



AMDIS Literature Review

June 20, 2019

Colin Banas, MD, MSHA

CMIO x 10 years

Associate Professor of Internal Medicine

colinbanas@gmail.com

@colin_banas

Karl Kochendorfer, MD, FAAFP

Assistant Vice Chancellor

Chief Health Information Officer

Associate Chief Medical Officer

Associate Professor of Family Medicine

FREEAGENT

 UI Health | 

AGENDA

- What was done before
- How to do an informatics literature review and search
 - The Right Way
 - The Banas Way
- Interesting trends
- Altered methodology
- Our favorite studies and news updates

DISCLOSURE OF CONFLICTS OF INTEREST



Karl Kochendorfer, MD, FAAFP

Founder and CMO

Karl Kochendorfer, MD

Executive Coaching and Consulting Services

However, none of the slides presented today are related to these roles or systems.

HELP WITH LITERATURE REVIEW



Its easy! I
published my
methodology



BILL'S METHODOLOGY IN 2017

Clinical Informatics OR

appl clin inform OR appl med inform OR bmc med inform decis mak
OR comput inform nurs OR int j med inform OR j amia OR j clin
bioinforma OR j innov health inform OR j med internet res OR j med
syst OR med inform OR

"Medical Informatics"[Mesh] OR

"Medical Informatics Computing"[Mesh] OR

"Medical Informatics Applications"[Mesh] OR

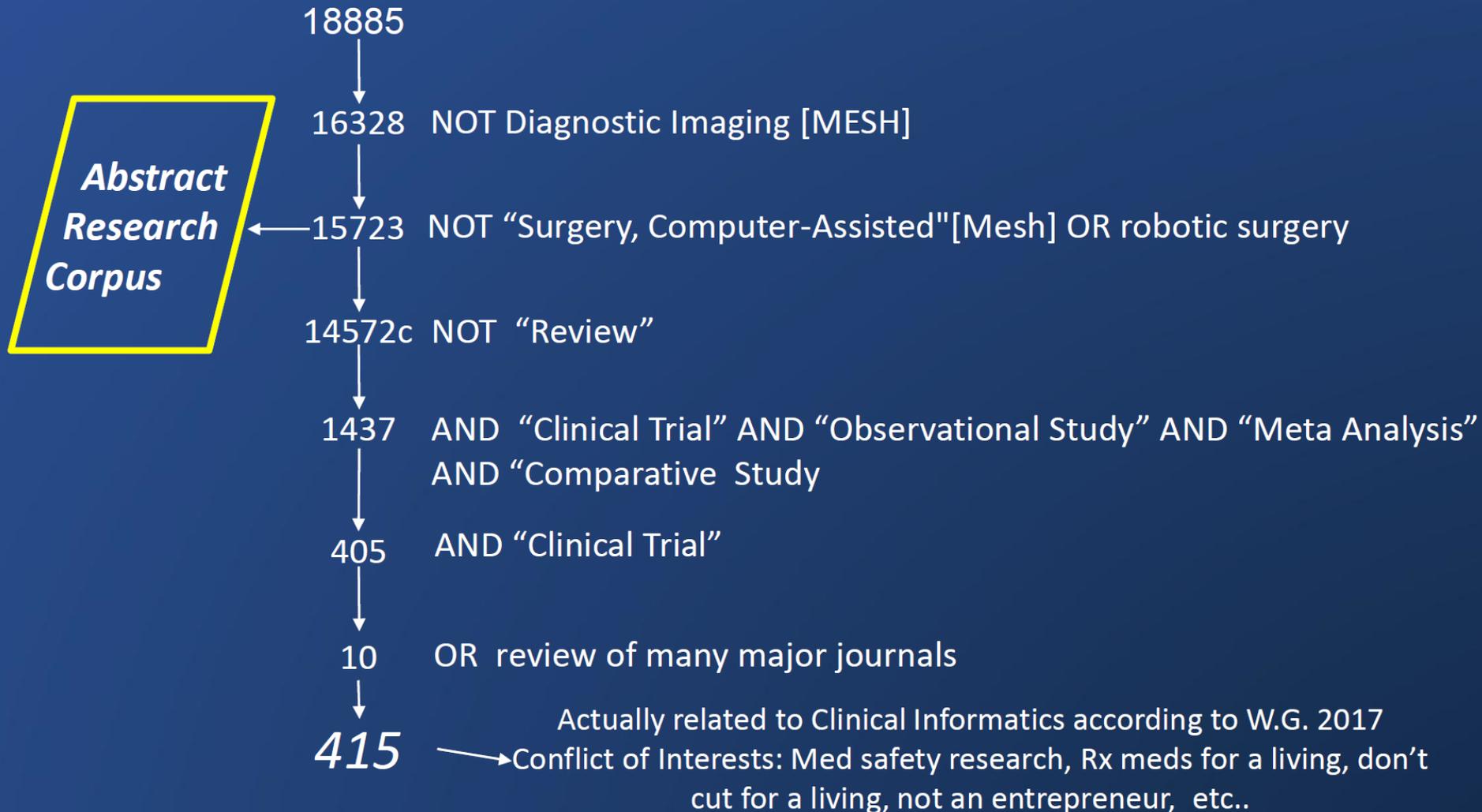
"Medical Order Entry Systems"[Mesh] OR

"Medical Records Systems, Computerized"[Mesh] AND

5/1/16 - 4/30/17 AND English

BILL'S RESULTS FROM 2017

Final Paper Review Methodology



MY ISSUES

- Some of these Journals were no longer in PubMed
- Bill didn't like digital imaging, but I've started working with Pathologists and Radiologists that LOVE that stuff and I've recognized that Imaging Informatics has HUGE opportunities in healthcare
- I've got lots of questions ???
- I'm running out of time





FINDING MY OWN WAY

- Are there really only 11 top informatics journals or now 9?
- If there are more, what are they?
- How do they rank?
- Where should I be encouraging our CI Fellows or AMDIS folks to publish their scholarly output?
- Where can I find this kind of information?
- What MeSH terms would our CHIO team or other AMDIS attendees want to include?

IF I HAVE SEEN FURTHER,
IT IS BY STANDING
ON THE SHOULDERS
OF GIANTS.

- ISAAC NEWTON



CHANGING JOURNAL LANDSCAPE

Removed:

- **Applied Medical Informatics**
 - Iranian, no longer in print or in PubMed
 - 1 PubMed article from 2013 about using Google docs for storing patient data
- **Journal of Clinical Bioinformatics**
 - last publication was from 2015 in PubMed

Renamed:

- **j innov health inform = BMJ Health & Care Informatics in 2019**
- **med inform = JMIR Medical Informatics**
 - published since 2013 but only added to SCIE in 2019
- **j amia = j am med inform assoc**
 - it's ISO 4 standard journal name

JOURNAL IMPACT AND CATEGORIZATION

Web of Science InCites Journal Citation Reports Essential Science Indicators EndNote Publons Sign In Help English

InCites Journal Citation Reports

Clarivate Analytics

Home Category Rankings

Go to Journal Profile

Master Search

Select Journals

Select Categories

Select JCR Year

2017

Select Edition

SCIE SSCI

Clear Submit

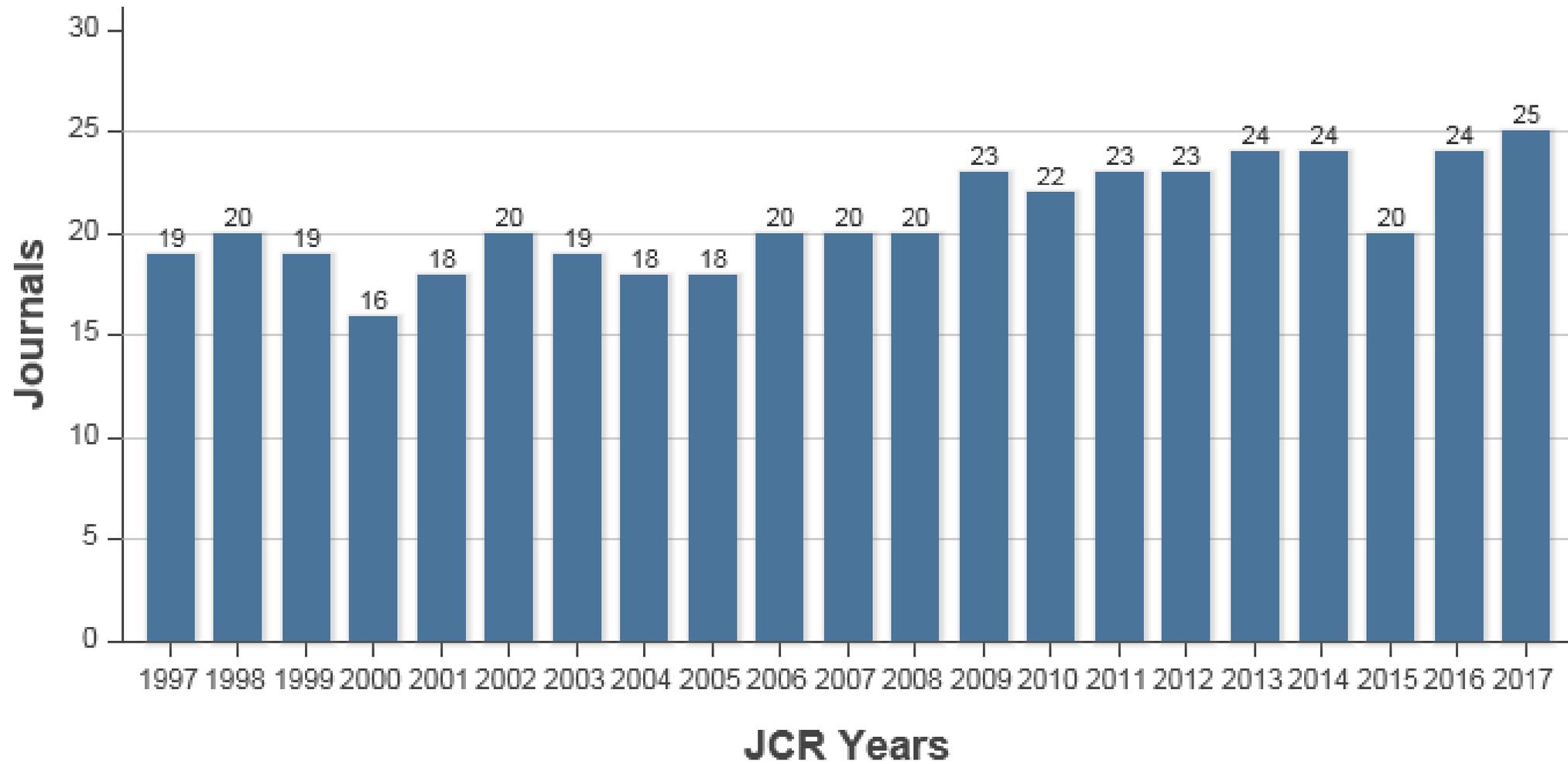
Journals By Rank Categories By Rank

All Journal Categories ranked by Number of Journals

Customize Indicators

	Category	Edition	#Journals	Total Cites	Median Impact Factor	Aggregate Impact Factor
191	ELECTROCHEMISTRY	SCIE	20	811,040	2.432	4.427
193	ALLERGY	SCIE	27	127,991	3.457	4.663
193	IMAGING SCIENCE & PHOTOGRAPHIC TECHNOLOGY	SCIE	27	162,870	1.643	3.149
193	INDUSTRIAL RELATIONS & LABOR	SSCI	27	32,289	1.364	1.625
193	INTEGRATIVE & COMPLEMENTARY MEDICINE	SCIE	27	101,746	1.685	2.199
193	MATERIALS SCIENCE, CERAMICS	SCIE	27	151,173	0.980	2.301
198	CRYSTALLOGRAPHY	SCIE	26	213,732	2.106	2.575
198	EMERGENCY MEDICINE	SCIE	26	87,289	1.391	1.971
198	MATERIALS SCIENCE, COMPOSITES	SCIE	26	140,892	1.402	3.254
198	ROBOTICS	SCIE	26	52,396	2.121	2.147
202	AUDIOLOGY & SPEECH-LANGUAGE PATHOLOGY	SCIE	25	100,231	1.696	1.826
202	MEDICAL INFORMATICS	SCIE	25	96,990	2.098	2.634

“MEDICAL INFORMATICS” JOURNALS



Web of Science. Journal Citation Reports. Medical Informatics category: Medical Informatics covers resources on health care information in clinical studies and medical research. This category includes resources on the evaluation, assessment, and use of health care technology, its consequences for patients, and its impact on society.



TOP 15 OF 25 INFORMATICS JOURNALS

Rank	Journal Title	Impact Factor	Citations	Bill's	Rank	Journal Title	Impact Factor	Citations	Bill's	Rank	Journal Title	Impact Factor	Citations	Bill's
1	JOURNAL OF MEDICAL INTERNET RESEARCH	4.7	10,875	✓	6	INTERNATIONAL JOURNAL OF MEDICAL INFORMATICS	3.0	4,584	✓	11	JMIR SERIOUS GAMES	2.2	166	
2	JMIR mHealth and uHealth	4.5	1,418		7	JOURNAL OF BIOMEDICAL INFORMATICS	2.9	5,871		12	BMC Medical Informatics and Decision Making	2.1	3,001	✓
3	JOURNAL OF THE AMERICAN MEDICAL INFORMATICS ASSOCIATION	4.3	8,713	✓	8	ARTIFICIAL INTELLIGENCE IN MEDICINE	2.9	2,097		13	JOURNAL OF MEDICAL SYSTEMS	2.1	3,751	✓
4	IEEE Journal of Biomedical and Health Informatics	3.9	2,922		9	COMPUTER METHODS AND PROGRAMS IN BIOMEDICINE	2.7	5,915		14	MEDICAL & BIOLOGICAL ENGINEERING & COMPUTING	2.0	5,422	
5	MEDICAL DECISION MAKING	3.0	4,718		10	STATISTICAL METHODS IN MEDICAL RESEARCH	2.3	3,435		15	STATISTICS IN MEDICINE	1.9	23,519	

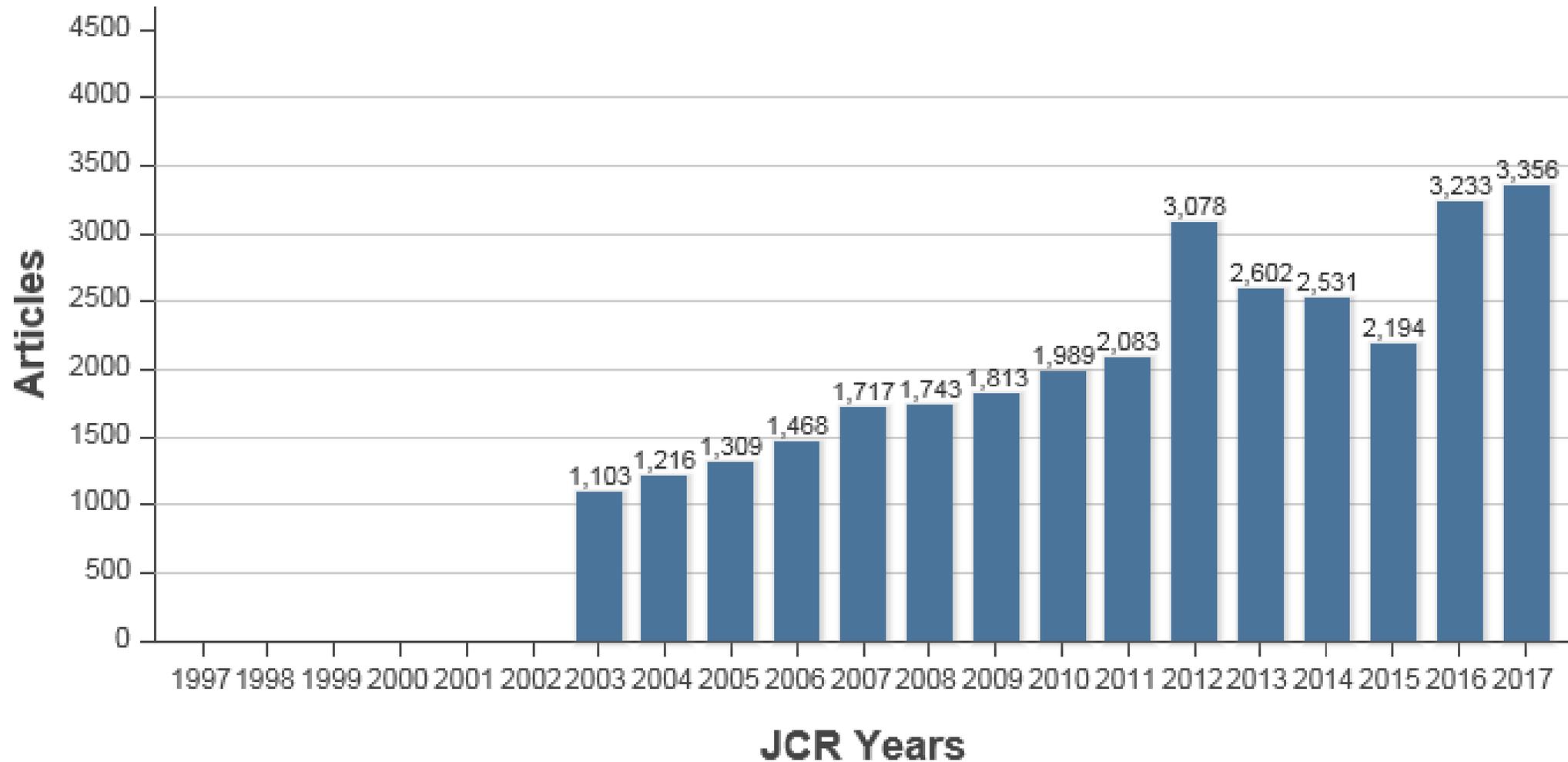
RANKED #16-25 JOURNALS + COMPS

Rank	Journal Title	Impact Factor	Citations	Bill's
16	Health Informatics Journal	1.8	542	
17	METHODS OF INFORMATION IN MEDICINE	1.5	1,462	
18	JOURNAL OF EVALUATION IN CLINICAL PRACTICE	1.5	3,416	
19	Health Information Management Journal	1.4	269	
20	INTERNATIONAL JOURNAL OF TECHNOLOGY ASSESSMENT IN HEALTH CARE	1.3	2,137	

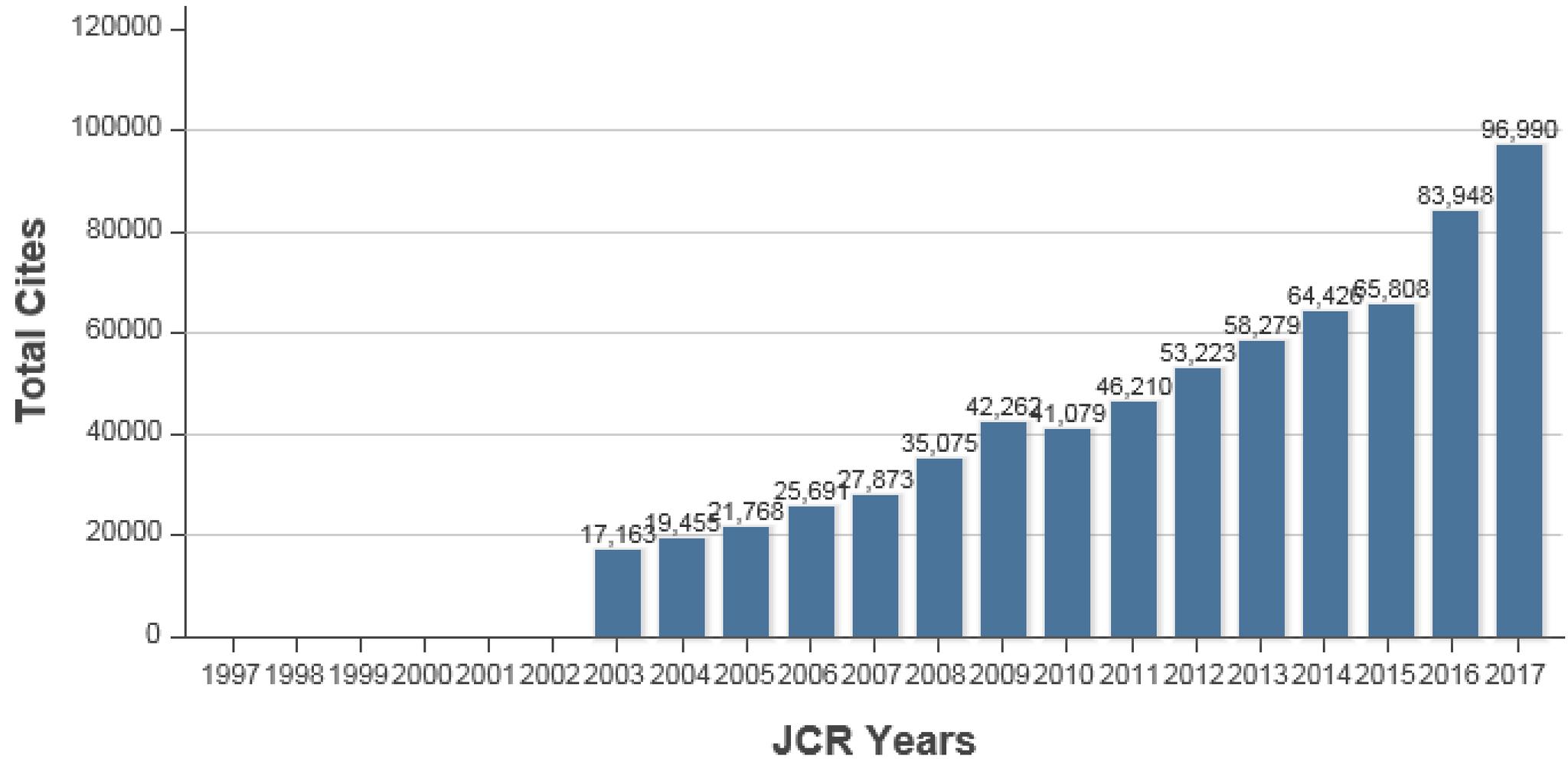
Rank	Journal Title	Impact Factor	Citations	Bill's
21	Applied Clinical Informatics	1.1	573	✓
22	Informatics for Health & Social Care	1.1	246	
23	Biomedical Engineering-Biomedizinische Technik	1.1	897	
24	CIN-COMPUTERS INFORMATICS NURSING	1.1	731	✓
25	Therapeutic Innovation & Regulatory Science	0.9	310	

Journal Title	Impact Factor
NEJM	79.3
Lancet	53.3
Chemical Reviews	52.6
JAMA	47.7
Nature Reviews Cancer	42.8
Nature Reviews Immunology	42.0
Nature	41.6
Nature Reviews Genetics	41.5
Science	41.1

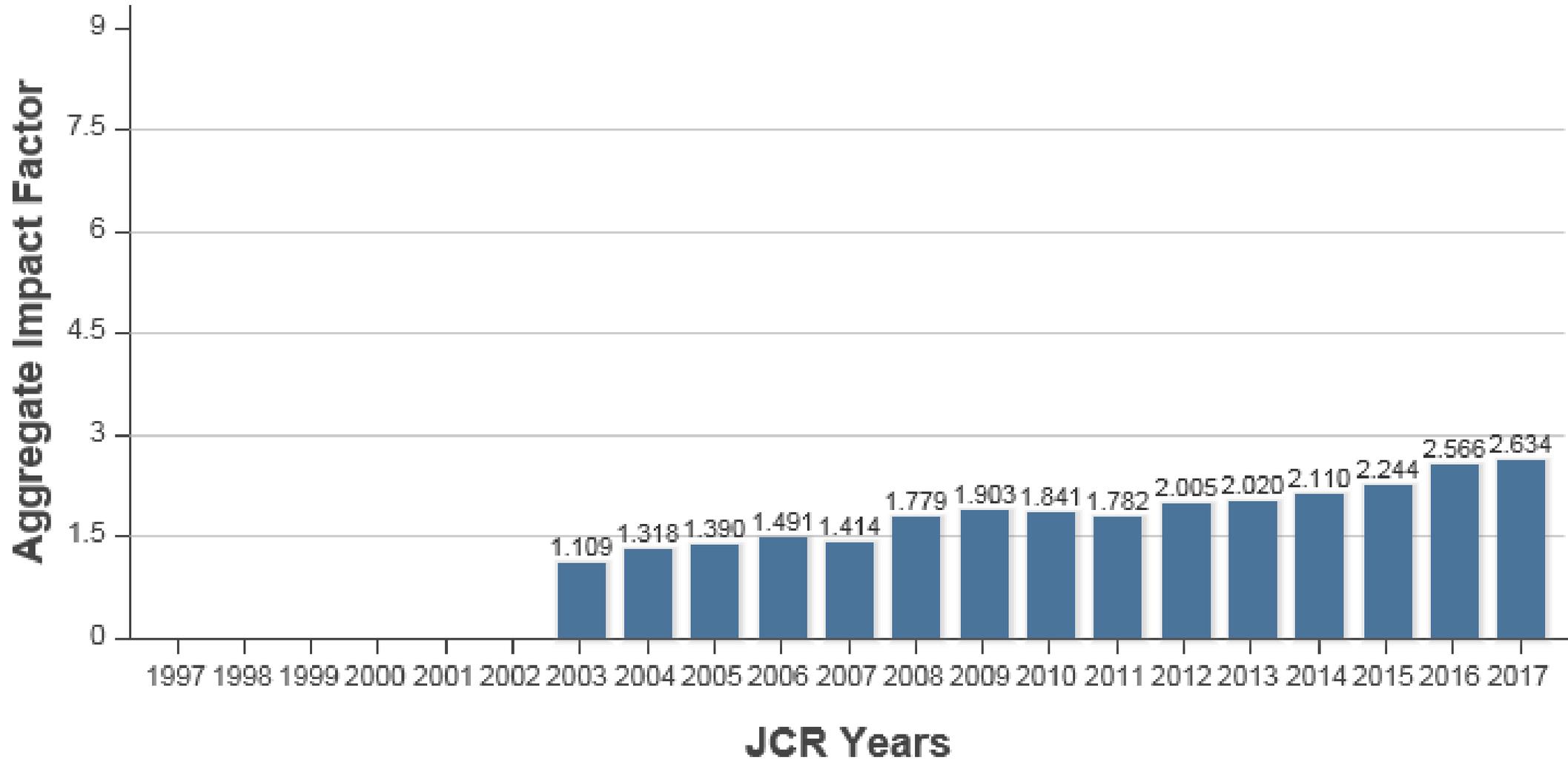
“MEDICAL INFORMATICS” ARTICLES



“MEDICAL INFORMATICS” CITATIONS



“MEDICAL INFORMATICS” IMPACT FACTOR



ARE THESE THE ONLY MESH TERMS OR EVEN THE RIGHT ONES?

"Medical Informatics"[Mesh] OR

"Medical Informatics Computing"[Mesh] OR

"Medical Informatics Applications"[Mesh] OR

"Medical Order Entry Systems"[Mesh] OR

"Medical Records Systems, Computerized"[Mesh] AND

MESH TERM EXPLOSION W/ PUBMED



Informatics MeSH Descriptor Data 2019

Details

Qualifiers

MeSH Tree Structures

Concepts

Information Science [L01]

- Classification [L01.100] +
- Communication [L01.143] +
- Communications Media [L01.178] +
- Computing Methodologies [L01.224] +
- Copying Processes [L01.280] +
- Data Display [L01.296] +
- Data Science [L01.305]

Informatics [L01.313] -

- Computational Biology [L01.313.124]
- Consumer Health Informatics [L01.313.187]
- Dental Informatics [L01.313.249]
- Medical Informatics [L01.313.500] -
 - Health Information Exchange [L01.313.500.500]
 - Medical Informatics Applications [L01.313.500.750] +
 - Medical Informatics Computing [L01.313.500.875] +
- Nursing Informatics [L01.313.650]
- Public Health Informatics [L01.313.750]
- Information Centers [L01.346] +
- Information Management [L01.399] +
- Information Services [L01.453] +
- Information Storage and Retrieval [L01.470] +
- Information Technology [L01.479]
- Information Theory [L01.488]
- Language [L01.559] +
- Library Science [L01.583] +
- Postcards as Topic [L01.731]
- Publishing [L01.737] +
- Systems Analysis [L01.906] +

Medical Informatics [L01.313.500] -

Health Information Exchange [L01.313.500.500]

Medical Informatics Applications [L01.313.500.750] -

Decision Making, Computer-Assisted [L01.313.500.750.100] +

Decision Support Techniques [L01.313.500.750.190] +

Information Storage and Retrieval [L01.313.500.750.280] +

Information Systems [L01.313.500.750.300] -

Big Data [L01.313.500.750.300.092]

Community Networks [L01.313.500.750.300.184]

Databases as Topic [L01.313.500.750.300.188] +

Decision Support Systems, Clinical [L01.313.500.750.300.190]

Geographic Information Systems [L01.313.500.750.300.314]

Health Information Systems [L01.313.500.750.300.361]

Integrated Advanced Information Management Systems [L01.313.500.750.300.420]

Knowledge Bases [L01.313.500.750.300.550] +

Medical Records Systems, Computerized [L01.313.500.750.300.695] -

Health Smart Cards [L01.313.500.750.300.695.300]

Medical Order Entry Systems [L01.313.500.750.300.695.600]

MEDLARS [L01.313.500.750.300.710] +

Online Systems [L01.313.500.750.300.742] +

Reminder Systems [L01.313.500.750.300.790]

Medical Informatics Computing [L01.313.500.875] +

ANY OTHER MESH TERMS TO POSSIBLY INCLUDE?

Investigative Techniques [E05]

Epidemiologic Methods [E05.318]

Data Collection [E05.318.308]

Records [E05.318.308.940]

Birth Certificates [E05.318.308.940.250]

Death Certificates [E05.318.308.940.350]

Dental Records [E05.318.308.940.375]

Hospital Records [E05.318.308.940.425]

Medical Records [E05.318.308.940.968] -

Health Records, Personal [E05.318.308.940.968.249] -

Patient Generated Health Data [E05.318.308.940.968.249.625]

Patient Portals [E05.318.308.940.968.249.750]

Medical Record Linkage [E05.318.308.940.968.500]

Medical Records, Problem-Oriented [E05.318.308.940.968.550]

Medical Records Systems, Computerized [E05.318.308.940.968.625] -

Electronic Health Records [E05.318.308.940.968.625.500] -

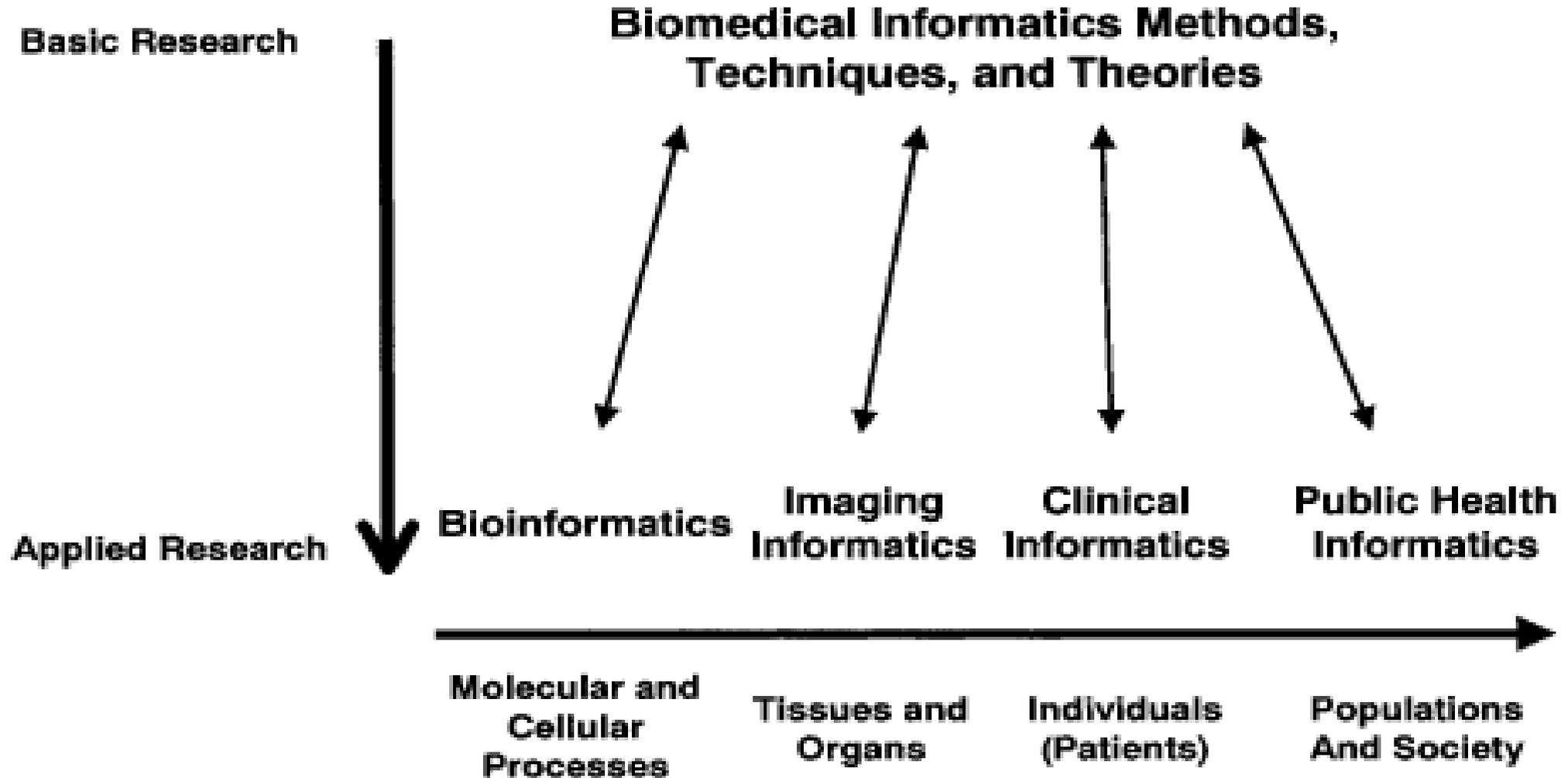
Health Information Exchange [E05.318.308.940.968.625.500.500]

Health Smart Cards [E05.318.308.940.968.625.750]

Trauma Severity Indices [E05.318.308.940.968.875] +

Nursing Records [E05.318.308.940.984]

WRAPPING YOUR HEAD AROUND THE TERM “*INFORMATICS*” IN OUR FIELD



FINAL QUERY

"Imaging Informatics" OR

"Clinical Informatics" OR

"Appl Clin Inform"[Journal] OR

"BMC Med Inform Decis Mak"[Journal] OR

"Comput Inform Nurs"[Journal] OR

"Int J Med Inform"[Journal] OR

"J Am Med Inform Assoc"[Journal] OR

"J Innov Health Inform"[Journal] OR

"BMJ Health Care Inform"[Journal] OR

"J Med Internet Res"[Journal] OR

"J Med Syst"[Journal] OR

"JMIR Med Inform"[Journal] OR

"JMIR mHealth and uHealth"[Journal] OR

"IEEE J Biomed Health Inform"[Journal] OR

"Med Decis Making"[Journal] OR

"J Biomed Inform"[Journal] OR

"Artif Intell Med"[Journal] OR

"Comput Methods Programs Biomed"[Journal] OR

"Stat Methods Med Res"[Journal] OR

"JMIR Serious Games"[Journal] OR

"Med Biol Eng Comput"[Journal] OR

"Stat Med"[Journal] OR

"Health Informatics J"[Journal] OR

"Methods Inf Med"[Journal] OR

"J Eval Clin Pract"[Journal] OR

"Health Inf Manag"[Journal] OR

"Int J Technol Assess Health Care"[Journal] OR

"Inform Health Soc Care"[Journal] OR

"Biomed Tech (Berl)"[Journal] OR

"Ther Innov Regul Sci"[Journal] OR

"Medical Informatics"[Mesh] OR

"Medical Order Entry Systems"[Mesh] OR

"Medical Records Systems, Computerized"[Mesh] OR

"Health Records, Personal"[Mesh] AND

("2018/05/01"[PDAT] : "2019/04/30"[PDAT]) AND

English[Language]

DO NOT FILTER FOR HUMAN as it removes 1/3 of results

OUR RESULTS FOR 2019

19,890



Top 25+ Informatics Journals, added “Imaging Informatics” and our updated MeSH Terms in English over the past year (this will change over time as NLM does more indexing)

2,370



Clinical Trials + Comparative Studies + Meta-Analysis + Observational Study

397



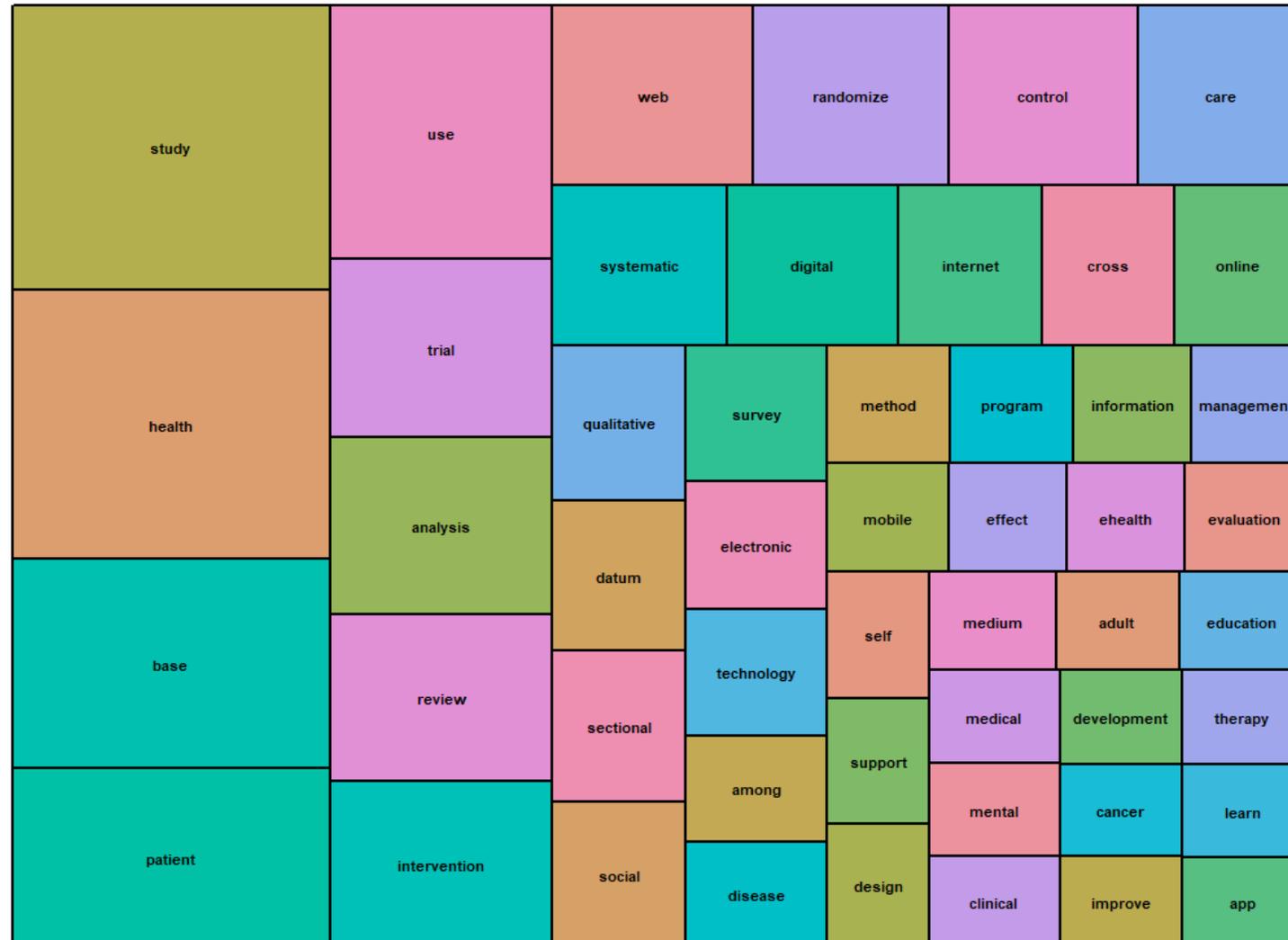
Clinical Trials

265

Randomized Control Trials

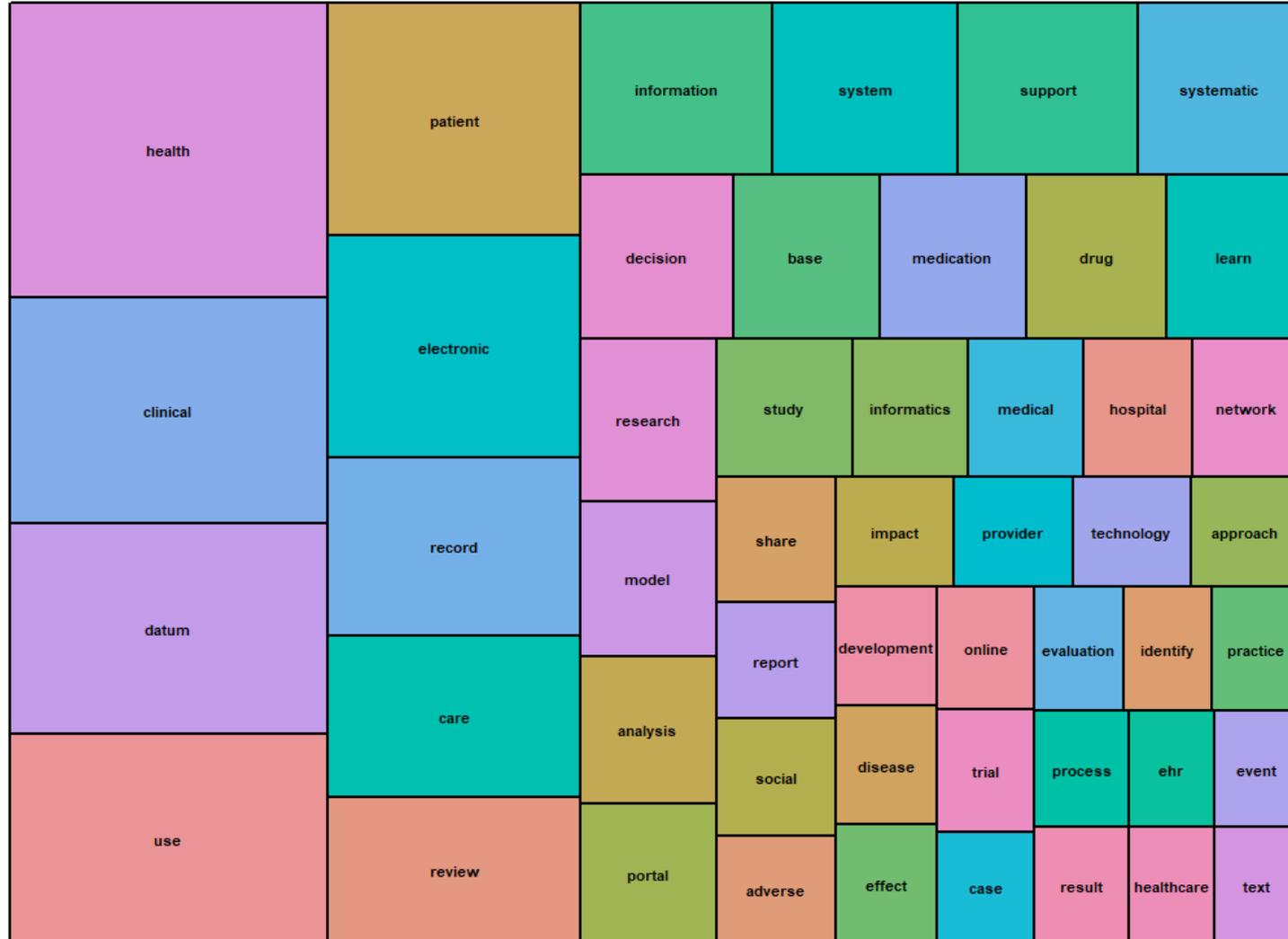
TREEMAP FOR JMIR

JMIR 2018 and 2019



TREEMAP FOR JAMIA

JAMIA 2018 and 2019



The Banas Way

- PubMed weekly hits on CDS / MU / AI / Machine Learning
- Google Scholar Weekly Hits on similar terms
- Twitter
- ListServ
- Trade Press and Non-Informatics News
- You guys email me
- Random methodology that is still unknown....

Our favorites

Banas

- Clinical Decision Support
- MU and Reform commentaries
- Apps and Cool Stuff
- In the News so you can look back and remember July 2018 – June 2019
- And of course....
 - Transition Comedy Slides !!!!!

Kochendorfer

- How many open charts is right?
- Commentaries on the field
- Artificial Intelligence
- Informatics Education

Perspective

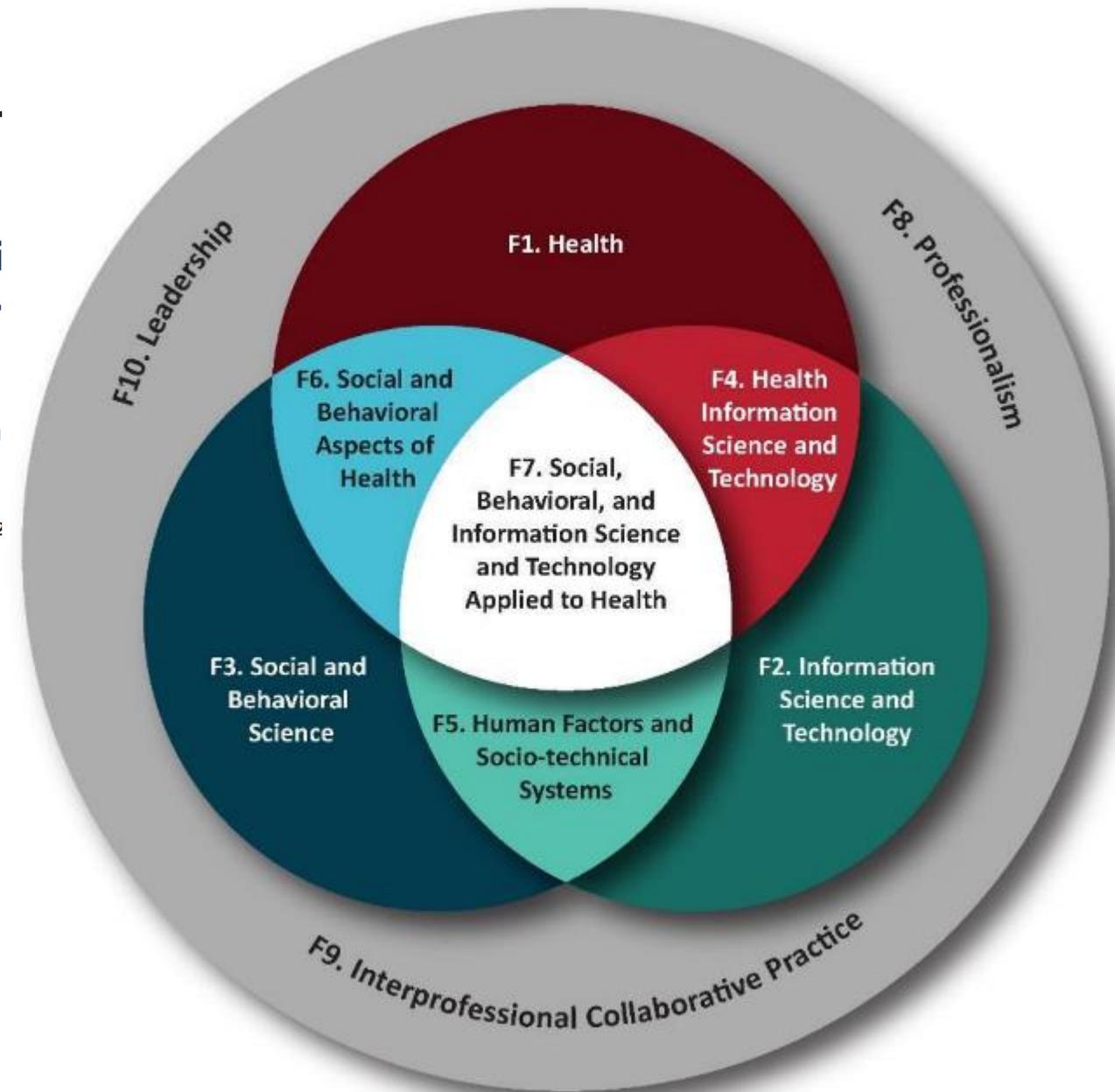
AMIA Board White Paper: AMIA 2017 core competencies for applied health informatics education at the master degree level

Annette L Valenta,^{1,2} Eta S Berner,³ Suzanne A Boren,⁴ Gloria J Deckard,⁵ Christin Eldredge,⁶ Douglas B Fridsma,⁷ Cynthia Gadd,⁸ Yang Gong,⁹ Todd Johnson,¹⁰ Josette Jones,¹¹ E LaVerne Manos,¹² Kirk T Phillips,¹³ Nancy K Roderer,^{14,15} Douglas Rosendale,¹⁶ Anne M Turner,^{17,18} Guenter Tusch,¹⁹ Jeffrey J Williamson,² and Stephen B Johnson²¹

CORE COMPETENCIES

Health + Tech ≠ Informatics

Health + Tech + Social/Behavior Science +
Human Factors + Implementation Science +
Leadership + Professionalism + Data +
Interprofessional Collaboration + ... = Informatics



I, EHR

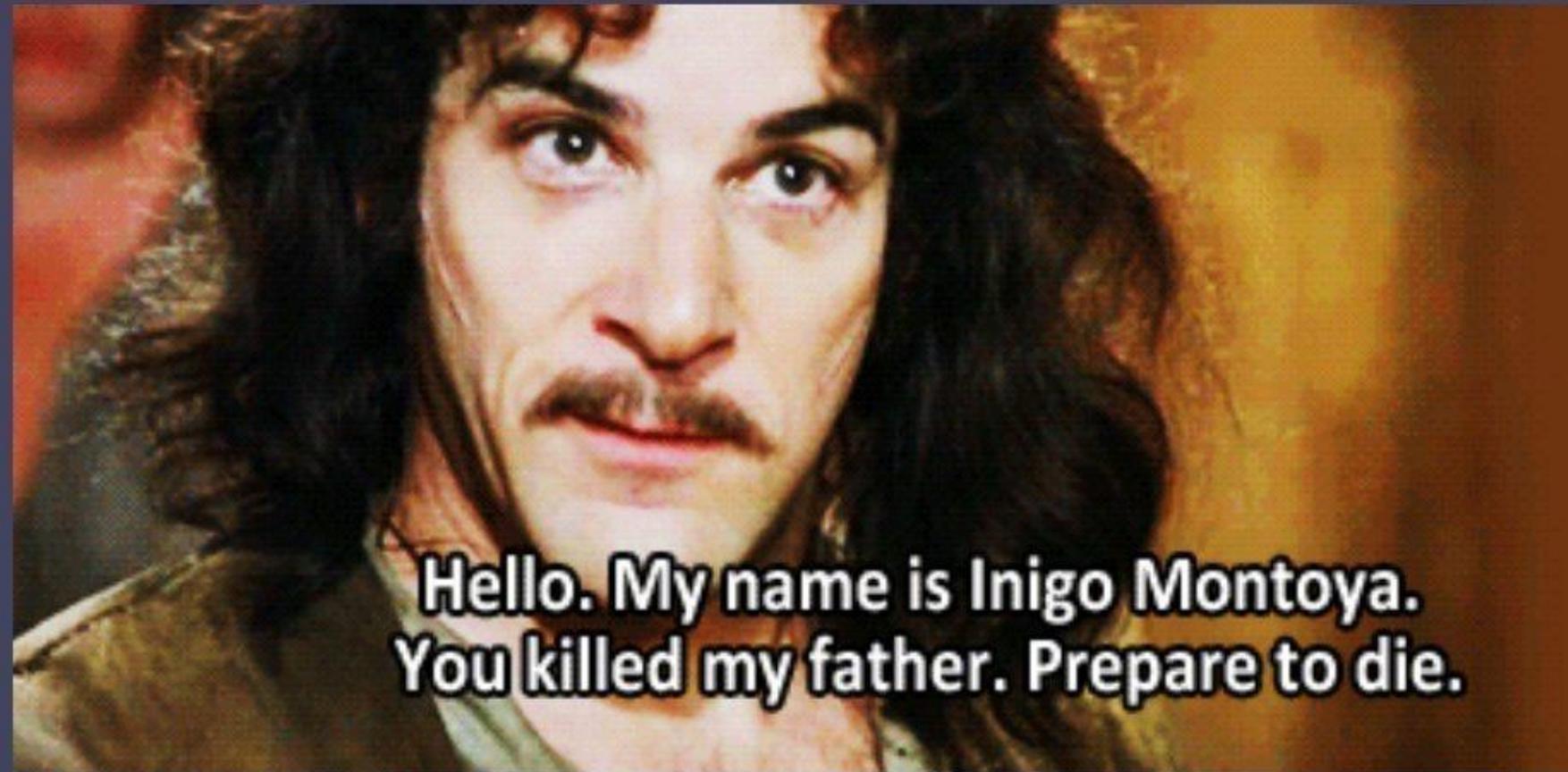
Indira Sriram, PhD¹; Robin Harland, BS¹; Steven R Lowenstein, MD, MPH^{1,2*}

¹University of Colorado School of Medicine, Aurora, Colorado; ²Department of Emergency Medicine and Office of the Dean, University of Colorado School of Medicine, Aurora, Colorado.

- 1) Introduce me to your patient
 - “What you’re telling me is important, I’d like to get it right. Do you mind if I type while we speak?”
 - “I am going to put in orders now. Here is what I am ordering and why.”
- 2) Don’t look at me when the patient says they may be depressed
 - Listen. Make eye contact. Touch. Stop typing.
- 3) Incorporate my functionality into the discussion
 - Show images, do appropriate screenings, show graphs to the patient
- 4) Leverage me to include personal aspects as a part of your notes
 - Include the patient’s picture, preferred name, hobbies, life events

How to start
out your talk
– Princess
Bride keys to
success.

TRANSITION
COMEDY
SLIDE!!!!



Remember Inigo Montoya:

1. Polite greeting
2. Name
3. Relevant personal link
4. Manage expectations

Cranky comments: detecting clinical decision support malfunctions through free-text override reasons

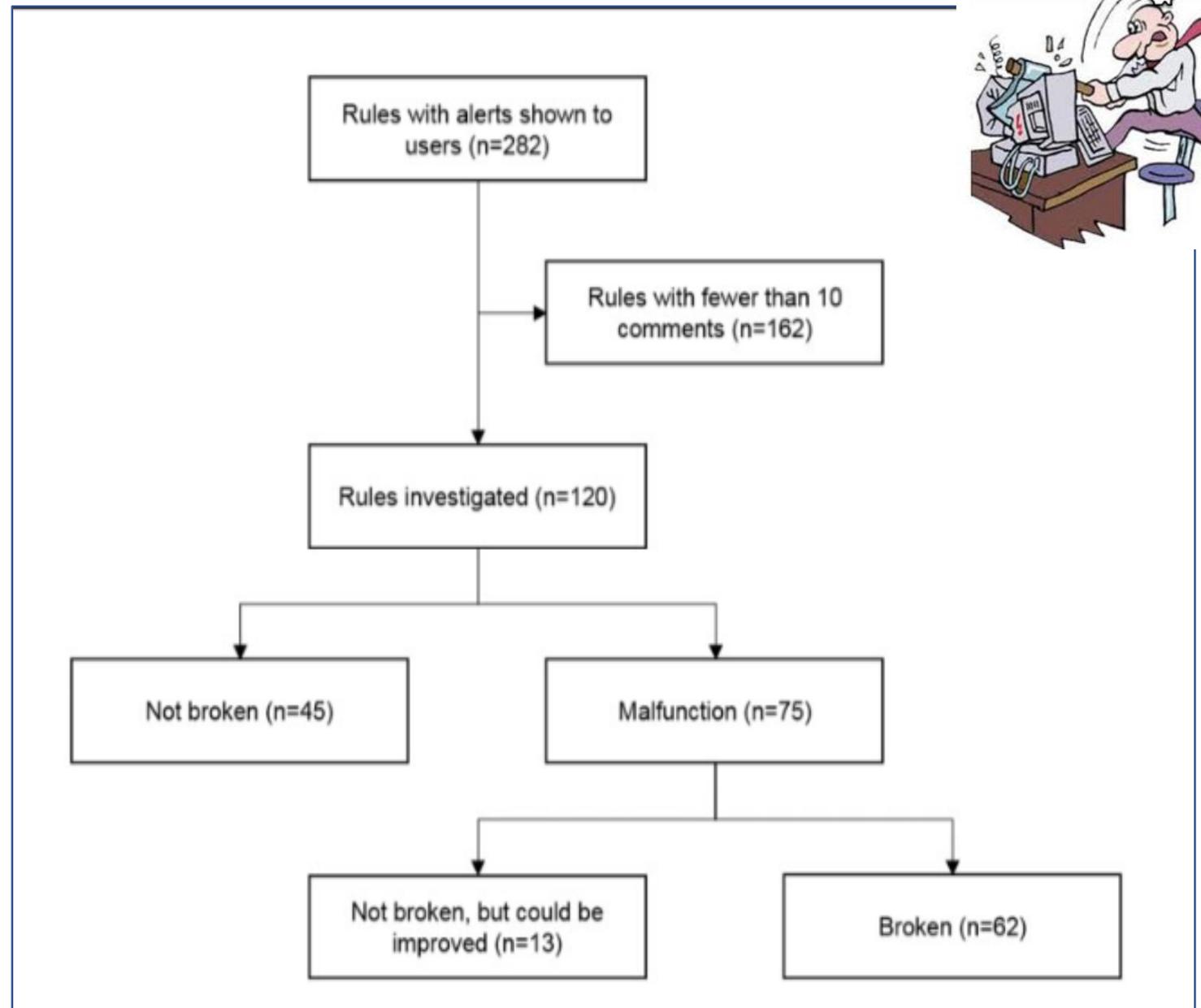
Skye Aaron,¹ Dustin S McEvoy,² Soumi Ray,^{1,3} Thu-Trang T. Hickman,⁴ and Adam Wright^{1,2,3,5}



- All BPA at Partners (inpatient and outpatient) ~2 years
- Examined comments and used NLP for a second level "sentiment analysis" hence the term "Cranky"
- Used as an opportunity to review the logic of rule
- Put rules into 3 buckets
 - Not Broken
 - Malfunction - Broken
 - Malfunction - Not Broken could be improved
- Why didn't I think of this paper????!?!!!!!!!



- 27% of alerts were found to be either broken or in need of improvement



Cranky Comments



- Patient has CAD or equivalent on Problem List and is not on a B-blocker
 - “You are stupid... patient is on carvedilol”
 - “He is on a B-blocker!!!”
 - Rule was looking for B-blocker, carvedilol is a/b blocker and therefore was excluded
 - Rule was BROKEN and adjusted
- Patient is due for a Cyclosporine level
 - “NOT ON CYCLOSPORINE!!!!”
 - “Stupid EPIC reminder – N/A for ophthalmic CyA”
 - Rule did not include route of administration in it’s logic
 - Rule was BROKEN and adjusted

User feedback provided through override comments has been an underutilized by valuable data source for improving CDS

Structured override reasons for drug-drug interaction alerts in electronic health records

Adam Wright^{1,2,3,4}, Dustin S McEvoy⁴, Skye Aaron¹, Allison B McCoy⁵,
Mary G Amato^{1,6}, Hyun Kim⁷, Angela Ai⁸, James J Cimino⁹,
Bimal R Desai¹⁰, Robert El-Kareh¹¹, William Galanter¹², Christopher A Longhurst¹¹,
Sameer Malhotra¹³, Ryan P Radecki¹⁴, Lipika Samal^{1,2}, Richard Schreiber¹⁵,
Eric Shelov¹⁰, Anwar Mohammad Sirajuddin¹⁶, and Dean F Sittig¹⁷



- A natural extension to a paper presented last year
- 10 organizations with codified reasons for their DDI alerting surveyed
 - CHOP / Partners / UIC / UCSD / Kaiser / more...
- Mix of Epic / Cerner / Allscripts
- 177 unique CODIFIED override reasons
- Sites ranged from 3 reasons to 100 (!)

Findings



It's a mess universally...

- Override rates 65% - 95%

The Big 3

- "Not clinically significant"
 - "Will monitor"
 - "Benefit outweighs risk"
- } **78%**

- Similar to Cranky Comments the codified override reasons offer a wealth of data related to DDI fine-tuning AND...
- The reasons need to be better tailored to the situation AND the alerts need to be more actionable
 - Let me cancel the prior med
 - Let me see the INR / QTC / data
 - Let me adjust the dose...
- There is a role for vendors to assist as well (of course)



Best practices for preventing malfunctions in rule-based clinical decision support alerts and reminders: Results of a Delphi study

Adam Wright^{a,b,c,*}, Joan S. Ash^d, Skye Aaron^a, Angela Ai^c, Thu-Trang T. Hickman^c, Jane F. Wiesen^d, William Galanter^g, Allison B. McCoy^f, Richard Schreiber^h, Christopher A. Longhurstⁱ, Dean F. Sittig^j

- Another extension of prior CDS paper on malfunctions
- Delphi method to arrive at best practices for developing, testing, implementing and maintaining alerts and avoiding malfunctions

Results

- 7 groups of best practices
- Also an estimated difficulty in implementing the best practice as well as estimated importance of the practice using Likert scale

Best Practices, Grouped by Category

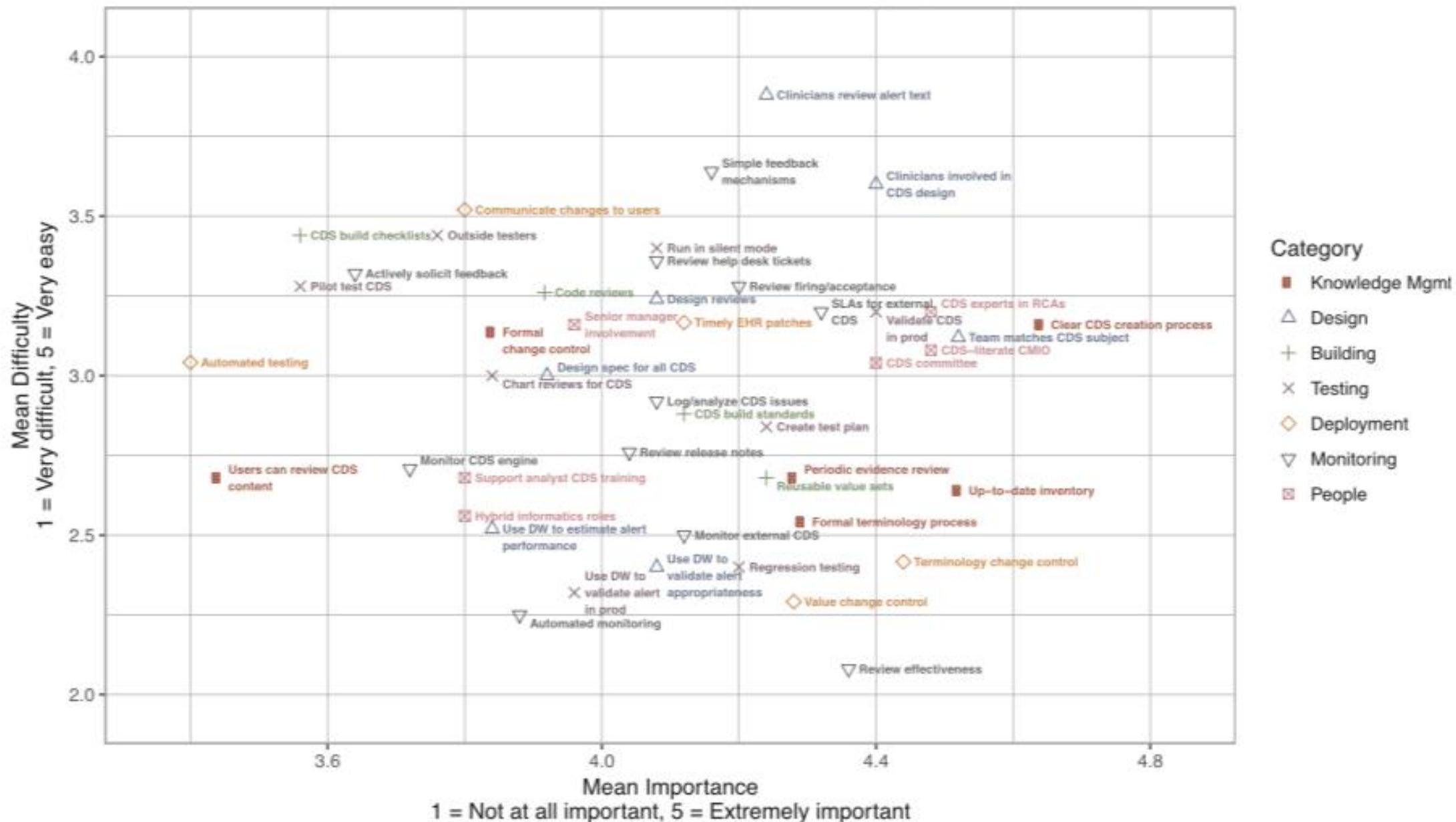


Fig. 2. Scatter plot of all best practices, grouped by category.

LALALALALALALA - I can't hear you - LALALALA...

OK

Cancel

Alert



Hitting OK or Cancel will take you straight to Nickelback's home page.

OK

Cancel

Alert



Hi!!!!!!!!!!!!!!!!!!!!

Your student loan interest rates all went up 1%.

OK

Cancel

Alert



COVFEFE.

OK

Cancel

Alert



LOL.

EHR Alerts Reach New Level of Annoying

From now on, any key you press on the keyboard will produce the letter W.



BY DR. 99

OK

Cancel

Alert



EHR down. All orders need to be written out by hand, then scanned in, then printed, then given to the charge nurse to be scanned in, then printed...

OK

Cancel

Alert



Have you tried bicarb?



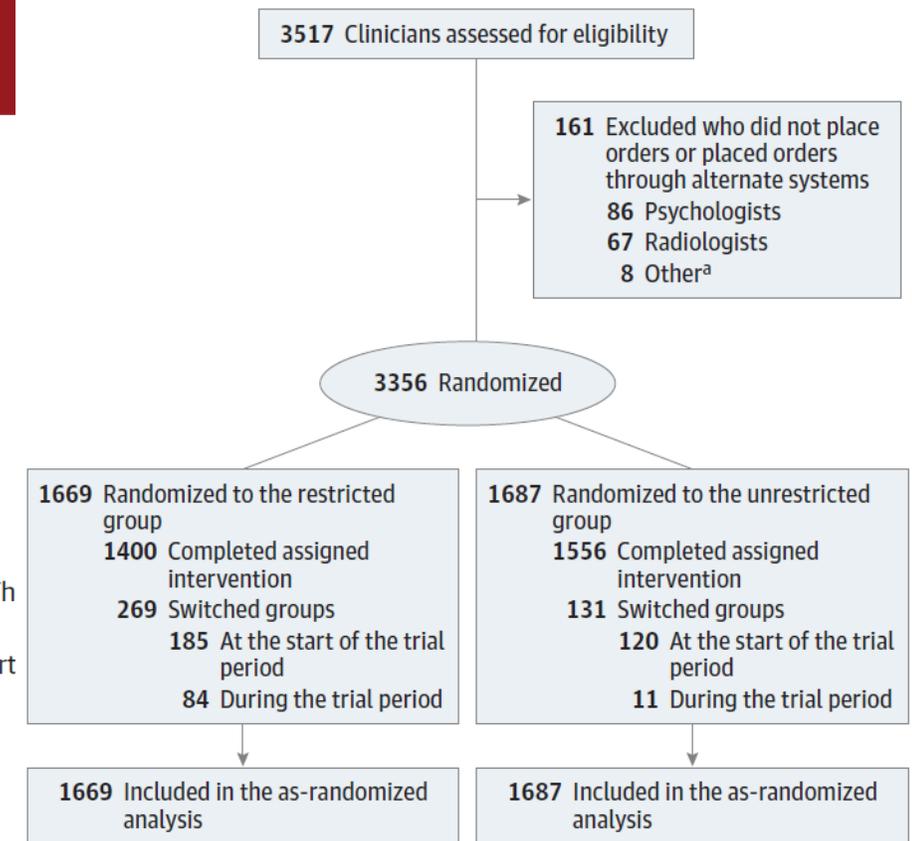


Effect of Restriction of the Number of Concurrently Open Records in an Electronic Health Record on Wrong-Patient Order Errors

A Randomized Clinical Trial

Jason S. Adelman, MD, MS; Jo R. Applebaum, MPH; Clyde B. Schechter, MD, MA; Matthew A. Berger, MD; Stan H. Reissman, MSW; Raja Th Andrew D. Racine, MD, PhD; David K. Vawdrey, PhD; Robert A. Green, MD, MPH; Hojjat Salmasian, MD, MPH, PhD; Gordon D. Schiff, MD; Adam Wright, PhD; Adam Landman, MD; David W. Bates, MD, MSc; Ross Koppel, PhD; William L. Galanter, MD, PhD, MS; Bruce L. Lambert Susan Paparella, MSN, RN; William N. Southern, MD, MS

Figure 1. Randomization and Assignment of Clinicians



A RCT about having 4 Charts available to be opened simultaneously, did NOT seem to make a significant difference in Wrong-Patient Retract-and-Reorder

Practice Setting	No. of Order Sessions		Odds Ratio ^c (95% CI)	Favors Restricted Group	Favors Unrestricted Group	P Value
	Restricted Group ^a	Unrestricted Group ^b				
Overall						
Wrong-patient order sessions per 100 000	90.7	88.0	1.03 (0.90-1.20)			.60
Wrong-patient order sessions	1980	2026				
Total order sessions	2 183 365	2 303 266				

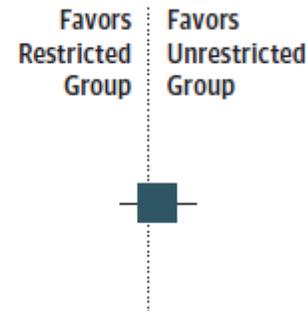


Table 2. Utilization and Wrong-Patient Order Sessions by Number of Records Open in the Unrestricted Group^a

Open Records	No. of Order Sessions	% of Order Sessions ^b	Wrong-Patient Order Sessions per 100 000	
			Rate (95% CI)	P Value ^c
Overall				
1	1 523 585	66.2	52.0 (48.4-55.7)	
2	303 080	13.2	132.0 (119.4-145.6)	
3	168 387	7.3	165.7 (146.8-186.3)	<.001
4	267 697	11.6	184.5 (168.6-201.5)	
Varying	40 517	1.8	150.6 (115.2-193.4)	

Overall: errors for restricted (91) vs. unrest (88) was essentially the same
 However: sub-analysis showed that 66% orders were done with only 1 chart open and those that opened 4 charts had a rate as high as 185, but low of 52

Restricting the Number of Open Patient Records in the Electronic Health Record

Is the Record Half Open or Half Closed?

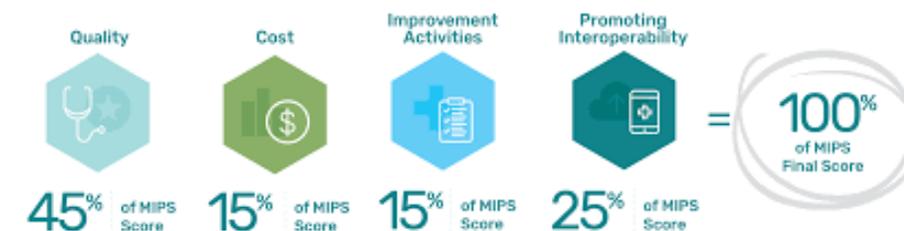
Robert M. Wachter, MD; Sara G. Murray, MD, MAS; Julia Adler-Milstein, PhD

ONC and Joint Commission have published that they recommend only 1 chart to be open, but had no solid evidence to base that recommendation on.

Commentary: tradeoff of safety and efficiency, unintended consequences, this kind of research is helping us move toward a “digital learning health system”

Viewpoint

Unintended Consequences of Nationwide Electronic Health Record Adoption: Challenges and Opportunities in the Post-Meaningful Use Era



Tiago K Colicchio¹, PhD, MBA; James J Cimino¹, MD; Guilherme Del Fiol², MD, PhD

¹Informatics Institute, University of Alabama at Birmingham, Birmingham, AL, United States

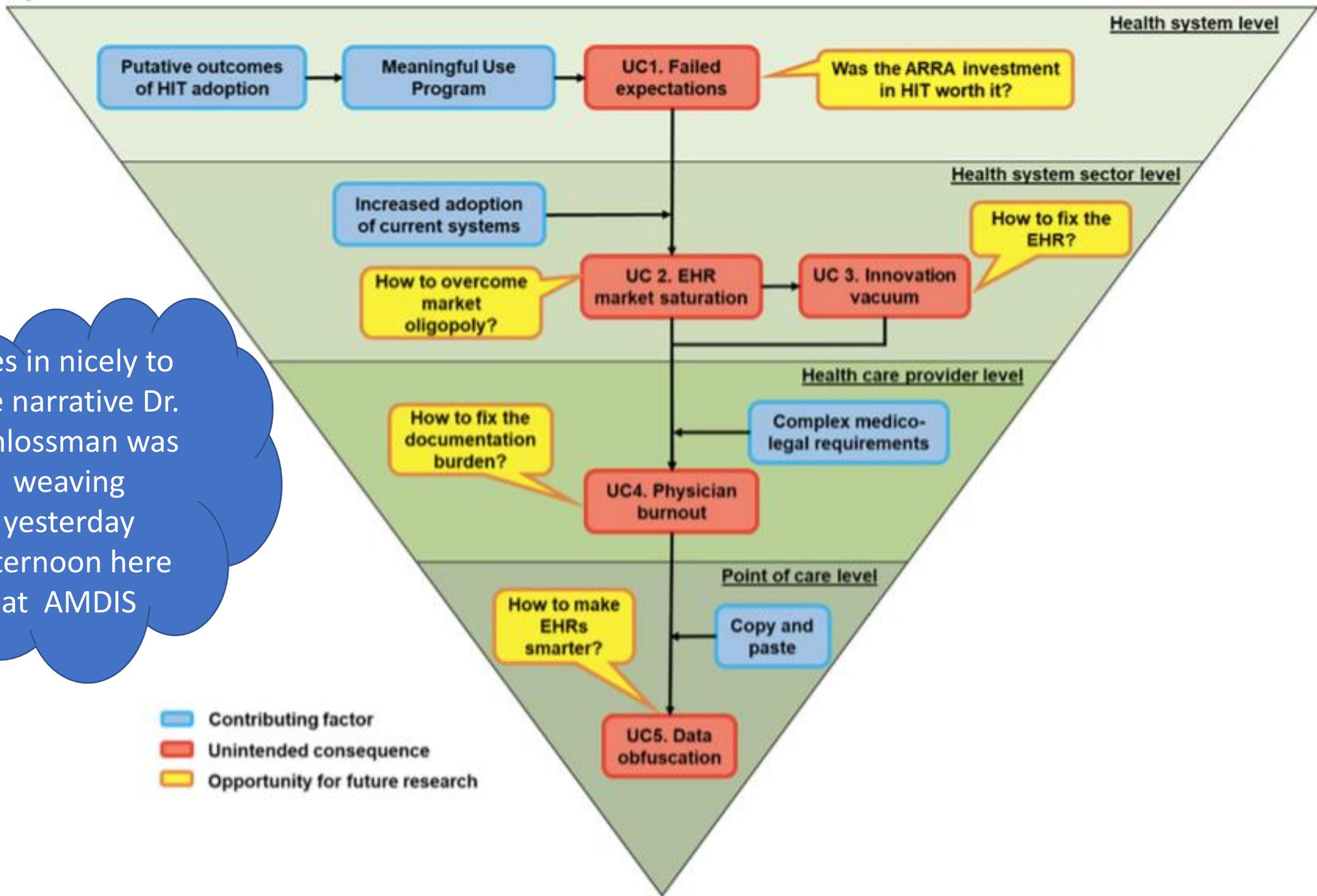
²Department of Biomedical Informatics, University of Utah, Salt Lake City, UT, United States

Thought piece on where we landed ~10 years later after the start of Meaningful Use

5 Unintended Consequences identified

- Failed Expectations
- EHR Market Saturation
- Innovation Vacuum
- Physician Burnout
- Data Obfuscation

Ties in nicely to the narrative Dr. Schlossman was weaving yesterday afternoon here at AMDIS



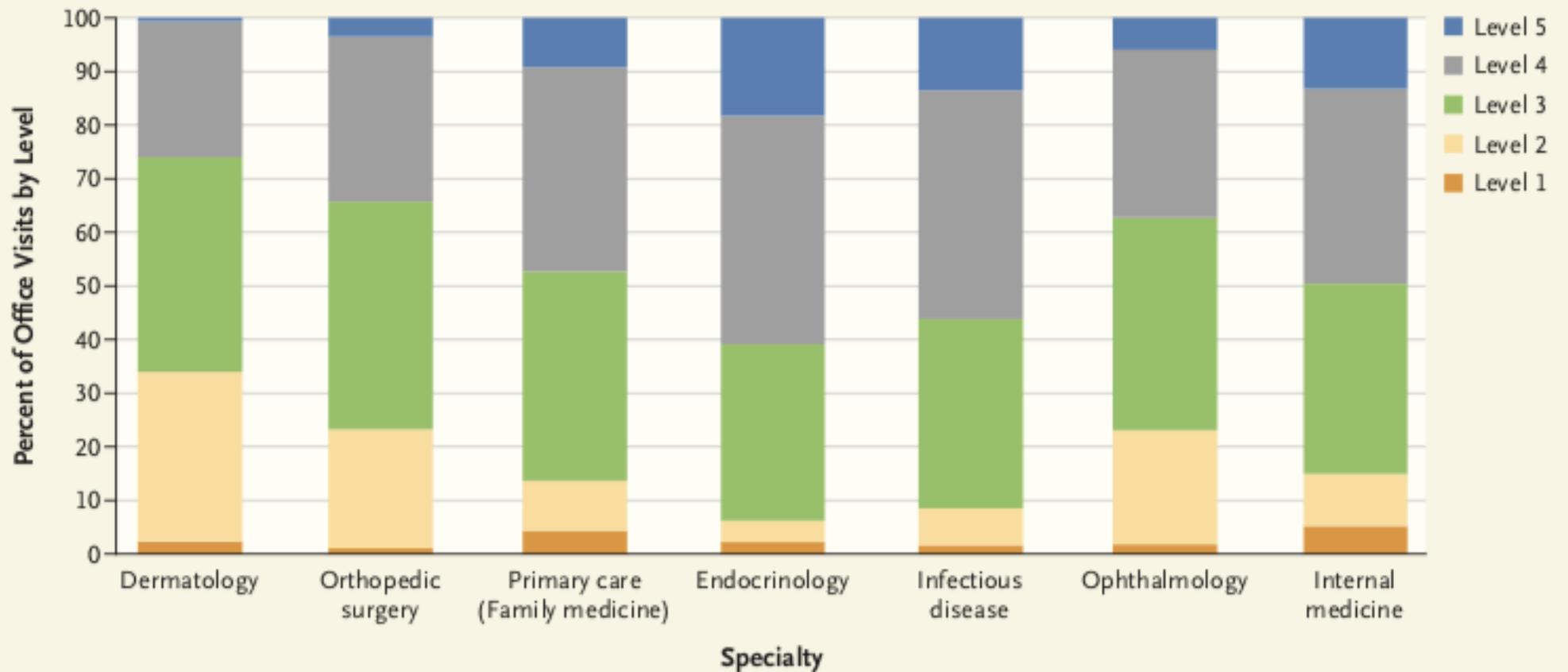
The CMS Proposal to Reform Office-Visit Payments

Zirui Song, M.D., Ph.D., and John D. Goodson, M.D.

- Compressing the current CMS fee schedule such that levels 2-5 become a single fee
- Documentation requirements for this type of visit is at level 2 standards
- Part of Patients over Paperwork; attempting to reduce documentation burden

Potential Unintended Consequences?

- Harms providers who do lengthy complex visits (level 4-5)
- Incentivizes short / "easy" visits
- Harms specialties that are E&M heavy (see graph) but not proceduralists
- Do we need to consider alternatives?



Variable	Dermatology	Orthopedic surgery	Primary care (Family medicine)	Endocrinology	Infectious disease	Ophthalmology	Internal medicine
Medicare office-visit payments per physician (\$)	49,441	30,150	30,975	45,611	10,977	19,126	31,684
Share of Medicare payments from E&M codes (%)	22.4	23.1	70.8	70.3	80.2	5.3	74.9



That Can't Be Good: Flu Swab Positive for C. Diff



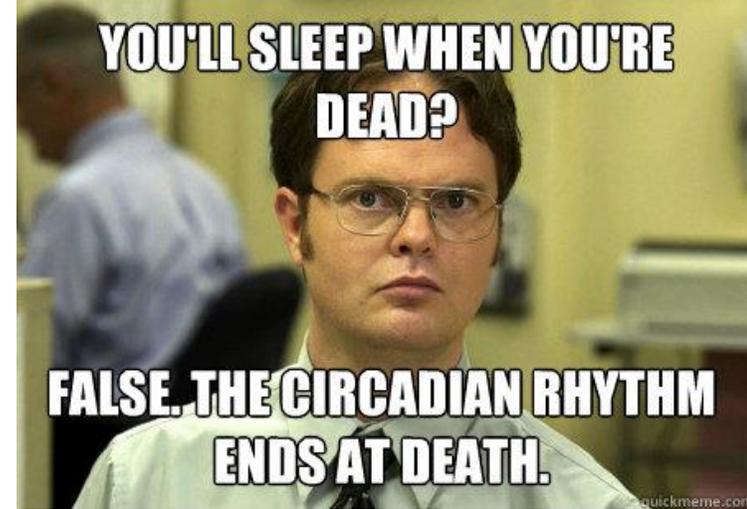
BY DR. 99



Reducing Hospital Toxicity: Impact on Patient Outcomes

Richard V. Milani, MD,^{a,b} Robert M. Bober, MD,^{a,b} Carl J. Lavie, MD,^b Jonathan K. Wilt,^a Alexander R. Milani,^{a,c} Christopher J. White, MD^b

^aCenter for Healthcare Innovation, Ochsner Health System; ^bDepartment of Cardiovascular Diseases, John Ochsner Heart and Vascular Institute, Ochsner Clinical School—University of Queensland School of Medicine, New Orleans, La; ^cEmory University School of Medicine, Atlanta, Ga.



- Efforts to reduce circadian rhythm interruptions for an inpatient ward AND...
- Empowering patients to control their health information
- Admitted patients were either sent to traditional med-surg, with tele, unit or to the intervention unit (15 beds)





Hospital Toxicity

- **Reduce Circadian Disruptions**

- Continuous vital sign wrist monitoring
- Reduction in white light
- Phlebotomy hours pushed forward (closer to 6a)
- Noise burden reduction at night

- **Empower patients to control their own Health Information**

- Inpatient Portal
 - Schedule of upcoming tests
 - Lab results
 - Education
- Recording potential of interactions for playback
- Care team designations and bios on a tablet app



ACUTE TOXICITY

Impressive Outcomes

Table 4 Outcome Measures in Intervention and Control Groups

Parameter	Control	Intervention	Change	P Value
Night noise burden (minutes)	60.3 ± 398.2	41.7 ± 335.3	−31%	.04
Morning phlebotomy time (mean)	4:53 AM	6:04 AM	1:11	<.001
Hospital length of stay (hours)	145.1 ± 190.2	136.5 ± 144.4	−6%	.04
Intensive care unit transfer	9.9%	8.4%	−15%	.16
Inpatient mortality	0.7%	0.7%	0%	.99
30-day readmission	22.4%	18.8%	−16%	.02
90-day readmission	39.0%	34.5%	−12%	.009
≥2 admissions over 90 days	17.3%	14.9%	−14%	.06
Emotional/mental health (rating 'very good/excellent')	52.4%	69.2%	32%	.03
Medicine needed for pain (rating)	53%	33%	−38%	.07

- Reduction in 30 / 90 day readmissions
- Improvement in emotional health
- Reduction in medication needed for pain
- Reduction in ICU transfers
- Reduction in LOS

The takeaway?

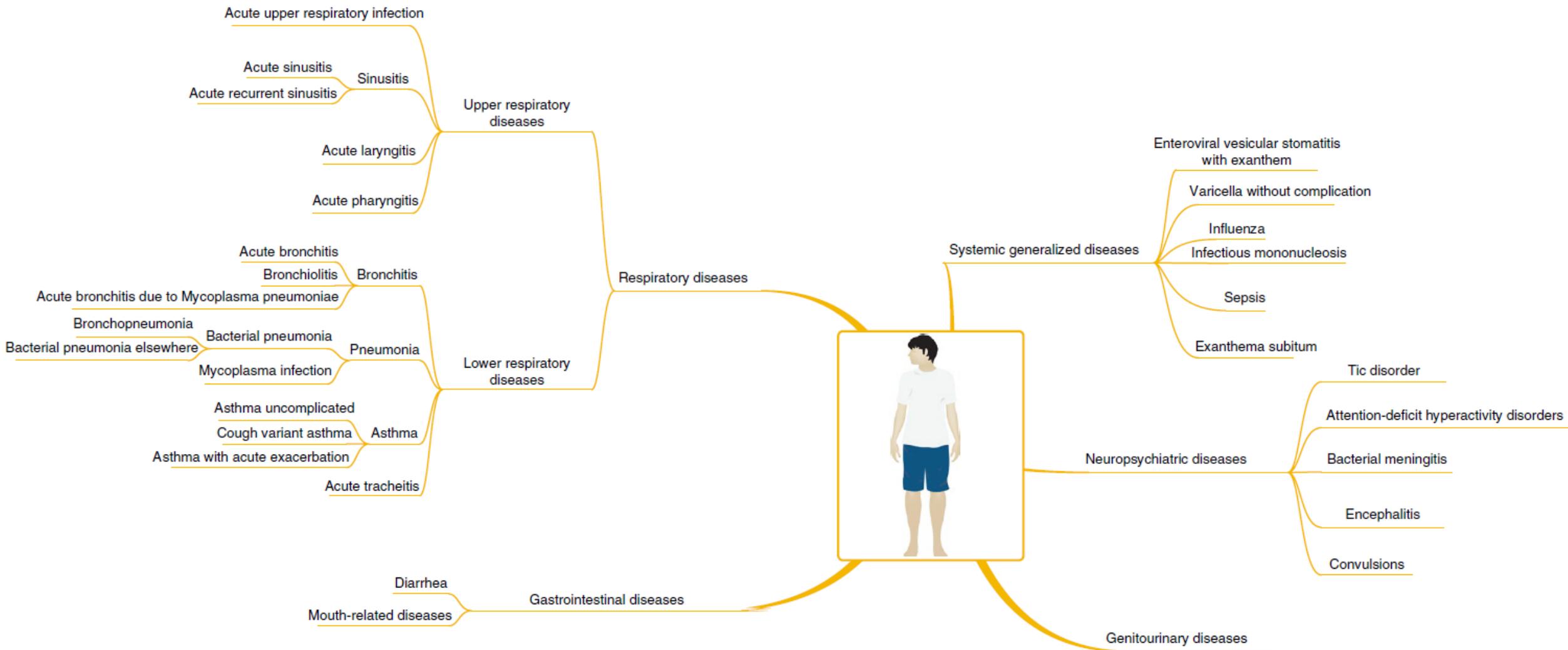
Demand your own intervention unit in your hospital!!!!

When
you
realize
you don't
know
what
exactly is
in your
code.....



Evaluation and accurate diagnoses of pediatric diseases using artificial intelligence

Huiying Liang^{1,8}, Brian Y. Tsui ^{2,8}, Hao Ni^{3,8}, Carolina C. S. Valentim^{4,8}, Sally L. Baxter ^{2,8}, Guangjian Liu^{1,8}, Wenjia Cai ², Daniel S. Kermany^{1,2}, Xin Sun¹, Jiancong Chen², Liya He¹, Jie Zhu¹, Pin Tian², Hua Shao², Lianghong Zheng^{5,6}, Rui Hou^{5,6}, Sierra Hewett^{1,2}, Gen Li^{1,2}, Ping Liang³, Xuan Zang³, Zhiqi Zhang³, Liyan Pan¹, Huimin Cai^{5,6}, Rujuan Ling¹, Shuhua Li¹, Yongwang Cui¹, Shusheng Tang¹, Hong Ye¹, Xiaoyan Huang¹, Waner He¹, Wenqing Liang¹, Qing Zhang¹, Jianmin Jiang¹, Wei Yu¹, Jianqun Gao¹, Wanxing Ou¹, Yingmin Deng¹, Qiaozhen Hou¹, Bei Wang¹, Cuichan Yao¹, Yan Liang¹, Shu Zhang¹, Yaou Duan², Runze Zhang², Sarah Gibson², Charlotte L. Zhang², Oulan Li², Edward D. Zhang², Gabriel Karin², Nathan Nguyen², Xiaokang Wu^{1,2}, Cindy Wen², Jie Xu², Wenqin Xu², Bochu Wang², Winston Wang², Jing Li^{1,2}, Bianca Pizzato², Caroline Bao², Daoman Xiang¹, Wanting He^{1,2}, Suiqin He², Yugui Zhou^{1,2}, Weldon Haw^{2,7}, Michael Goldbaum², Adriana Tremoulet², Chun-Nan Hsu ², Hannah Carter², Long Zhu³, Kang Zhang ^{1,2,7*} and Huimin Xia ^{1*}



Evaluation and accurate diagnoses of pediatric diseases using artificial intelligence

Physician-assigned diagnoses					
Organ systems					
	Resp. (<i>n</i> = 315,661)	Gast. (<i>n</i> = 41,098)	Sys. (<i>n</i> = 11,698)	Neuro (<i>n</i> = 8,410)	Geni. (<i>n</i> = 1,326)
<u>Resp. (<i>n</i> = 295,403)</u>	0.920	0.100	0.048	0.005	0.049
<u>Gast. (<i>n</i> = 55,704)</u>	0.063	0.850	0.066	0.005	0.044
<u>Sys. (<i>n</i> = 14,267)</u>	0.009	0.028	0.870	0.003	0.012
<u>Neuro. (<i>n</i> = 9,007)</u>	0.002	0.003	0.003	0.980	0.005
<u>Geni. (<i>n</i> = 3,812)</u>	0.006	0.014	0.008	0.004	0.890

Table 2 | Illustration of diagnostic performance of our AI model and physicians

Disease conditions	Our model	Physicians				
		Physician group 1	Physician group 2	Physician group 3	Physician group 4	Physician group 5
Asthma	0.920	0.801	0.837	0.904	0.890	0.935
Encephalitis	0.837	0.947	0.961	0.950	0.959	0.965
Gastrointestinal disease	0.865	0.818	0.872	0.854	0.896	0.893
Group: 'Acute laryngitis'	0.786	0.808	0.730	0.879	0.940	0.943
Group: 'Pneumonia'	0.888	0.829	0.767	0.946	0.952	0.972
Group: 'Sinusitis'	0.932	0.839	0.797	0.896	0.873	0.870
Lower respiratory	0.803	0.803	0.815	0.910	0.903	0.935
Mouth-related diseases	0.897	0.818	0.872	0.854	0.896	0.893
Neuropsychiatric disease	0.895	0.925	0.963	0.960	0.962	0.906
Respiratory	0.935	0.808	0.769	0.89	0.907	0.917
Systemic or generalized	0.925	0.879	0.907	0.952	0.907	0.944
Upper respiratory	0.929	0.817	0.754	0.884	0.916	0.916
Root	0.889	0.843	0.863	0.908	0.903	0.912
Average F1 score	0.885	0.841	0.839	0.907	0.915	0.923

We used the F1score to evaluate the diagnosis performance across different groups (rows); our model, two junior physician groups (groups 1 and 2), and three senior physician groups (groups 3, 4, and 5) (see Methods section for description). We observed that our model performed better than junior physician groups but slightly worse than three experienced physician groups. Root is the first level of diagnosis classification.

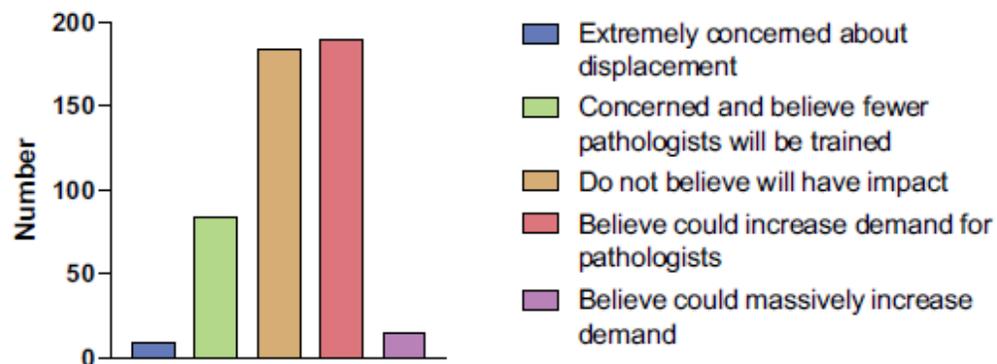
Bottom line: Be careful with these headline grabbing news/journal articles. This really isn't talking about prospective accurate diagnoses in Pediatric patients but rather AI making concordant diagnoses based on retrospective chart review.

ARTICLE OPEN

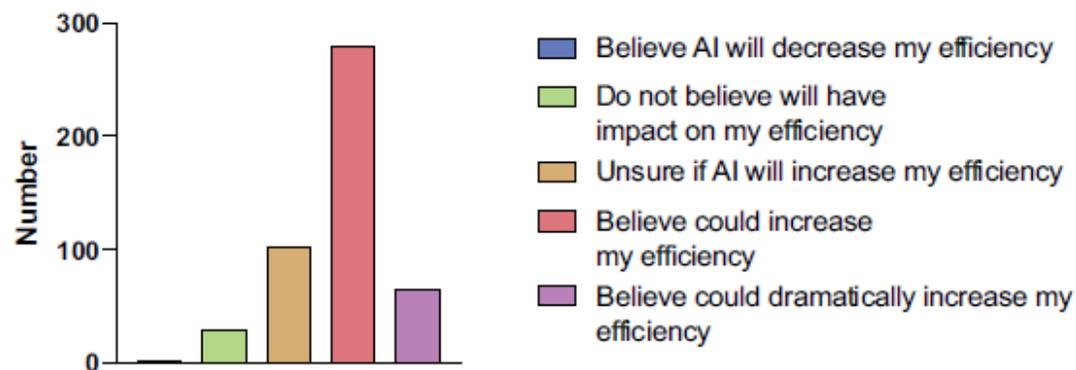
Physician perspectives on integration into diagnostic pathology

Shihab Sarwar¹, Anglin Dent¹, Kevin Faust², Maxime Richer^{1,3}, Ugljesa Dj Phedias Diamandis^{1,3,4}

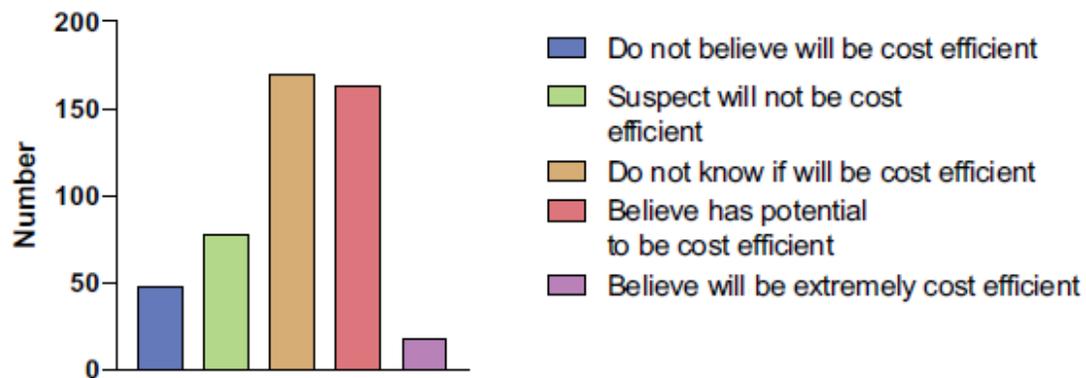
c. Concern about displacement

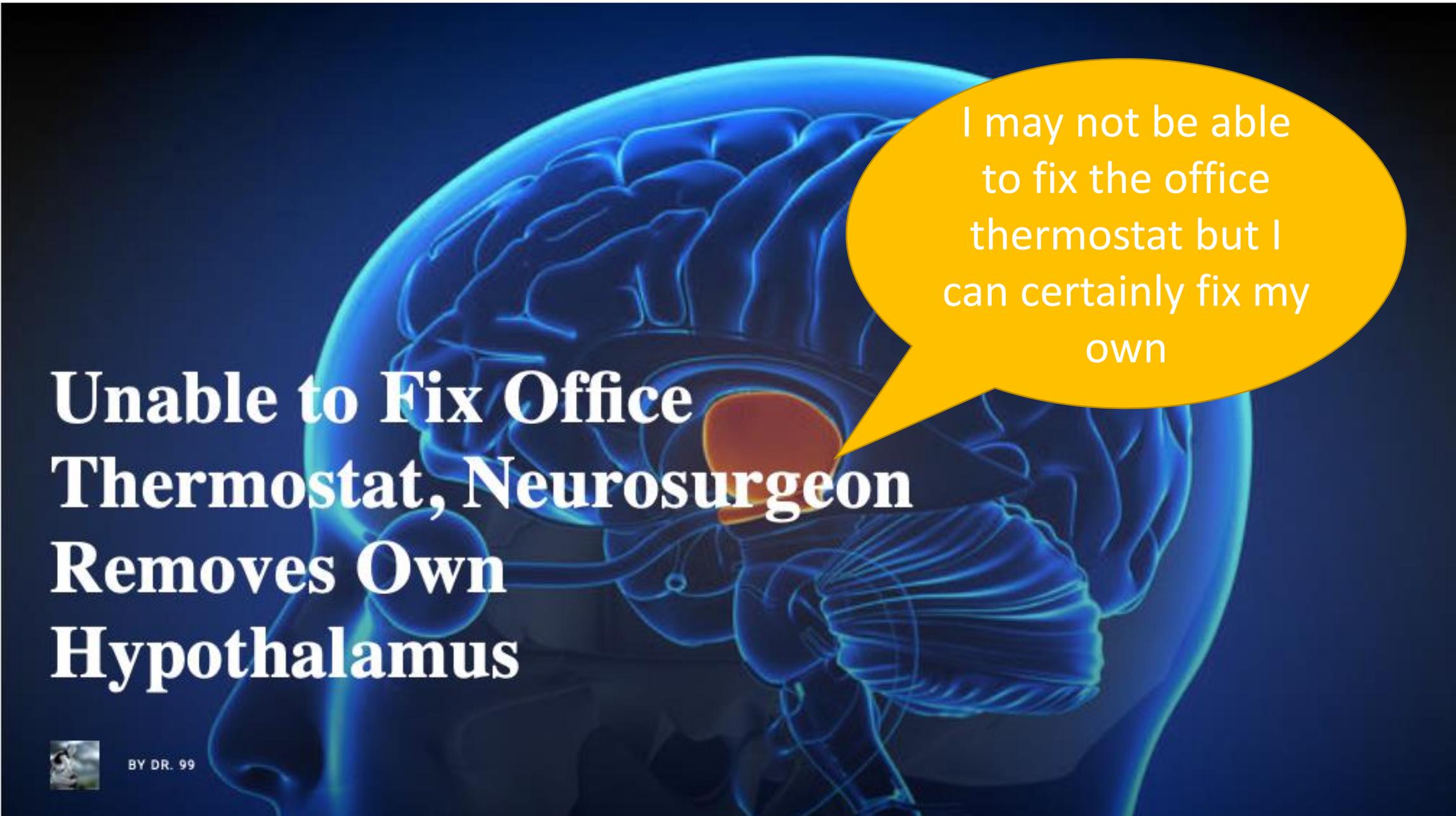


d. Impact on Personal Efficiency



e. Cost Effectiveness





Unable to Fix Office Thermostat, Neurosurgeon Removes Own Hypothalamus

I may not be able
to fix the office
thermostat but I
can certainly fix my
own



BY DR. 99



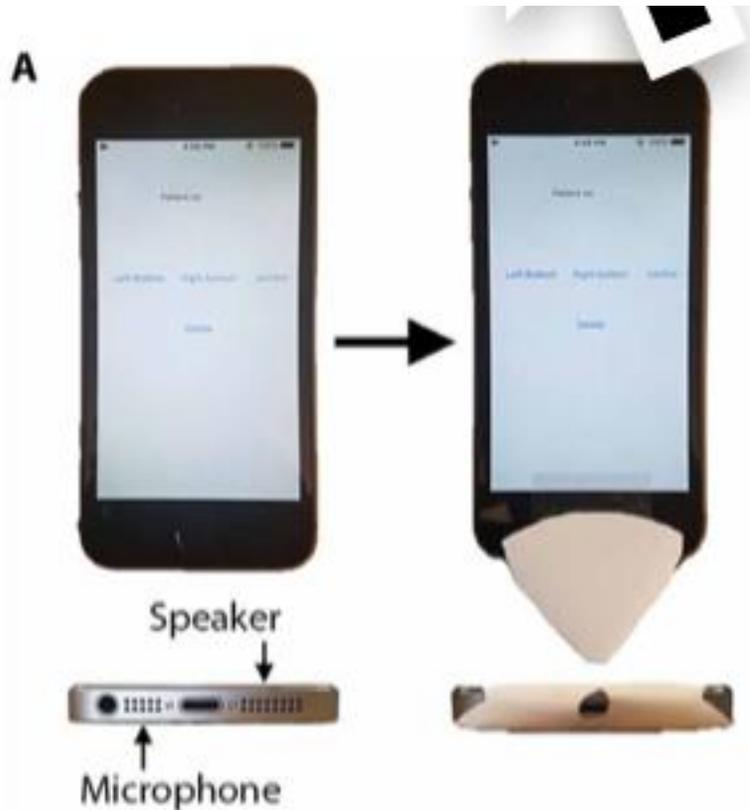
EAR INFECTION

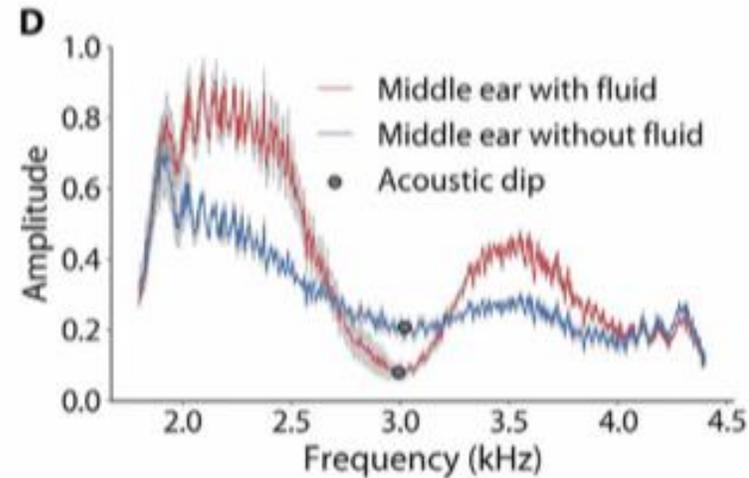
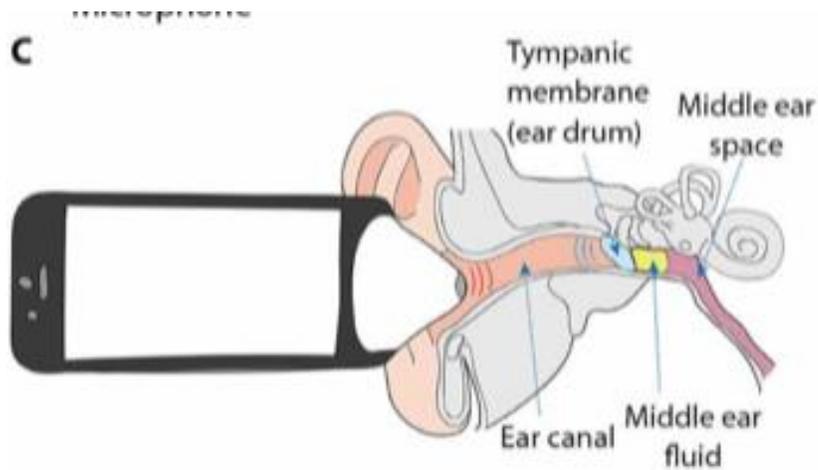
Detecting middle ear fluid using smartphones

Justin Chan^{1*†}, Sharat Raju^{2,3*†}, Rajalakshmi Nandakumar¹,
Randall Bly^{2,3}, Shyamnath Gollakota^{1†}

What is it ?

- App emits chirps with varying frequency interspersed with silence, microphone records the echoes – look for the dip
- Funnel is printer paper and clear tape (different paper types were tested)
- Various angles also tested
- Clinicians and non-clinicians alike tried the evaluation





Results

- Barring some unique situations (anatomical for example) it is close to as sensitive as traditional fluid detection
- Yet another example of low cost screening opportunities utilizing smartphone
- Clinicians and non-clinicians (parents) achieved similar results



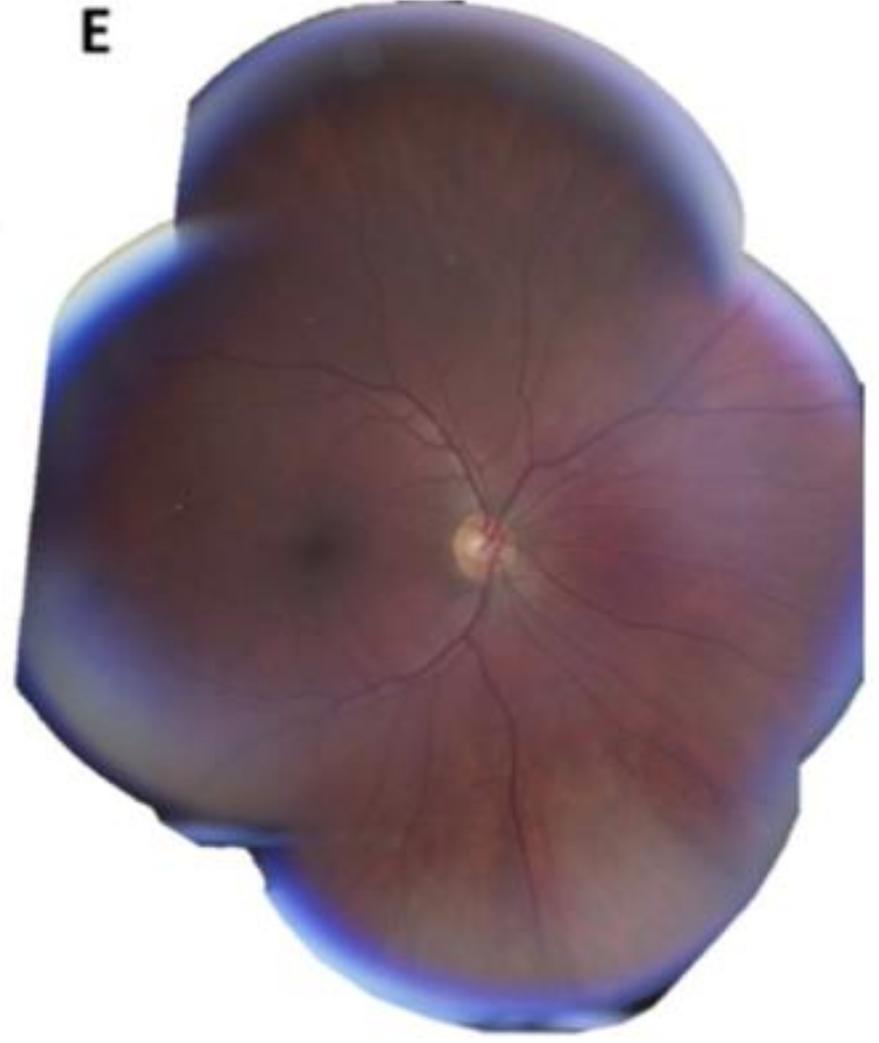
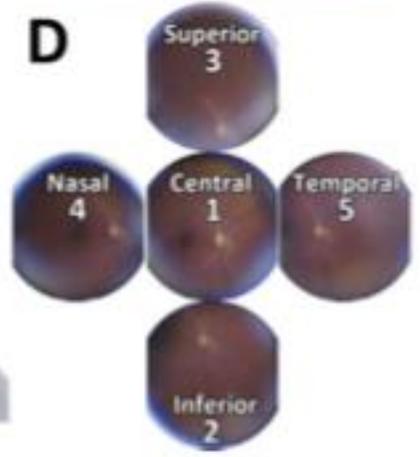
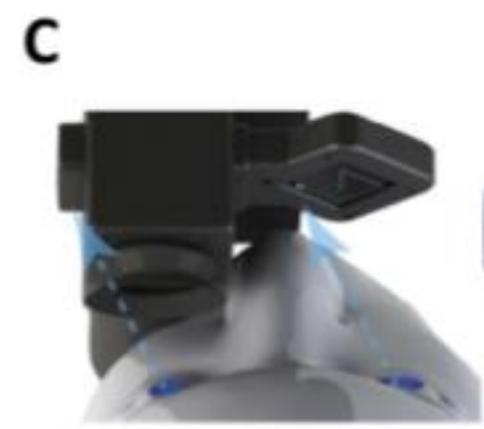
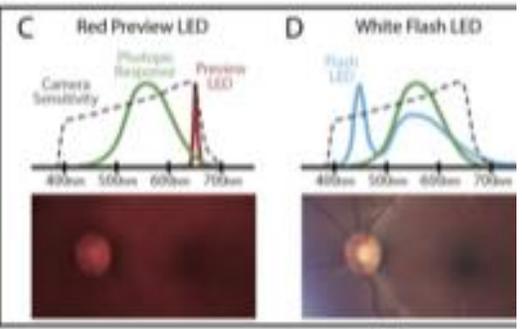
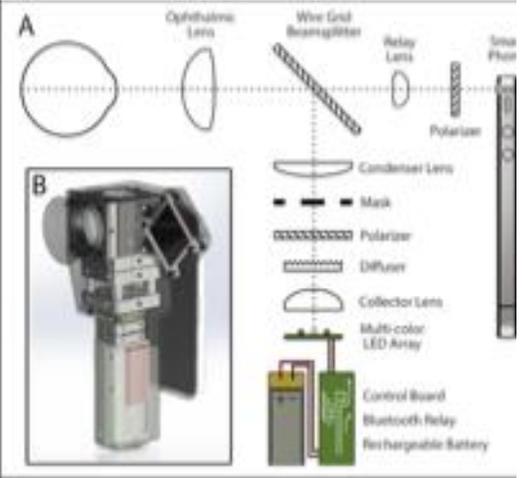
A Smartphone-Based Tool for Rapid, Portable, and Automated Wide-Field Retinal Imaging

Tyson N. Kim^{1,2,3}, Frank Myers², Clay Reber², PJ Loury², Panagiota Loumou², Doug Webster², Chris Echanique², Patrick Li¹, Jose R. Davila¹, Robi N. Maamari^{2,4}, Neil A. Switz⁵, Jeremy Keenan³, Maria A. Woodward¹, Yannis M. Paulus¹, Todd Margolis⁴, and Daniel A. Fletcher^{2,6}

- Expands on earlier work related to the use of smartphones for retinal imaging over conventional optho techniques
- Overall aim to improve the quality of images that are captured which have been shown to be highly variable
- Capture of 5 overlapping images in ~1 minute
- Automation fixation guidance
- Touch screen interface and preview
- Use of non-experts (ie – medical students and residents) in capture
- Did not rely on head stabilization



Kim et al.

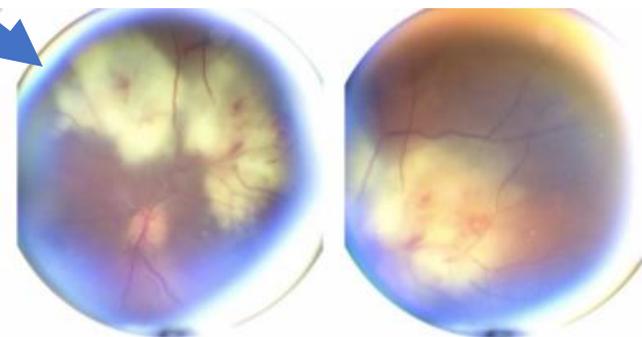
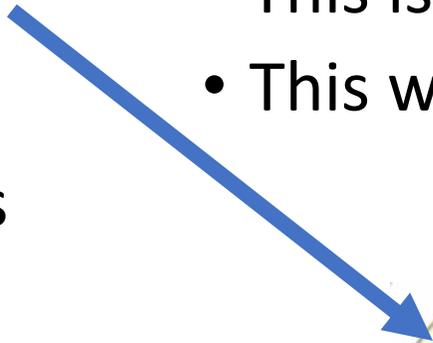




Results

- Inpatient and Outpatient use cases including fungemia screening in ICU patients detecting involvement
- Image capture was graded as appropriate
- High comfort rating from patients
- Comparable results in experts and non-experts capturing the image

- This is only going to get better
- This was an iPhone 5s....



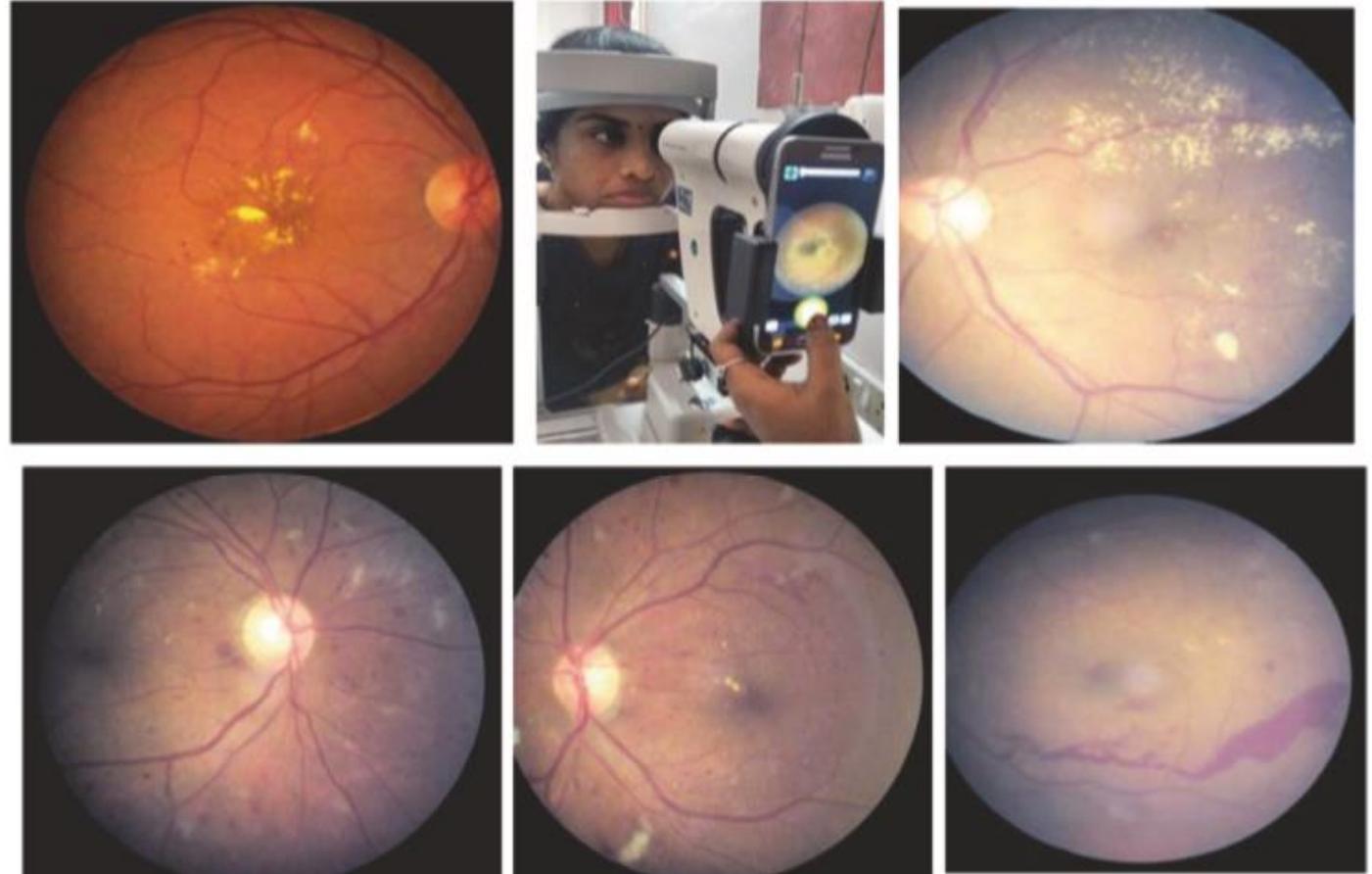
Automated diabetic retinopathy detection in smartphone-based fundus photography using artificial intelligence



Ramachandran Rajalakshmi¹ · Radhakrishnan Subashini¹ · Ranjit Mohan Anjana¹ · Viswanathan Mohan¹

Extension of prior AI work from 2017 Google work

- “Fundus on Phone” images examined by AI and compared to Optho read





- Extends prior work AI by doing it on top of smartphone acquired images
- Very good agreement with grading such that it appears to be an appropriate screening modality

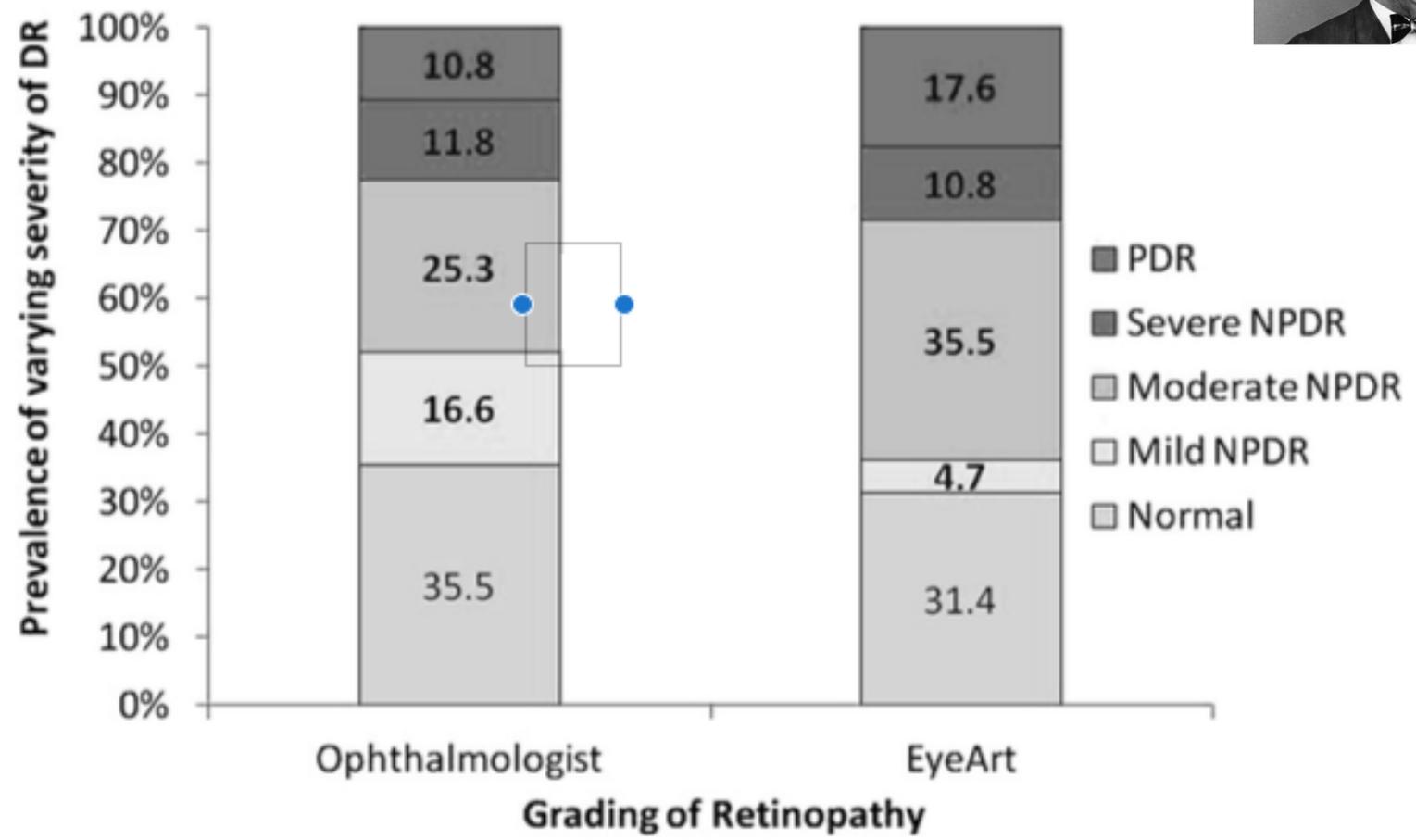


Fig. 2 Comparison of diabetic retinopathy (DR) severity between ophthalmologist and EyeArt software grading ($n = 296$)

ORIGINAL PAPER

10 Steps to Strategically Build and Imp Imaging System: HIMSS-SIIM Collabora

Henri Primo¹  • Matthew Bishop² • Louis Lannum³ • Daw

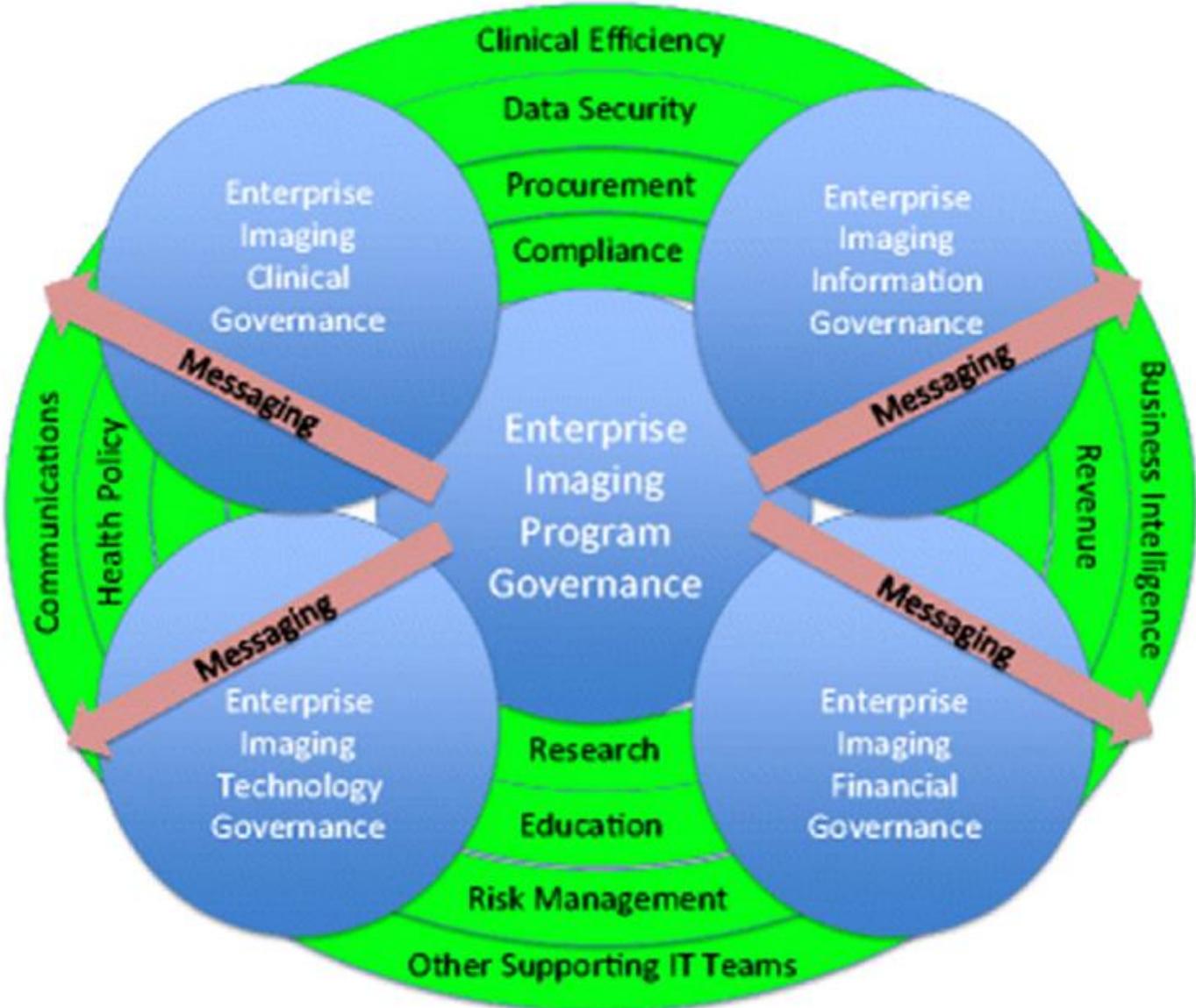


Fig. 1 The integrated nature of EI governance: many non-imaging considerations impact EI decision-making in all five areas of focus

Don't be an anti-vaxxer....

Impassable EMR Alert Demands Flu Shot For Deceased Patient



BY PALPABLE THRILL



“Upload 30 minute video that shows vaccine education session with the patient including their clear verbalization of a refusal in fluent English. Use Ken Burn effect.”

Google's Masterplan for Healthcare

The Medical Futurist
19 June 2018



<https://medicalfuturist.com/googles-masterplan-for-healthcare>



http://fortune.com/2018/06/22/walmart-blockchain-patent-health-records/?utm_campaign=social-button-sharing&utm_medium=social&utm_source=twitter.com

HEALTH • BLOCKCHAIN

Walmart Just Scored a Patent for a Blockchain-Based Health Care Records System



HIT Think What 'Amazon healthcare' could look like in 5 years

By Yulan Egan, Jacqueline Kimmell
Published November 15 2018, 5:15pm EST



Health Information Technology

Amazon moves into healthcare: A 2018 timeline

Alia Paavola - Thursday, December 20th, 2018 [Print](#) | [Email](#)

Episode 3: Dr. David T. Feinberg says fixing healthcare is 'the simplest thing we can do'

October 9, 2018 | Jeremy Corr | Uncategorized | 2

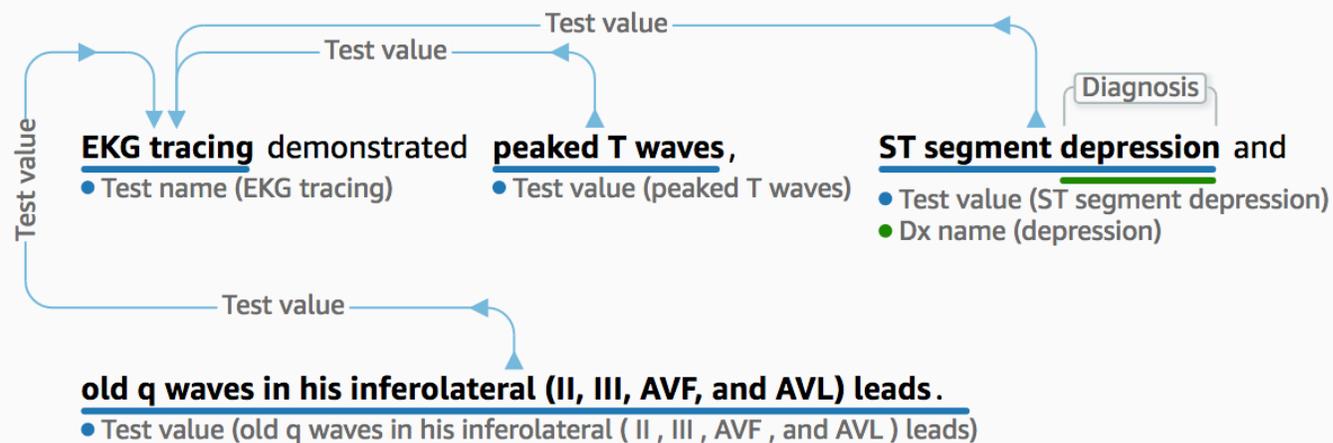


Before leaving Geisinger for Google, Dr. David Feinberg offered his plan to fix U.S. healthcare

Robert Pearl, M.D. - Wednesday, November 21st, 2018 [Print](#) | [Email](#)

Amazon announces new HIPAA eligible machine-learning service

November 28, 2018 | Danielle Brown | Business Intelligence



► Results (28)

► Application integration

<https://www.linkedin.com/pulse/amazons-comprehend-medical-david-carnahan-md-msce/>

WHY DOCTORS HATE THEIR COMPUTERS

Digitization promises to make medical care easier and more efficient. But are screens coming between doctors and patients?

By **Atul Gawande** November 5, 2018

THE
NEW YORKER

The Tar Pit has trapped a great many of us: clinicians, scientists, police, salespeople—all of us hunched over our screens, spending more time dealing with constraints on how we do our jobs and less time simply doing them. And the only choice we seem to have is to adapt to this reality or become crushed by it.



Why Doctors Love Their Computers



University of California IT Blog

- It's all about perspective and it's nice to see a positive piece after an avalanche of negativity in past 8 years

<https://cio.ucop.edu/why-doctors-love-their-computers/>

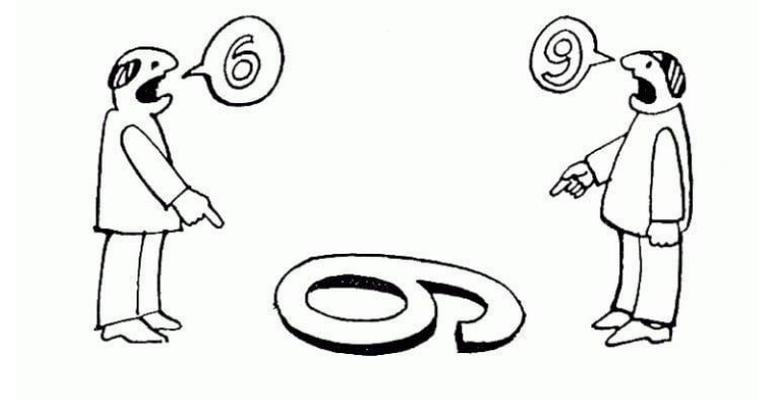


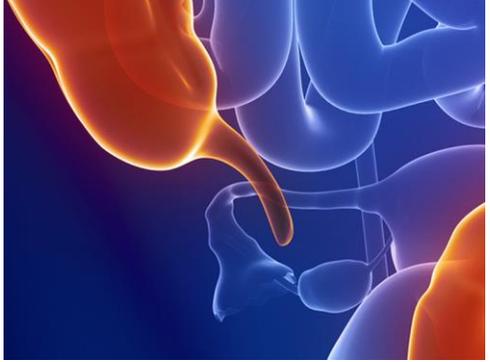
Debunking Regulatory Myths

Myth Topics

- [Computerized Process Order Entry \(CPOE\)](#)
- [Medical Student Documentation](#)
- [Ancillary staff and/or patient documentation](#)

- Good resource if you need to have a crucial conversation with your compliance officer perhaps
- Perhaps some things that could help with the burnout equation





Appendix

Worth checking out....

Perspective
NOVEMBER 8, 2018

Getting Rid of Stupid Stuff

Melinda Ashton, M.D.

Opinion

VIEWPOINT

Health Apps and Health Policy What Is Needed?

RESEARCH ARTICLE

Automated detection of moderate and large pneumothorax on frontal chest X-rays using deep convolutional neural networks: A retrospective study

Andrew G. Taylor^{1,2*}, Clinton Mielke², John Mongan^{1,2}

1 Department of Radiology and Biomedical Imaging, University of California, San Francisco, San Francisco, California, United States of America, **2** Center for Digital Health Innovation, University of California, San Francisco, San Francisco, California, United States of America

* andrew.taylor@ucsf.edu



VIEWPOINT

A Decade of Health Information Technology Usability Challenges and the Path Forward



Appendix

Providers' Perspectives on Sharing Health Information through Acute Care Patient Portals

[Lisa V Grossman](#),^{1, 2} [Ruth M Masterson Creber](#),³ [Beatriz Ryan](#),⁴ [Susan Restaino](#),⁵ [Irma Alarcon](#),⁵
[Fernanda Polubriaginof](#),¹ [Suzanne Bakken](#),^{1, 3} and [David K Vawdrey](#)^{1, 4}



Appendix

Empowering Patients during Hospitalization: Perspectives on Inpatient Portal Use

Ann Scheck McAlearney, Naleef Fareed, Alice Gaughan, Sarah R. MacEwan, Jaclyn Volney, Cynthia J. Sieck

This Issue

Views **29,579** | Citations **0** | Altmetric **403** | Comments **1**

Viewpoint

May 20, 2019

Artificial Intelligence in Health Care Will the Value Match the Hype?

Ezekiel J. Emanuel, MD, PhD^{1,2}; Robert M. Wachter, MD³

» [Author Affiliations](#)

JAMA. 2019;321(23):2281-2282. doi:10.1001/jama.2019.4914



Appendix

Also important -> @EricTopol tweet 12/23/18



Digital Medicine Clinical Trials

Condition	Digital Intervention	Impact	Citation
Asthma	Inhaler Sensor + GPS for hot spots	Reduce rescue inhaler use by 78%; 48% more symptom-free days (Louisville Air)	Barrett, Health Affairs, April 2018
Hypertension	Smartphone app RCT	Improved medication adherence	Morawski, JAMA Internal Med 2018
Diabetes	Telemedicine RCT	Improved control of Type 2 diabetes	Wild et al, PLOS Medicine, 2016
Heart failure	Telemedicine RCT	Less hospital admission and mortality	Koehler, Lancet, 2018
Inflammatory Bowel Disease	Telemedicine RCT	Striking reduction in outpatient visits and hospital admissions	De Jong, Lancet 2017
Cancer	Smartphone app RCT	Improved survival in lung cancer	Denis, ASCO 2018
Headaches	Telemedicine RCT	As effective as in traditional consultation	Muller, Neurology, 2017
Visual Impairment	Smartphone app RCT	Marked improvement of detection among school children in Kenya	Rono, Lancet Global Health, 2018
Insomnia	Digital CBT RCT	Major reduction in insomnia among patients with mental health conditions	Freeman, Lancet Psychiatry, 2017
Attention deficit disorder	Video game RCT	Significant improvement of attention performance in children and adolescents	Kollins, December 2017 and Proof of Concept PLOS One, 2018
Schizophrenia	Avatar CBT RCT	Significant reduction of hallucinations	Craig, Lancet Psychiatry 2017

Tweet from @EricTopol outlining RCTs and Digital Health Interventions

Fin...



@colin_banas

@DoctorKarlMD