clinical practice and patient outcomes

Cochrane Systematic Review - Intervention | Version published: 14 March 2015 see what's new https://doi.org/10.1002/14651858.CD004749.pub3 C

Key results

The results of this review showed that when provided with a combination of EHI and training, practitioners used the information more often. Two studies measured doctors' use of electronic treatment guidelines, but showed that the electronic aspect of the guidelines did not mean that doctors followed the guidelines. This review provided no information on whether more frequent use of EHI translated into improved clinical practice or whether patients were better off when doctors or nurses used health information when treating them.

PLOS ONE

RESEARCH ARTICLE

Improved patient satisfaction and diagnostic accuracy in skin diseases with a Visual Clinical Decision Support System—A feasibility study with general practitioners

Abstract

Patient satisfaction is an important indicator of health care quality, and it remains an important goal for optimal treatment outcomes to reduce the level of misdiagnoses and inappropriate or absent therapeutic actions. Digital support tools for differential diagnosis to assist clinicians in reaching the correct diagnosis may be helpful, but how the use of these affect patients is not clear. The primary objective of this feasibility study was to investigate patient experience and satisfaction in a primary care setting where general practitioners (GPs) used a visual clinical decision support system (CDSS) compared with standard consultations. Secondary objectives were diagnostic accuracy and length of consultation. Thirty-one patients with a dermatologist-confirmed skin diagnosis were allocated to consult GPs that had been randomized to conduct either standard consultations (SDR, n = 21) or CDSS (n = 16) on two separate study days one week apart. All patients were diagnosed independently by multiple GPs (n = 3-8) in both the SDR and CDSS study arms. Using the CDSS, more patients felt involved in the decision making (P = 0.05). In addition, more patients were exposed to images during the consultations (P = 6.8e-27), and 83% of those that were shown images replied they felt better supported in the consultation. The use of CDSS significantly improved the diagnostic accuracy (34%, P = 0.007), and did not increase the duration of the consultation (median 10 minutes in both arms). This study shows for the first time that compared with standard GP consultations, CDSS assist the GP on skin related diagnoses and improve patient satisfaction and diagnostic accuracy without impacting the duration of the consultations. This is likely to increase correct treatment choices, patient adherence, and overall result in better healthcare outcomes.

In Short: START SOMEWHERE



Smartphone Prescription

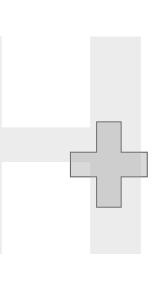
1. Be "fluent" with at least one "all inclusive" reference application

1. Have at least one "case based" learning method on your smartphone that is used at least weekly

- 1. Extra Credit:
 - a. Explore niche applications to expand knowledge in areas of weakness
 - b. Subscribe to podcasts to passively expand knowledge







"All inclusive" Pointof-Care Clinical Decision Support Software

B. Wolters Kluwer UpToDate®

Beneficial Features:

- Comprehensive & provides citations to primary literature
- Has infiltrated the market at is ubiquitously recognized (Is used on "open book" formats for some medical boards)
- Lexicomp drug reference

Caveats:

• Recommendations are often "expert opinion"

Educational Credit: CME & and ABIM MOC available

<u>Cost:</u> \$519+ / yr (individual physician subscription)

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Canada	PRETREATMENT EVALUATION	increase in water intake (primary polydipsia) and/or by impaired water exceeden due, for example, to			
Questions and pressers (COVID-198)	Description that Banalises of Paparetamentum	advacced renal balaxy or persistent release of antiduresis hormone (ADH), (See "Causes of biodims. Inconstrumts in solutio".) This topic provides an overview of the treatment of adults with hyponativenia, including the pressament watuation, selection of initial and subsequent therapy, gasts of therapy, and communiphalis. This causes, directly and evaluation of hyponativenia, as we presented in other topics. • (See "Causes of Syconativenia, are presented in other topics. • (See "Causes of Syconativenia, are bioditic.) • (See "Disponence evaluation of adults with bioconstrumts".)			
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DynaMed Plus

Beneficial Features:

- Good for brief, succinct pearls about conditions
- "Goldilocks" amount of info not too much, not too little
- Often written in collaboration with guideline committees/orgs

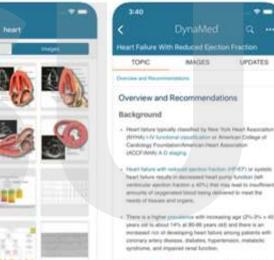
Caveats:

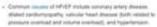
Bullet point style leaves off some nuanced discussion

Educational Credit: CME & and ABIM MOC available

<u>Cost:</u> \$395/yr for individual physicians, free with ACP membership







- Selected block and imaging studies may help identify assessments reliable at the training of complements HF, and Heatyle changes and medications was hele prevent programment of payrophymatic to symptomatic ref.
- Programme or took of murbality due to HPHEF carries an using autobalant instituantable tisk scores

-Heart Failure With Reduced Election Fraction MADES **UPDATES**

Overview and Recommendations

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- Heart halons with web and associate fraction; (107-6.7) to approxi-Travel failure results in decreased head party function (wh. centricular apartitor, fraction a 42%.) that may head to impedicate amounts of paysments blood being delivered to meet the meetin of blacksis and organs.

BMJ Best Practice

Beneficial Features:

- Good for brief, succinct pearls about conditions, treatment
- Succinct in content
- Great User interface & very clinically focused

Caveats:

- Does not readily provide primary literature citations
- Not as much content compared to Dynamed/Up to Date

Educational Credit: Up to 20 hrs AAFP CME available (In theory AMA CME as well)

<u>Cost:</u> ~ \$300 /yr for individual physicians subscribers

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Beneficial Features:

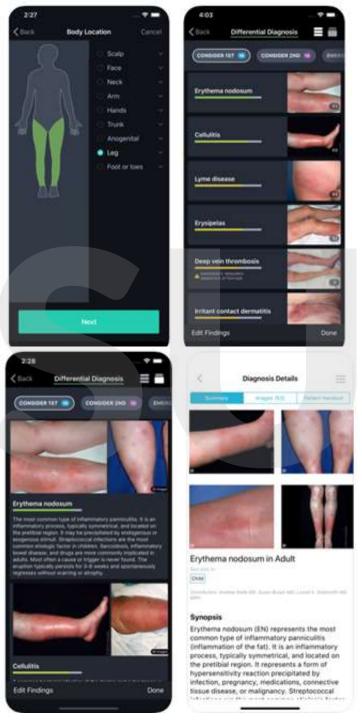
- The gold standard for dermatology applications
- Most pictures of reference applications
- DDx Engine

Caveats:

• Less robust evidence based compared to others :all inclusive" reference

Educational Credits: CME for individual subscribers

Cost: \$399 + / yr for individual physician subscribers





Free basic version (pill identifier, pharmacopoeia with dosing)

Premium version with robust clinical engine

Beneficial Features:

- Very easy to use at point of care
- Lowest cost
- Has a built in "alternative medicine" reference

Caveats:

- Pharmacists more leery about credibility of pharmacopoeia
- less robust evidence based compared to others in this section

Educational Credits: No CME

<u>Cost: \$399 + / yr</u>

Review expert disease content from the BMJ

10:26	ad 🗢 🗰
<	Ø☆e
Type 2 DM, adult	2
Highlights & Basics	8
Treatment Options	
Emerging Treatments	
Treatment Approach	÷
History & Exam	2
Tests	
Differential Diagnosis	3
Diagnostic Approach	
Follow-up	× 1
Complications	5
Citations	2

Case Based Learning





Description:

Long-standing resource for exam-prep and CME for internal Medicine offered by American College of Physicians

Beneficial Features:

- App has good interface
- Can get through a few questions/cases in just a few minutes
- Great for long elevator rides

Caveat:

• Quite heavy on outpatient knowledge for full-time hospital medicine based practitioners

Educational Credit: CME & and ABIM MOC available

Cost: \$639 (\$479 ACP members) for digital only subscriptions

(also referred to as "Human Dx")

Description:

"The Human Diagnosis Project is a worldwide effort, created with and led by the global medical community, to build an open intelligence system that maps the steps to help any patient."

Focus

- Clinical Reasoning
- Illness Script Building

Learning Credits: Working towards providing CME (not yet)

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<	Finding 1 of 7	Û

66-year-old man with encephalopathy

Created by Zeven Sangayan

Findings

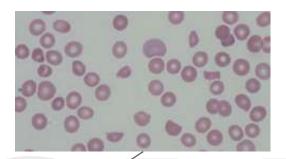
1. Confusion

- Onset: 3 days
- Associated with: Urinary incontinence
- Associated with: auditory hallucination

What's the initial differential diagnosis? t. Univery yard infantion. 2. Deletion due to known physiologic ... = 10 3. Alcohol Wilhumanal Syndrome 4. Worsche's servephalopathy 0 7. Normal pleasure hydrocephalue 8. Carolical infention - 0 10. Encephainte - 0 NEXT FINDING

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4. Dalmum dae to known physiologic	0
5. Onay but inledian	0
6. Nonrevnetic subclust/hemoritage	0
7. Carabral infanction	0
B. CAA: Cerebral amplified amplopathy	0
9. Strongthafilis	0
10. Ensis abscess	0
the formal pressore hydrocephalus	0

4. Hgb 9.4, platelets 8, WBC 4.8 with normal differential. INR 1.2, PTT 29. Cr 1.2.



66-year-old man with encephalopathy

Counted by Zavan Sampsyoi Findings

1. Confusion

- Ocset 3 days

- Associated with: Urinary incontinence - Associated with: auditory hallucination

2. Gait instability

3. Medical History: Substance use disorder

- Active use of heroin, manjuana, alcohol; cocaine

Thrombotic thrombocytopenic purpura At an one had different at stagene Address of the P Realizer Descended

VIEW ALL ACCEPTED ANSWERS

THE DIAGNOSIS

Teaching points

Case resolution: He received FFP and steroids overnight, and plasma exchange (PLEX) the following day. His symptoms resolved after 1 session. Two months later he had a relapse and was treated with rituximab.

Diagnostic reasoning: it is helpful to consider the "discerning features" of an illness. For instance: anemia, thrombocytopenia, confusion, and renal dysfunction occur very frequently in sepsis. The discerning feature in thrombotic microangiopathies (TMAs) is intravascular hemolysis, appreciated quickly by noting schistocytes on the peripheral smear.



Apple App Store

Android App Store







Description:

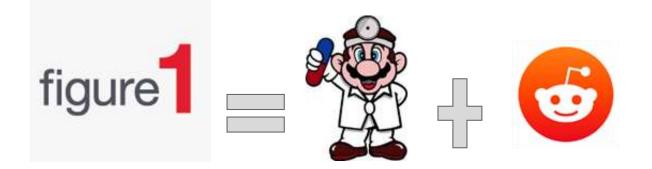
Figure 1's mission is to democratize medical knowledge and improve the future of healthcare.

Focus

- Clinical image sharing
- Crowdsourcing Medical Questions

Learning Credits: No CME/MOC available

<u>Cost:</u> Free







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 \times

daleeni B Family Medicine + 23.8k

That's venous marbling. It develops post mortem when hydrogen sulphide produced by bacteria reacts with hemoglobin from lysed erythrocytes. It's part of the decomposition process (edited)

Like • 96 Reply

vandygirl Nurse Practitioner

Iron deposits from venous pooling in Rigor Mortice vessels from the arm lying supine for a prolonged time then turned prone : large vessels in arms and capillary beds in fingers

Like

daleeni 🛢 Family Medicine 🔶 23.8k

Venous pooling and eventual extravasation of erythrocytes cause livor mortis, which is what I suspect you are referring to. This isn't that. Lm doesn't have the 'veiny' marbling pattern we see here.

Like • 14

NelsonMa_PA-S C Physician Assistant Student

Is it possible that MSM (or similar) is the causative and not bacterial? (edited)

Like



daleeni 🛢 Family Medicine 🧄 23.8k

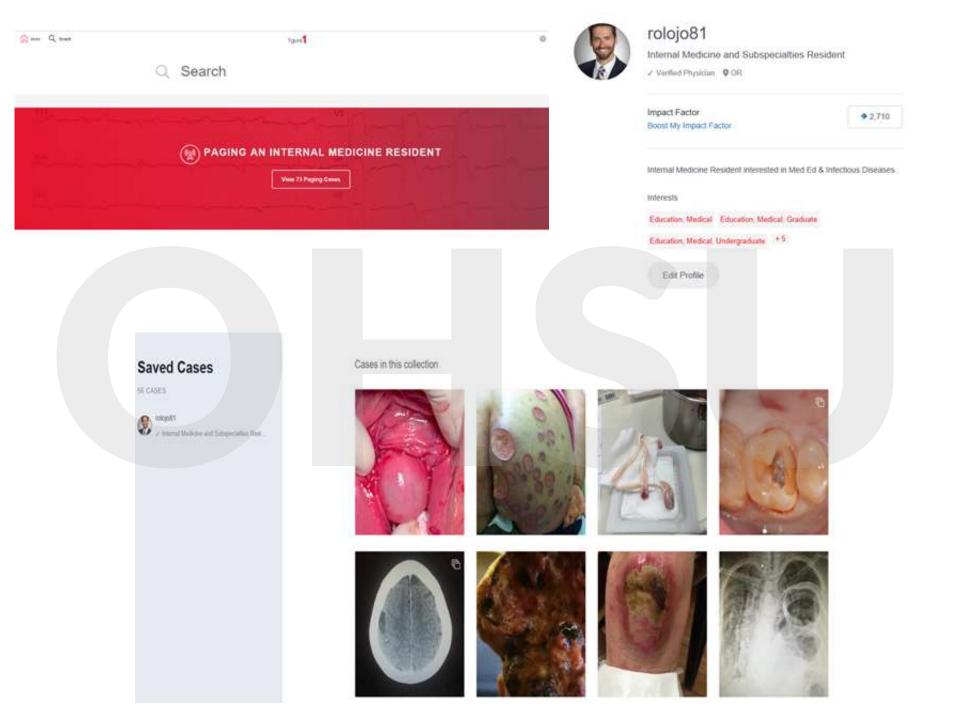
In theory that is certainly possible. A quick search didn't yield any literature to that effect but I didn't search very comprehensively.

Like • 2 Reply

NelsonMa_PA-S Ø Physician Assistant Student

Venous SulphHb dyshemoglobinemia. Due to sulphur binding from drug or H2S poisoning

Like • 21 Reply





Apple App Store

Android App Store





#TwitterReport



Description:

- Physicians at Pittsburgh lead a semisynchronous case discussion on twitter
- Follow their account and monitor twitter

<u>Downside:</u> requires twitter account and must check regularly



MedEd Pittsburgh

@MedEdPGH Follows you

Some Pittsburgh doctors with smart friends learn medical stuff and teach it back to the world. #TwitterReport #PhysioQuizzo Posts don't replace medical advice.

Pittsburgh, PA Doined May 2017



https://twitter.com/MedEdPGH/status/115150 6163483238400

Helpful Niche Applications



Microbiology and Antibiotics

Beneficial Features:

- Succinct background, evaluation, empiric antibiotic selections
- Both are well supported with evidence with links to literature

The Hopkins app seems to be a little more "inclusive" on all the information you could want on a topic at the expense of being a little more difficult to navigate comparatively to Sanford



Cardiology: ACC "Guideline App"

Beneficial Features:

- One of the most user friendly and actually "helpful" guideline apps on the market
- Includes many Dx & Tx algorithms based on ACC guidelines

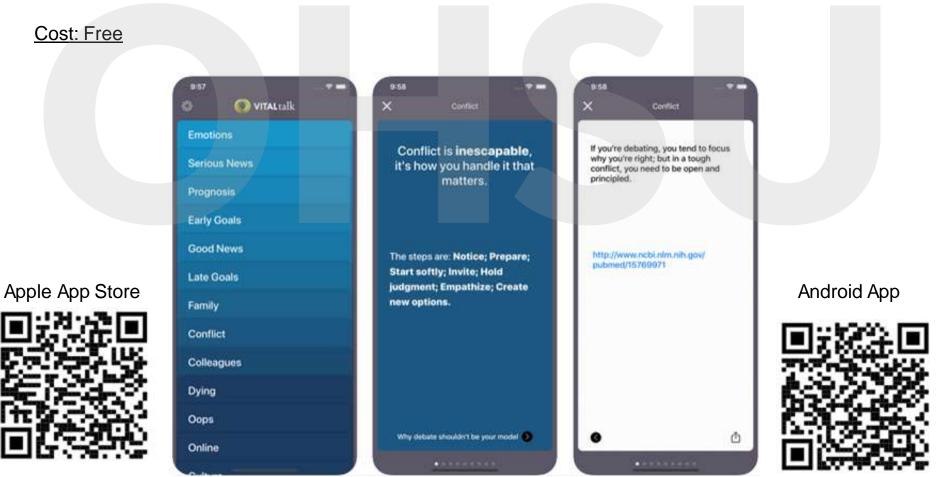
Cost: Free



Palliative & Hospice Care: Vital Talk Tips

Beneficial Features:

- Provide very useful language/scripts surrounding difficult conversations
- Has updates on how to address difficult questions re: COVID-19



MD Calc

Beneficial Features:

• Have access to hundreds of clinical calculators and scoring systems (NIH stroke scale, MELD, Pneumonia Severity Index, etc) even when not connected to internet

Cost: Free (with free registration), can pay to earn CME







Canopy Speak

Beneficial Features:

Apple App Store

Cost: Free

- Medical interpreter app co-produced by NIH
- Quick reference for "yes/no" style questions for dozen + languages
- Integrates with Translator services

52% at Verizon S 14:08 and Verizon 🗢 51% Select Patient's Language Done C Phrases **Recently Used** Allow patient to select language What brings you in here today? Please note, although this app will help me Arabic (العربية) to communicate with you, I still will not be able to understand your language. Bengali (attent) - Text Only Would you like me to call a translator? Chinese Cantonese (廣東話) I would like to use this device to Chinese Mandarin (普通話) ----Me gustaría usar este Filipino (Tagalog) - Text Only dispositivo para French (Français) comunicarme con usted. Haitian Creole (Kreyól ayisyen) - Auctio Requires Internet Play ★ Save X Show Hindi (हिन्दी) Have you had Tuberculosis (positive TB Japanese (日本語) skin test)? Korean (한국어) Have you ever had abnormal Pap smears? Malay (Bahasa Melayu) - Text Only Have you ever had a pap smear? Portuguese (Português) a \star Russian (русский язык)

Google Play

Visualmed

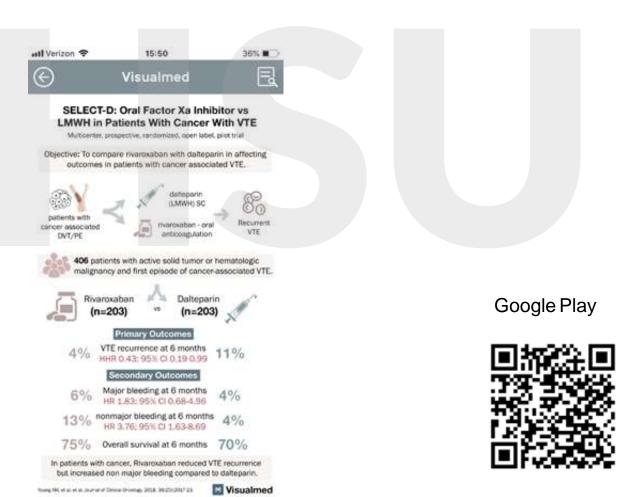
Features:

- Visual abstract formats of landmark trials
- Can sort by specialty or year

Cost: \$4.99 once







EBM diagnosis

Diagnose

Features:

• Consolidates the JAMA Rational Clinical exam series into an application to guide Bayesian diagnostic approach

Cost: free





Diagnose	2	COPD		C
Filter thema	_	Using spirometry as a inference si of men and 7% of women w pulmonary disease. The condition adults; however, those who have years or older at at greatly increase	orldwide have must be consi- unsoked and a	obstructiv dered in a
and closed plant	•	PRETEST: 11%		
Acute Otitis Media, Child	0			
Alcohol Problems	0			
Ascites	0	History	+LR	-LR
Bacteremia	ø	Smoking > 70 pack year	8	0.63
Bladder Outlet Obstruction	0	Smoking ever	1.8	0.16
Bunt Intra-Abdominal Trauma		Sputum > 1/4 cup	4	0.84
and the second and trauma.		Chronic bronchiltis symptom	s 3	0.78
Cancer, Family History	0	Wheezing	3.8	0.66
Cardiac Arrhythmia, Any	0	Any exertional dyspnea	2.2	0.83
		Coughing	1.8	0.69

Google Play

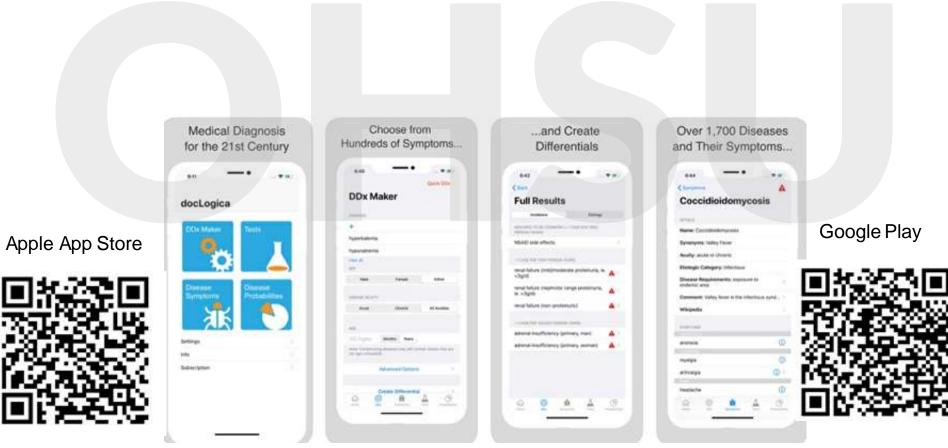


DocLogica

Features:

- Very robust database of physical exam / history findings and their likelihood ratios
- Has a differential diagnosis engine

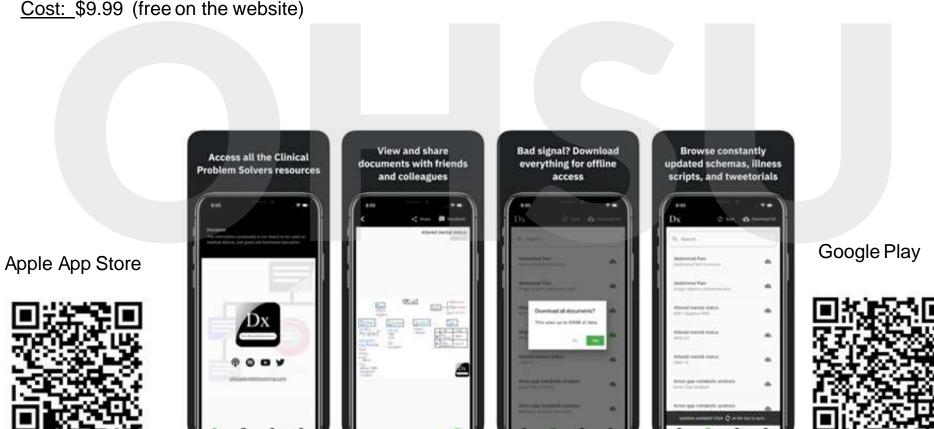
<u>Cost:</u> \$9.99/ yr



Clinical Problem Solvers

Features:

Growing list of diagnostic frameworks - originates from the podcast "Clinical Problem Solvers"



Cost: \$9.99 (free on the website)

Master your POCUS

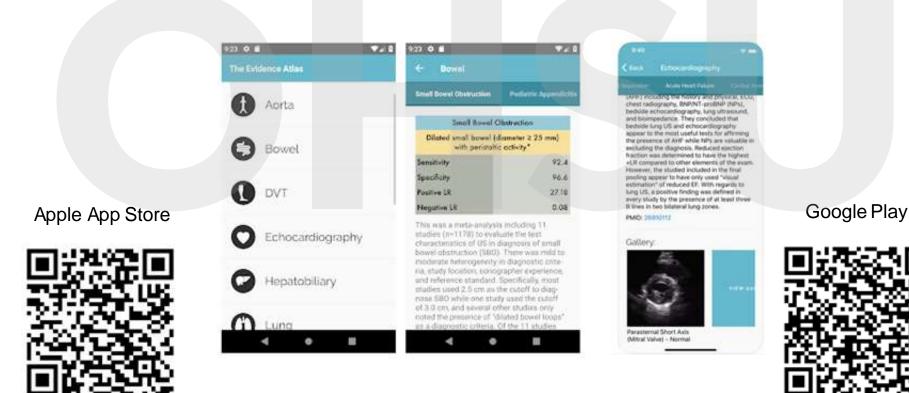


Evidence Atlas

Beneficial Features:

- Synthesizes the diagnostic utility of specific Point-of-care Ultrasound findings
- Links to citations and brief image library

Cost: Free

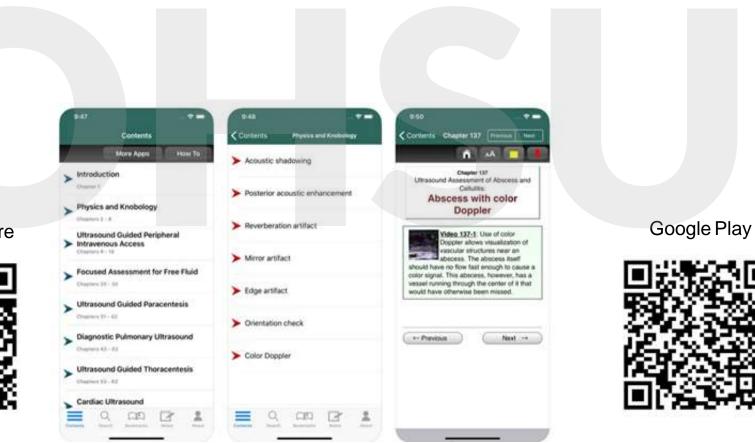


Videos for POCUS: Ultrasound

Beneficial Features:

• An app meant as an adjunct for a textbook but can be used as a stand-alone quick POCUS reference library

Cost: Free

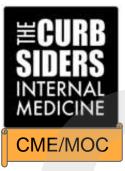


Apple App Store



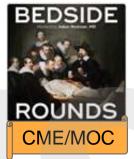
Podcasts

Get Your Knowledge Food with a Side of CME/MOC



The Curbsiders Internal Medicine Podcast

Matthew Watto MD, Stuart Brigham MD, Paul Williams MD



Bedside Rounds Adam Rodman, MD, MPH, FACP



Core IM | Internal Medicine Podcast

Core IM Team



Annals On Call Podcast

American College of Physicians

ACP Online Learning Center: Podcasts and Audio Content CME & MOC instructions



Just Really Good Stuff



The Clinical Problem Solvers

The Clinical Problem Solvers



This Podcast Will Kill You

Exactly Right



EMCrit Podcast - Critical Care and Resuscitation Scott D. Weingart, MD FCCM



Explore the Space

Mark Shapiro MD



Plenary Session Vinay Prasad, MD MPH



The Nocturnists

The Nocturnists



Persiflagers Infectious Disease Puscast

Mark Crislip



IMreasoning

Drs. Art Nahill & Nic Szecket

Now What?



Self Educational Rx:

1. Clinical Decision Support Software

- a. <u>Have at least one you're comfortable with.</u>
- b. Navigation speed can be a barrier, so fluency will keep you coming back for more learning

2. Case Based Learning

- a. Consider setting a case quota (ex. "I will do 1 case per day/week etc")
- b. Find which format appeals to you and your learning style

3. Niche Apps can be helpful, but too many can be clutter

- a. A mastercraftsman slowly adds tools to the toolbox over time
- b. Trying to use too many apps all at once is overwhelming...add new ones in slow increments

4. Podcasts are a great filler for multitasking

- a. Bike/car commute
- b. Chores at home

Using Apps for Educational Tools

Human Dx:

Diagnostic Reasoning Rounds

Review a case in real time, have everyone on the team work through their differential and share at various points



Physical Diagnosis Rounds:

_____Review a presentation of a classic case, and review how strong/weak diagnostic certainty should be using exam/history: <u>Diagnose or DocLogica</u>

Refer back to this later (save the web-link to your phone)

