



I-PrACTISE

Improving Prim^{Ar}y Care Through
Industrial and Systems Engineering

It's Time to Bring Human Factors to Primary Care Policy and Practice

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Why bother discussing this?

- “...EHR products have not had a measurable effect on the very goals to which meaningful use aspires.”
- “...the challenge of ensuring that meaningful use actually leads to meaningful benefits...improvements in safety and quality of care, remains a serious concern.”



The NEW ENGLAND JOURNAL of MEDICINE

Transitional Chaos or Enduring Harm? The EHR and the Disruption of Medicine

Lisa Rosenbaum, M.D.

A decade ago, a primary care physician I admired seemed to come undone. His efficiency had derived not from rushing between patients but from knowing them so well that his charting was effort-

less and fast. But suddenly he became distracted, losing his grip on the details of his patients' lives.

push to digitize medicine and the sanctity of the doctor-patient relationship.¹ Wachter centers his EHR

For inhabitants of this upside-down world, Wachter's "House of Horrors" tour is vindicating. There's the critical care doctor who, unable to identify new information in daily notes, has begun printing them out and holding two superimposed pages up to the light to see what's changed.

...he became distracted, losing his grip on the details of his patients' lives.

Rosenbaum L. Transitional Chaos or Enduring Harm?

The EHR and the Disruption of Medicine. *N Engl J Med*. 2015;373(17):1585-1588.

From Harvard Business Review

...the EHR has been a disaster for the clinical user, in large part because the billing/compliance function has dominated.

...Only in health care, it seems, could we find a way to “automate” that ended up adding staff and costs.

Wachter R, Goldsmith J, To Combat Physician Burnout and Improve Care, Fix the Electronic Health Record. Harvard Business Review, March 30, 2018.



Primary Care is in Trouble

- Older, more complex patients
- Physicians (and other clinicians) reducing scope of practice and/or retiring early
- Interventions intended to help have been largely ineffectual and there are unanticipated harms from
 - EHRs
 - PCMH
- Much of this is due to the inappropriate use of technology
 - Increased interruptions
 - Loss of flow
 - Shunting physician attention to clerical tasks
 - Poor communication strategies
 - The goal is NOT to document!

“Houston, we have a problem...”

- The current state of EHR use has resulted in...
 - Inefficient data entry
 - Decreased quality of face to face patient interaction
 - More difficult, less fulfilling work
 - Degradation of the quality of clinical notes
 - Decreased workforce satisfaction
 - More errors, higher costs, more lawsuits, burnout

Friedberg MW, Chen PG, Busum KR, et al. Factors Affecting Physician Professional Satisfaction and Their Implications for Patient Care, Health Systems, and Health Policy. Rand Corporation, 2013.

http://www.rand.org/content/dam/rand/pubs/research_reports/RR400/RR439/RAND_RR439.pdf

Coleman M, Dexter D, Nankivil N. Factors Affecting Physician Satisfaction and Wisconsin Medical Society Strategies to Drive Change. Wisconsin Medical Journal 2015; 114:135-142

Are There Hazards?

“... these applications do not take advantage of human-computer interaction principles, leading to poor designs that can increase the chance of error, add to rather than reduce work, and compound the frustrations of executing required tasks.

As a result, these applications sometimes increase workload, and they can introduce new forms of error that are difficult to detect. (emphasis added)

Stead, 2009, National Research Council:
“Computational Technology for Effective Healthcare”



Primary Care Needs Human Factors to:

- Understand the “basic science” of primary care: Cognition, social interactions and team function, communication and technology
- Help design potentially useful interventions and improvements
- Help design and conduct “laboratory testing” of proposed interventions and improvements
- Help with monitoring systems in the real world when technology is deployed with special attention to unintended consequences.

Consider an analogy to developing a medication



- First understand the basic molecular and cellular biology of the disease and host
- Then design the medication around that understanding
- Then test the medication in the lab
- Then monitor the medication as it is used in practice to assess effectiveness and safety – and monitor for unintended consequences (side effects)

<http://www.fammed.wisc.edu/files/webfm-uploads/documents/research/i-practise/i-practise-white-paper.pdf>

Beasley JW, Otles E, Green LA, et al. It's Time to Bring Science to Policy and Practice. The Role Human Factors. Manuscript submitted to Applied Ergonomics.



Like care innovations, this may be useful but...

Ciprofloxacin: Adverse Reactions

- **Serious Reactions**

- anaphylaxis
- anaphylactic shock
- hypersensitivity rxn
- skin rxns, severe (rare)
- phototoxicity
- seizures
- pseudomembranous colitis
- superinfection
- incr. ICP
- toxic psychosis
- peripheral neuropathy (rare)
- vasculitis (rare)
- serum sickness (rare)
- pneumonitis, allergic (rare)
- hepatotoxicity, incl. fatal (rare)
- nephrotoxicity (rare)
- crystalluria (rare)
- myelosuppression (rare)
- blood dyscrasias (rare)
- tendon rupture (rare)
- arthropathy (animal studies)

- **Common Reactions**

- nausea
- diarrhea
- vomiting
- abdominal pain
- headache
- dyspepsia
- dizziness
- restlessness
- lightheadedness
- vaginitis
- insomnia
- photosensitivity
- pruritus
- rash
- anxiety
- agitation
- confusion
- tendinitis
- arthralgia
- elevated LFTs





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Primary care – ISyE Collaboration (brief) History

- Started as informal collaboration in 2000
- Bentzi said, when observing primary care, that “**It’s a mess!**”
- Studies on
 - Quality of work life of clinicians and staff
 - Medical error reporting in primary care
 - Complexity & workflow in primary care
 - Systems & technology to support primary care
 - Hazards in primary care of elderly
 - RCT of a pre-visit planning intervention



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The I-PrACTISE Vision

- Vision:
 - The care of patients will be improved and the practice of primary care medicine will become more efficient through new knowledge and techniques created by the collaboration between Industrial & Systems Engineering and the primary care specialties

“The Basic Science of Primary Care”

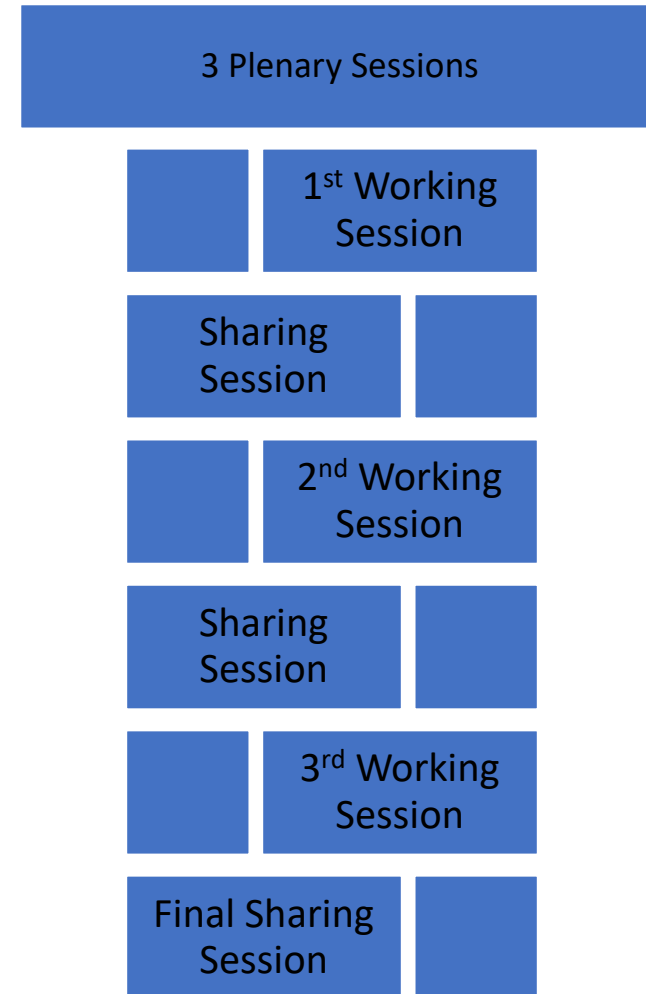
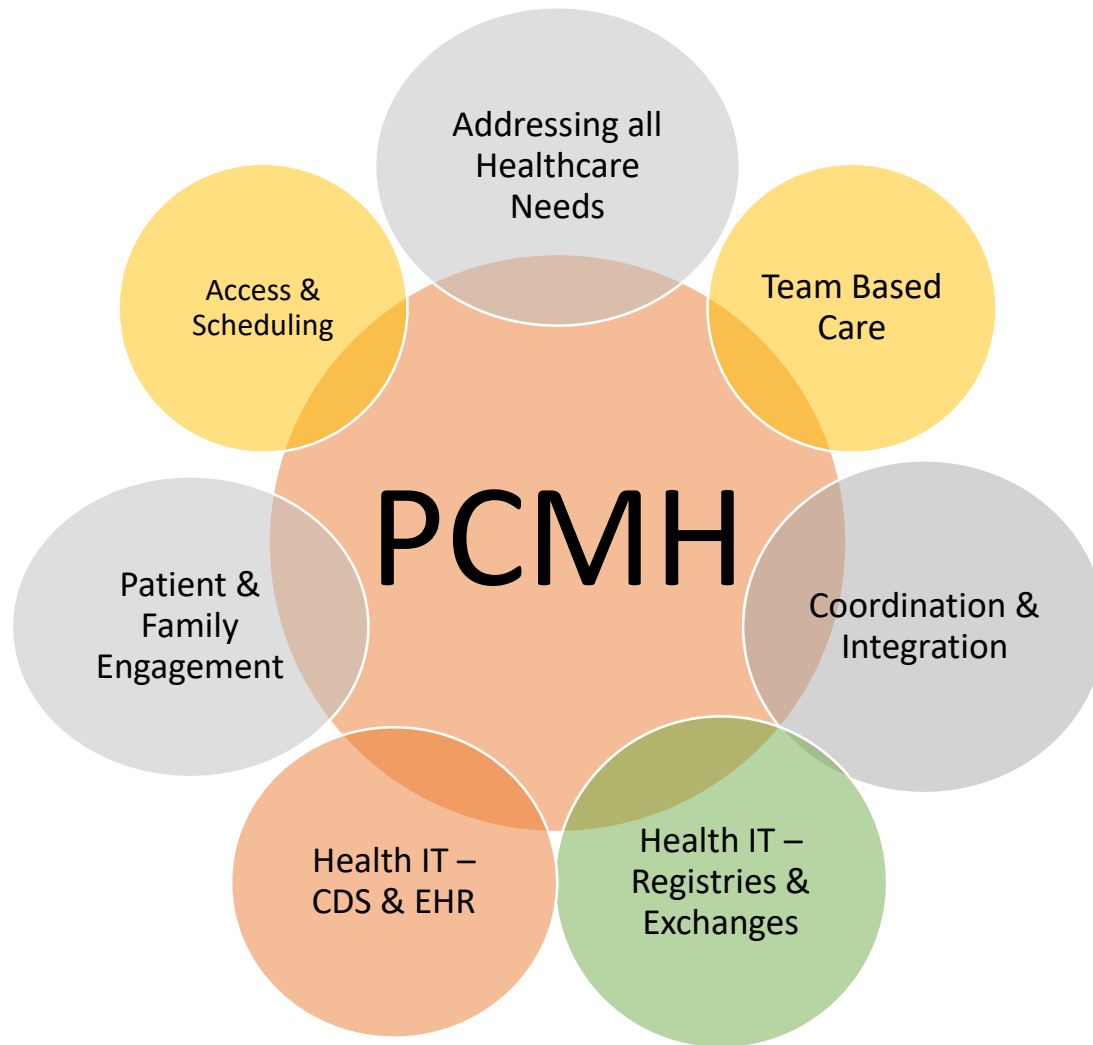
2013 I-PrACTISE Conference



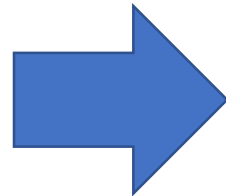
I-PrACTISE
Improving PrimArY Care Through
Industrial and Systems Engineering

- Conceived by Ben-Tzion Karsh, Ph.D.
- Develop a research agenda for advancing primary care practice using ISyE science.
- Method: brought together national experts in ISyE & Primary Care
- 75 Attendees
 - 29 were experts in primary care,
 - 27 experts in industrial engineering,
 - Related disciplines: psychology, nursing, pharmacy, administration, medical informatics
 - 10 graduate students – our future!

2013 I-PrACTISE Conference



Qualitative analysis – themes/ideas



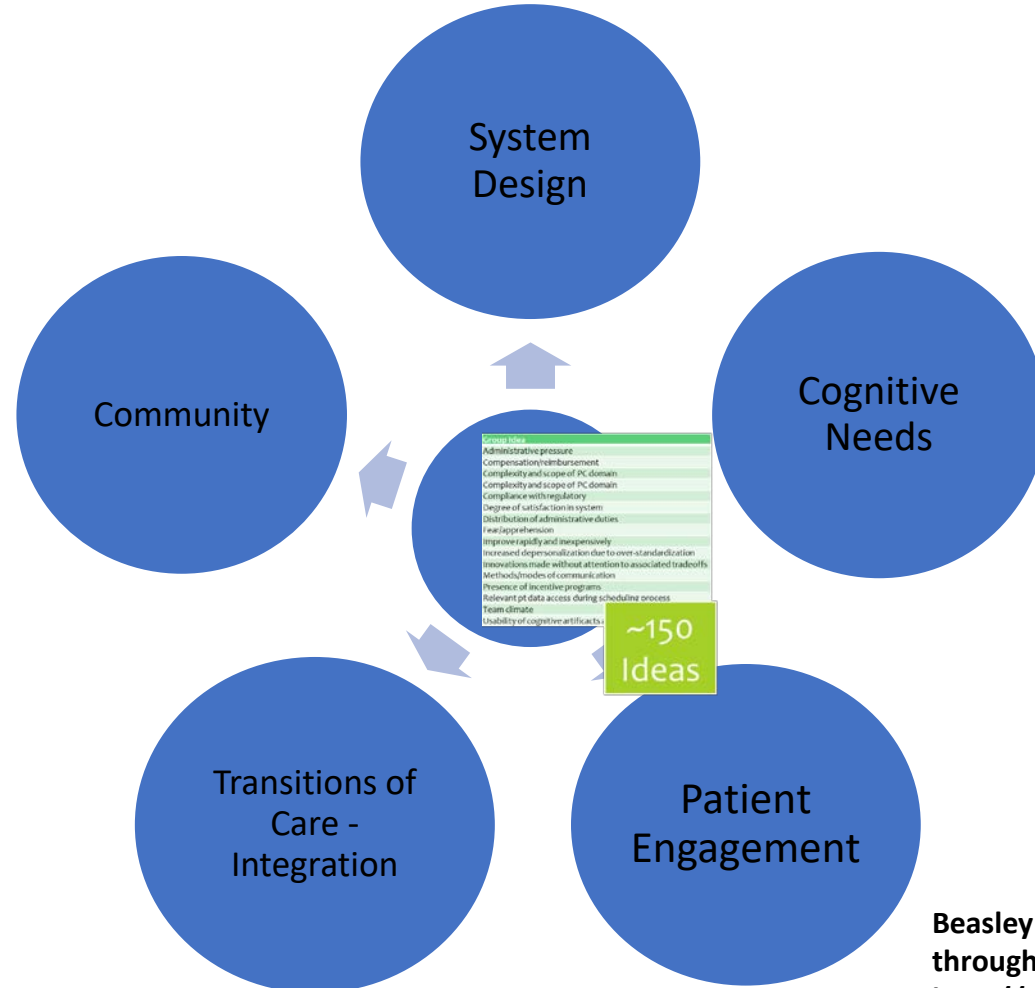
~140
Ideas

Group Idea

Administrative pressure
Compensation/reimbursement
Complexity and scope of PC domain
Complexity and scope of PC domain
Compliance with regulatory
Degree of satisfaction in system
Distribution of administrative duties
Fear/apprehension
Improve rapidly and inexpensively
Increased depersonalization due to over-standardization
Innovations made without attention to associated tradeoffs
Methods/modes of communication
Presence of incentive programs
Relevant patient data access during scheduling process
Team climate
Usability of cognitive artifacts and tools

Workgroup Themes

Problems / Issues for Research



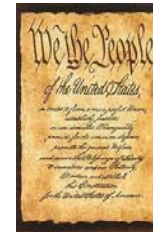
System design factors



Teams & Work



Technology



Policy

Beasley JW, Carayon P, Smith MA. Improving the Quality and Efficiency of Primary Care through Industrial and Systems Engineering – A White Paper. 2013;
<http://www.fammed.wisc.edu/sites/default/files//webfm-uploads/documents/research/i-practise/i-practise-white-paper.pdf>. Accessed July 2, 2018.

Research Matrix



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		System Design Factors		
		Teams and Workload	Technology	Policy
Problems and Issues for Research	Cognitive Needs			
	Patient Engagement			
	Community			
	Integration			
	Transitions of Care			

Cognitive needs



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Problems and issues for Research	System Design Factors		
	Teams and Workload Distribution	Technology	Policy
Problems and issues for Research	System Design Factors		
	Teams and Workload Distribution	Technology	Policy
Cognitive Needs	<ul style="list-style-type: none"> Understanding and supporting the cognitive challenges in individual and team decision making 	<ul style="list-style-type: none"> Improve synthesis and presentation of information at the right time Design usable and useful information Avoid alert fatigue, distraction effects 	<ul style="list-style-type: none"> Addressing patient complexity Registry definition and use to improve care
	<ul style="list-style-type: none"> continuity Navigating multiple care transitions and interfaces 	<ul style="list-style-type: none"> Information flow during handoffs 	<ul style="list-style-type: none"> Handoffs across the system

Patient engagement



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System Design Factors	
Problems and issues for Research	Teams and
Problems and issues for Research	System Design Factors
	Teams and Workload Distribution Technology Policy
Patient Engagement	<ul style="list-style-type: none"> • Understanding patient wants and needs • Effective ways to present information and incorporate information from patient • Involving patients in EHRs and creating registries • Tools for shared decision making • Assisting patients in finding resources • Keeping pace with what is happening in the market place • Conducting needs assessment
Care Transitions	<ul style="list-style-type: none"> • Optimize care continuity • Navigating multiple care transitions and interfaces • Information flow during handoffs • Handoffs across the system

Community



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Problems and issues for Research	System Design Factors			
	Teams and Workload	Technology	Policy	
Problems and issues for Research		Teams and Workload Distribution	Technology	Policy
	Community	• Reaching out to stakeholders and understanding their needs		• Systems needed to integrate PC with broader community • Improving access to care
		• What should we be asking HIT to do?		

Integration, Care transitions



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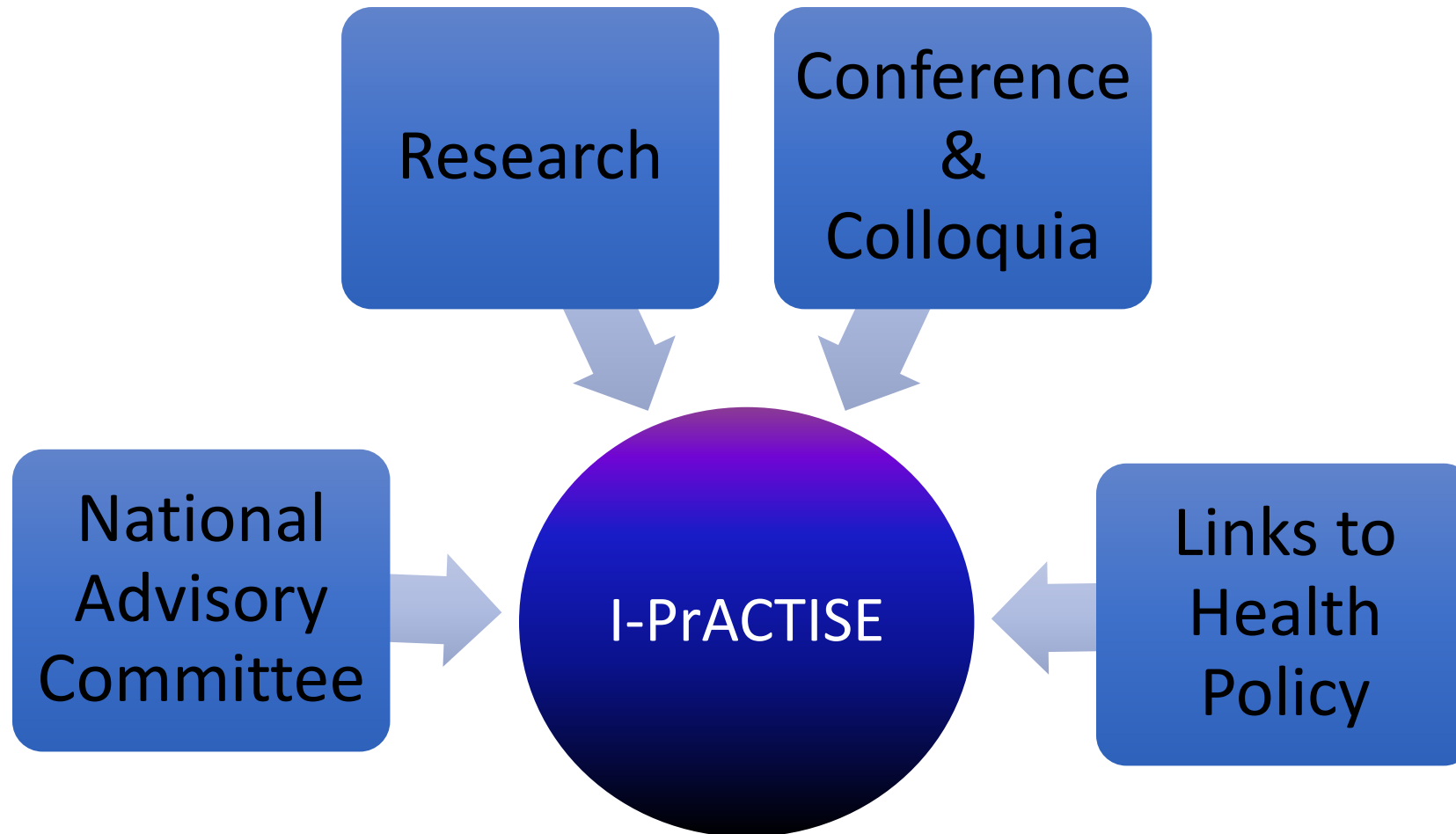
Improving PrimARy Care Through
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Problems and issues for Research	System Design Factors			
	Teams and Workload	Technology	Policy	
Problems and issues for Research		Teams and Workload Distribution	Technology	Policy
	Integration	<ul style="list-style-type: none"> • Sustaining high performing teams • Clarification and optimization of team roles 	<ul style="list-style-type: none"> • Effective design and use of HIT within and across systems • Enhancing communication 	<ul style="list-style-type: none"> • Tradeoffs and consequences of care innovations • Involvement of stakeholders in quality improvement
	Care Transitions	<ul style="list-style-type: none"> • Optimize care continuity • Navigating multiple care transitions and interfaces 	<ul style="list-style-type: none"> • Information flow during handoffs 	<ul style="list-style-type: none"> • Handoffs across the system

Team-based care research Q's

TeamBased Care	<ol style="list-style-type: none"><li data-bbox="619 249 1574 292">1. Do we need to refine our definition of healthcare?<li data-bbox="619 335 1956 435">2. What population are we serving with our teams and when? This is likely dynamic.<li data-bbox="619 478 2063 692">3. How do we develop a model for team development and function? This should be informed by healthcare workers' and patients' perceptions, determination of the best team leader, maintenance of a patient-centric view, and apply to care beyond the healthcare site.<li data-bbox="619 735 1516 778">4. How do we engage patients as team members?<li data-bbox="619 821 2025 921">5. How do we implement new models of team-based care in clinical practices? Activating the care team not only when a patient presents for care.<li data-bbox="619 963 2063 1120">6. How do we sustain high performing teams? Consider optimal use of feedback, reward systems, team performance metrics, evaluation of outcomes of care, and ongoing training.
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Current I-PrACTISE Work



1. Mundt MP, Swedlund MP. **A human factors systems approach to understanding team-based primary care: a qualitative analysis.** Fam Pract. 2016;33(6):721-726.
2. Swedlund M, Norton D, Birstler J, Chen G, Crus L, Hanrahan L. **Effectiveness of a Best Practice Alert at Improving Hypertension Control.** Am Jr Hypertension. 2019;32(1):70-76.
3. Karsh BT, Beasley JW, Brown RL. **Employed family physician satisfaction and commitment to their practice, work group, and health care organization.** Health Serv Res. 2010;45(2):457-475.
4. Arndt BG, Beasley JW, Watkinson MD, et al. **Tethered to the EHR: Primary Care Physician Workload Assessment Using EHR Event Log Data and Time-Motion Observations.** Ann Fam Med. 2017;15(5):419-426.
5. Sinsky CA, Beasley JW. **Texting while doctoring: a patient safety hazard.** Ann Intern Med. 2013;159(11):782-783.
6. Wetterneck TB, Lapin JA, Krueger DJ, Holman GT, Beasley JW, Karsh BT. **Development of a primary care physician task list to evaluate clinic visit workflow.** BMJ Qual Saf. 2011;21(1):47-53.
7. Holman GT, Beasley JW, Stone JA, Smith PD, Wetterneck TB. **The Myth of Workflow During the Primary Care Visit and Why it Matters for Electronic Health Record Design and Implementation.** Journal of American Medical Informatics Association. 2015;In Press.
8. Holman GT, Wetterneck TB, Beasley J, Marquard J, et al. **Meaningful Use's Benefits and Burdens for US Family Physicians.** JAMIA, 2018.
9. Sinsky CA, Beasley JW, Simmons GE, Baron RJ. **Electronic health records: design, implementation, and policy for higher-value primary care.** Ann Intern Med. 2014;160(10):727-728.

We Need Human Factors to Develop Systems to:

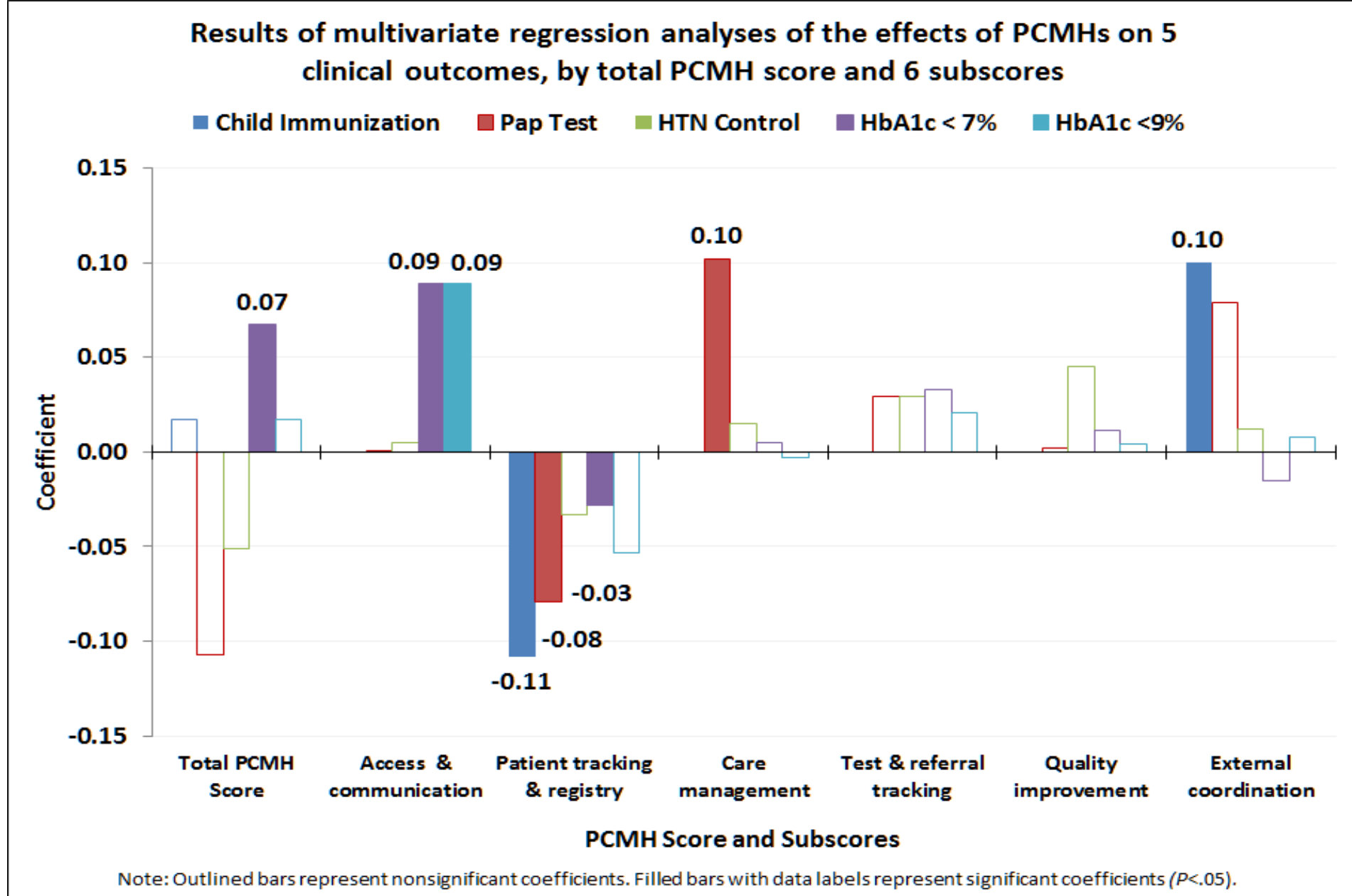
- Support the non-linear workflow
- Reduce the “information chaos”
- Promote open-ended dialogue
- Support the understanding of context
- Support the development of SA
- Promote human relationships (Patients, staff and colleagues)

Karsh BT, Beasley JW, Brown RL. Employed family physician satisfaction and commitment to their practice, work group, and health care organization. Health Serv Res. 2010;45(2):457-475.

Poorly Designed Interventions Do Not Improve Care.

- “...no difference in performance between EHR users and non-users.”
- “..no consistent pattern between length of time using an EHR and physician’s performance.”
 - And these are just process measures, not patient outcome measures
 - Workload and errors not assessed.
- No subsequent studies have altered these findings

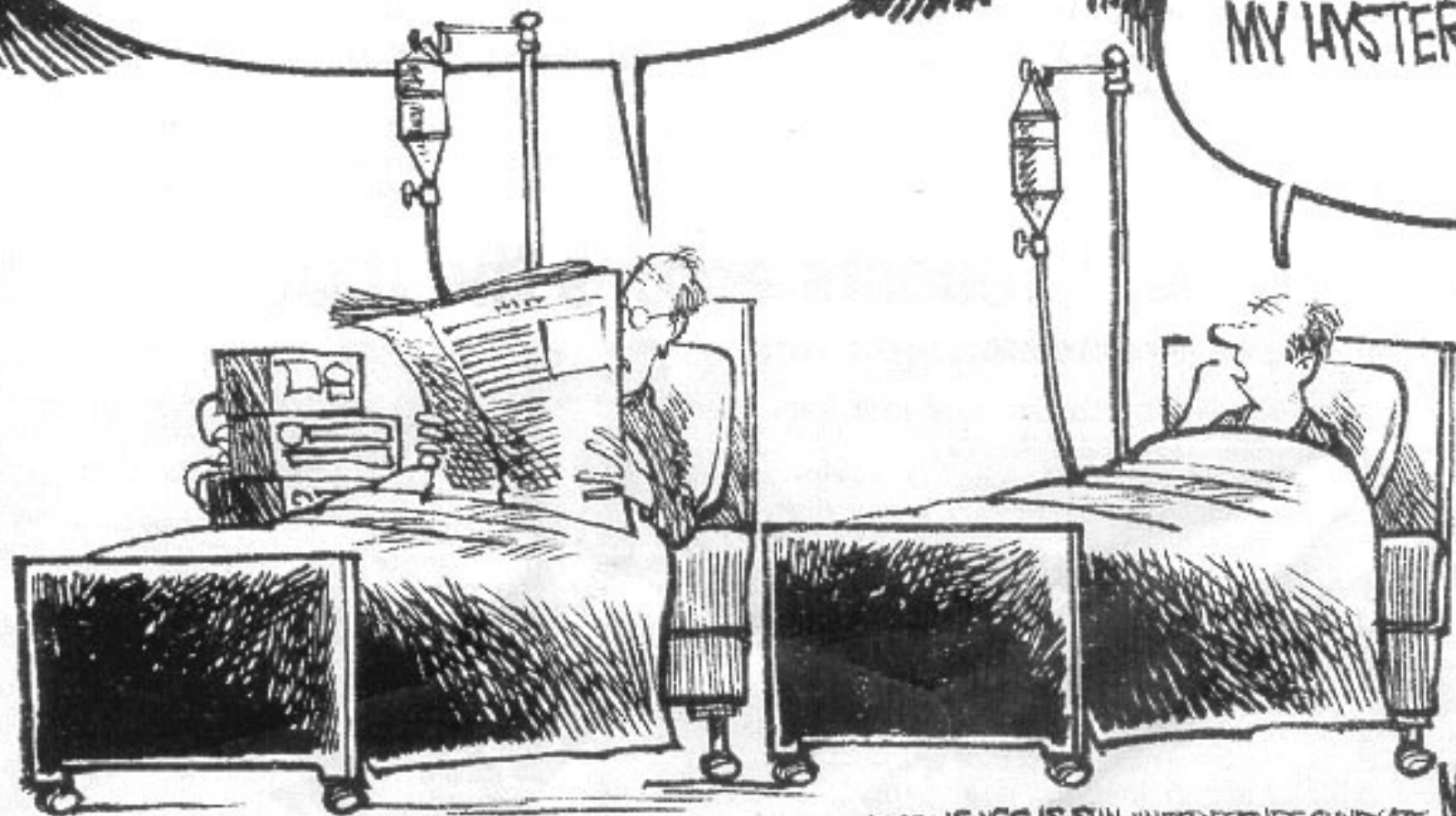
Zhou L, et al. The Relationship Between Electronic Health Record Use and Quality of Care Over Time. J Am Med Inform Assoc. 2009;16:457-64



Shi L, Lock DC, Lee DC, et al. Patient-Centered Medical Home Capability and Clinical Performance in HRSA-supported Health Centers. Medical Care, 2015;53:389-95

IT SAYS HERE THAT THE RATE OF
MEDICAL ERRORS IS STUNNINGLY
HIGH.

THAT EXPLAINS
MY HYSTERECTOMY.



© 1999 LAS VEGAS SUN UNITED FEATURE SYNDICATE

MIKE SMITH

Errors reduced or increased?

- 3% error rate with hand-written Rx, 13% with EHR Computerized Order Entry (CPOE).
- “The small number ...published to date do not provide ... evidence that CPOE systems enhance safety and reduce costs in the out-patient setting.
 - Increase guideline adherence
 - Increase prescribing time
 - Alerts are often ignored
 - And with good reason! [editorial comment]

Eslami S, Abu-Hanna A, de Keizer NF. Evaluation of outpatient computerized physician medication order entry systems: A systematic review. J Am Med Inform Assoc. 2007;14:400-406

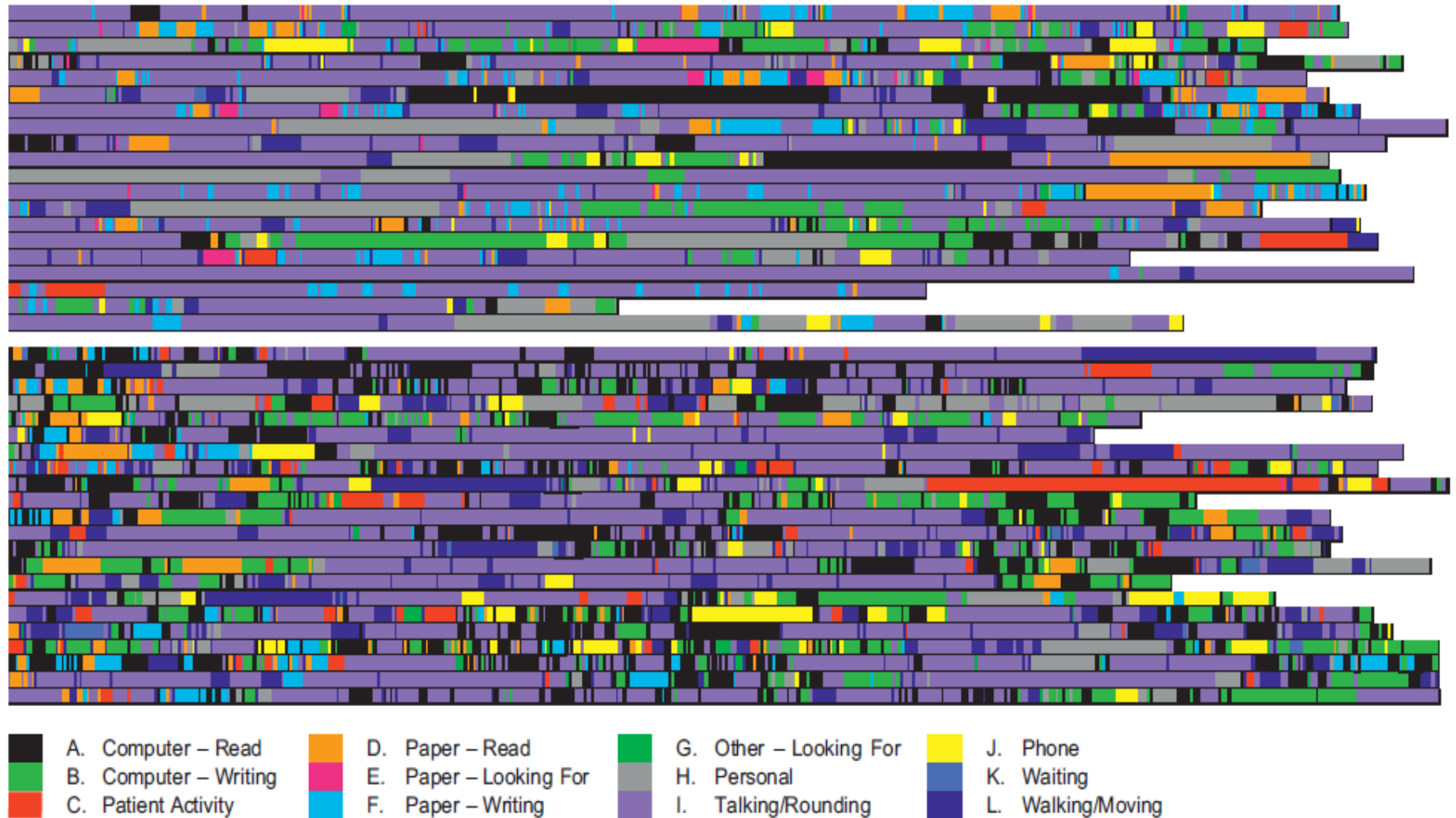
Does Clinical Decision Support (CDS) Including Best Practice Alerts (BPAs) Help?

- No compelling evidence that overall CDS and BPAs are effective in improving quality in primary care.
 - Probably helpful to assist memory (e.g. medication interactions)
 - No evidence that helpful at supporting cognition (e.g. diagnosis)
- No exploration of unintended consequences: (e.g.)
 - Break in task
 - Lost of eye contact
 - Increased clinician fatigue

Swedlund M, Norton D, Birstler J, Chen G, Crus L, Hanrahan L. Effectiveness of a Best Practise Alert at Improving Hypertension Control. *Am Jr Hypertension*. 2019;32(1):70-76.

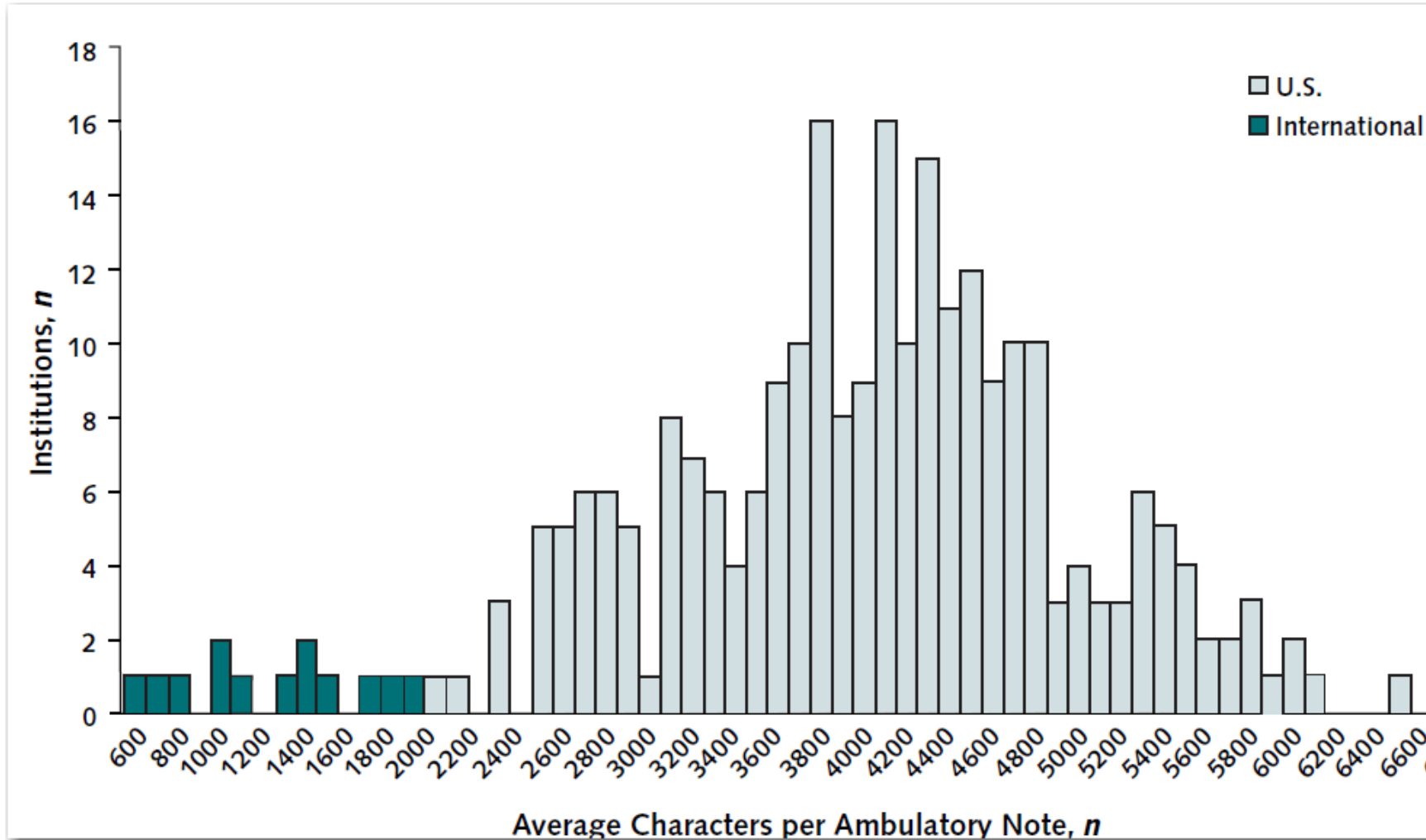
Romano MJ, Stafford RS. Electronic health records and clinical decision support systems: impact on national ambulatory care quality. *Arch Intern Med*. 2011;171(10):897-903.

Good HF Would Help Reduce Break-in-Task
















Zheng K, Haftel HM, Hirschl RB. Quantifying the impact of health IT implementations on clinical workflow: a new methodological perspective. *JAMIA* 2010 17: 454-461

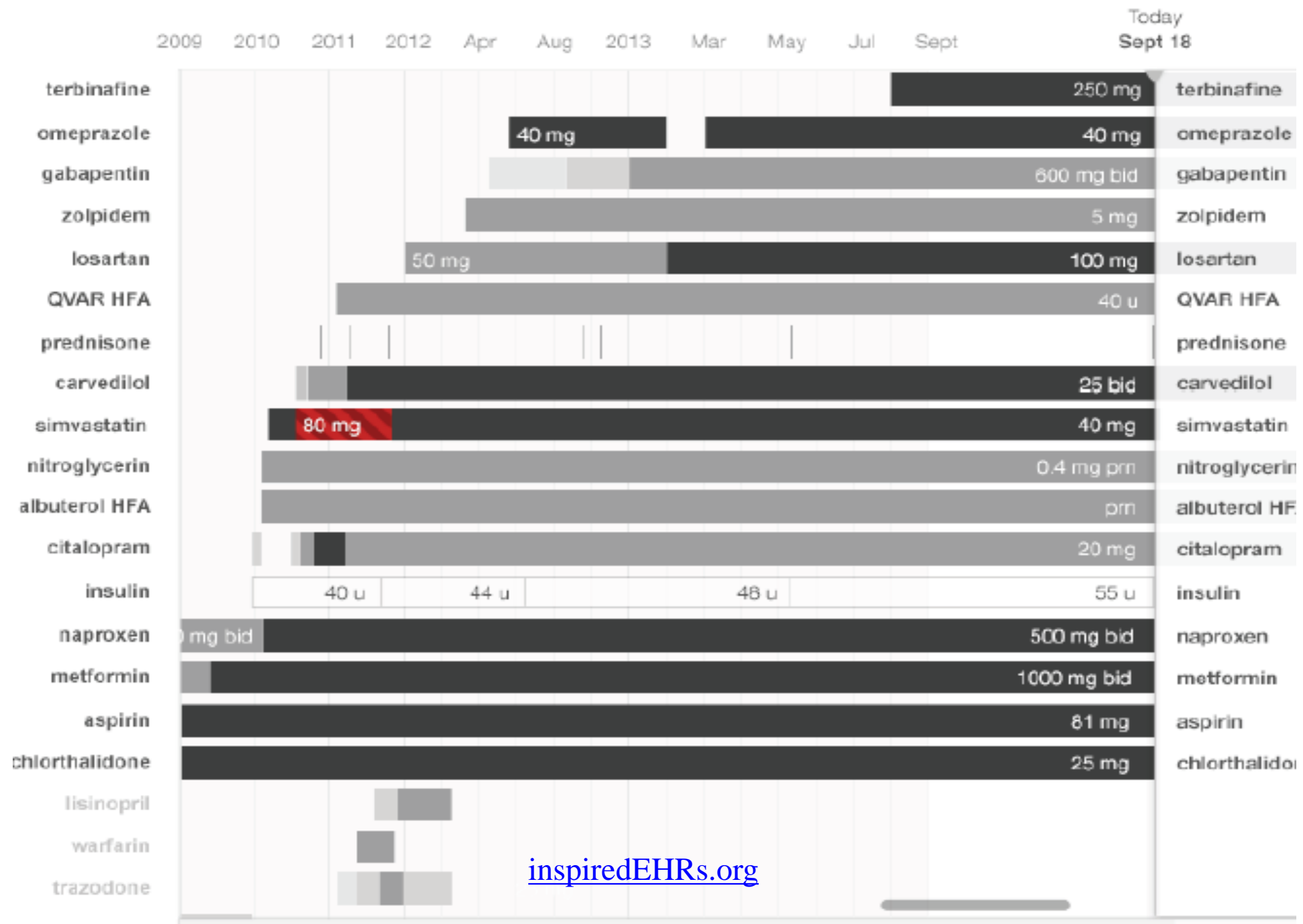
HF Would Help Reduce “Note Bloat”



Downing, LN, Bates DW, Longhurst CA. Physician Burnout in the Electronic Health Record Era: Are We Ignoring the Real Cause? Ann Intern Med 2018; doi:10.7326/M18-0139

Good HF Will Improve Data Displays

 Medication	Sig	Disp	Refills	Start Date	End Date	Comment	D/C Reason	Route
 irbesartan (AVAPRO) 75 MG TABS	Take 1 tablet by mouth daily for blood pressure and kidney protection	30 or ad lib	12/12	03/12/2009		Caution re Hx of allergic Rxn to Benazepril – but should be OK.		Oral
 darifenacin (ENABLEX) 15 MG TB24	1 TABLET DAILY to reduce urinary urgency	30 or ad lib	12/12	03/12/2009				Oral
 warfarin (COUMADIN) 2.5 MG TABS	Take 2.5mg daily except for 5mg on Wednesdays	30	0/0	03/12/2009	03/26/2009			Oral
 insulin aspart (NOVOLOG FLEXPEN) 100 UNIT/ML SOLN	As directed	ad lib	pm	02/09/2009				Subcutaneous
 hydrocodone-acetaMINOPHEN (NORCO) 5-325 MG TABS	1-2 tablets every 4-6 hours as needed for pain	120	6/6	12/30/2008				Oral
 solifenacin (VESICARE) 10 MG TABS	1 TABLET DAILY to help with incontinence.	30	12/12	12/15/2008				
 ezetimibe-simvastatin (VYTORIN) 10-40 MG TABS	1 TABLET EVERY EVENING for cholesterol	30	11/11	12/12/2008				Oral
 hydrochlorothiazide (HYDRODIURIL) 25 MG PO TABS	1 TABLET DAILY for blood pressure and edema	100	3/3	10/29/2008				Oral
 INSULIN ADMIN SUPPLIES N/A MISC	BD Ultra-fine III mini pen	200	1 year	10/20/2008				Does not apply
 POTASSIUM CHLORIDE 10 MEQ PO TBCR	1 tablet three times daily							Oral
 furosemide (LASIX) 40 MG PO TABS	1 tablet twice daily							Oral
 TYCOLENE 500 MG PO TABS	1 TABLET EVERY 4 HOURS AS NEEDED							Oral



The Cost of Technology



© 2011 Thomas G. Murphy, MD.

Toll E., The Cost of Technology, JAMA 2012;307:2497-8

HF – The Computer a Bridge, Not a Barricade



Thanks to Ellen Evans, PA-C

Sinsky CA, Beasley JW. Texting While Doctoring: A Patient Safety Hazard. *Ann Internal Med.* 2013;159:782-3

Patel MR, Vichich J, Lang I, Lin J, Sheng K. Developing and evidence base of best practices for integrating computerized systems into the exam room: A systematic review. *J Am Med Inform Assoc.* 2016;0:1-8



HF – The Computer a Bridge, Not a Barricade

“...bring the patient directly into the interaction between the clinician and the computer; e.g., using the computer to facilitate conversation and adjusting room design to allow the patient to view the computer screen alongside the clinician.”

Patel, MR, Vichich J, Lang I, Lin J, Sheng K. Developing an Evidence Base of Best Practices for Integrating Computerized Systems Into the Exam Room: A Systematic Review. 2016;0:1-8 doi: 10.1093/jamia/ocw121, Review

Adapted from: Ventres W, Kooienga S, Marlin R.
www.aafp.org/fpm/20080300/6enir.html

Sinsky CA, Beasley JW. Texting While Doctoring: A Patient Safety Hazard. Ann Internal Med. 2013;159:782-3



Other Considerations in Redesign:

- Start with patient concerns: the patient before the computer.
 - UWMF Directive “The first thing you must do when you enter the patient’s room is log into the computer.” No way!
- Don’t let templates rule the encounter
- Watch out for auto-fill, smart phrases, copy-paste, etc.
 - Potential fraud
 - Potential for malpractice
 - Loss of situation awareness

HF Will Help Redesign to Avoid Cognitive Clutter

SUBJECTIVE:

XXXX is an 59 year old male who presents for evaluation and treatment of Type 2 diabetes mellitus. Age at diagnosis ***. Family history positive for diabetes in the patient's {family members:20}.

Previous treatment modalities employed include {treatment:1216}.

Current treatment includes {treatment:1216}. |

Current monitoring regimen: {monitoring:1217}

Home blood sugar records: ***

Last HgbA1c: ***

Diabetic complications: {complications:1215}

Cardiovascular risk factors: {CV risk factors:510}

Current outpatient prescriptions prior to encounter:

HYDROCODONE-	1-2 tablets every 4-6	Disp: 42	Rfl: 4
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How about his knee arthritis and COPD which limit his exercise?, His wife's depression? His corn crop? His daughter with developmental delay?

HF can Inform Optimal Use of Technology

- Use the EMR in the way that works for all
 - The goal is **NOT** to go paperless
 - The goal **IS** to improve patient care – and our lives -- through efficient, effective communication and information handling!
- The optimal use of technology includes when to NOT use it
 - Air France 447!



HF Will Help Define the Best Use of Technology!

Paper
is not
Evil!



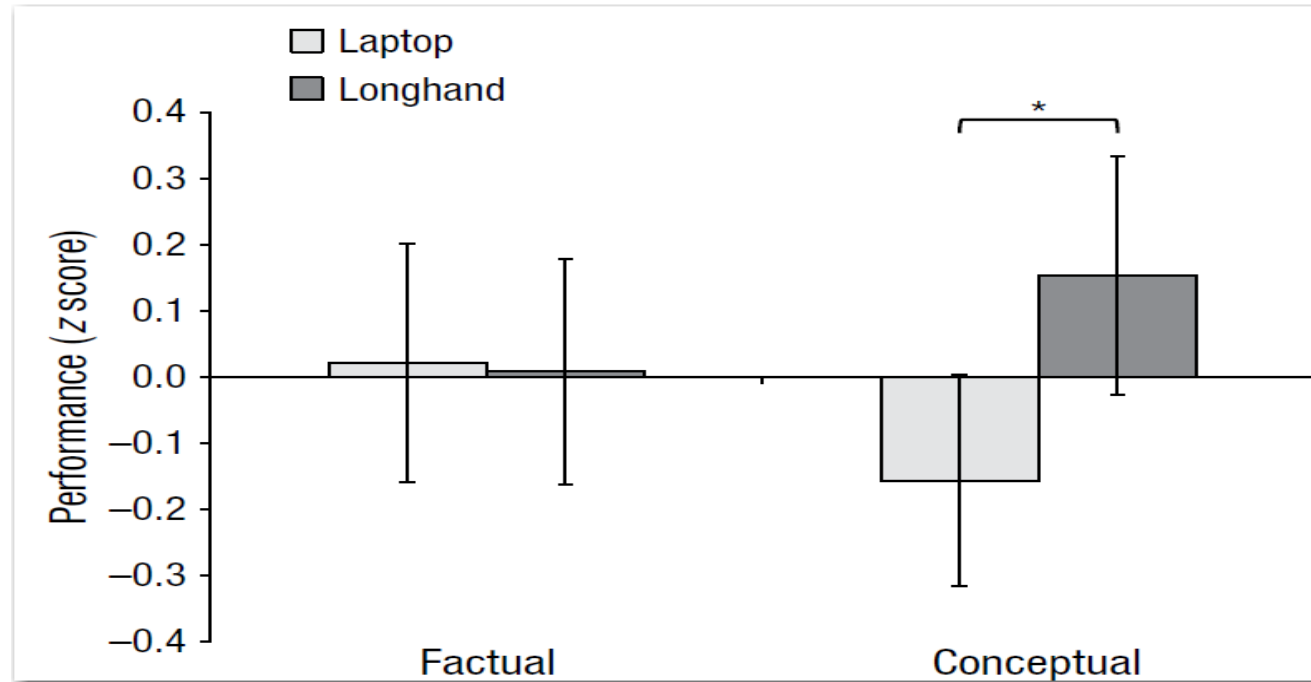
“...screens are more cognitively...taxing than paper...People consistently report that when they really want to focus...they read it on paper.”

Jabr F, Why the Brain Prefers Paper. *Scientific American* 2013, 49-53.

The Pen Is Mightier Than the Keyboard

Advantages of Longhand Over Laptop Note Taking

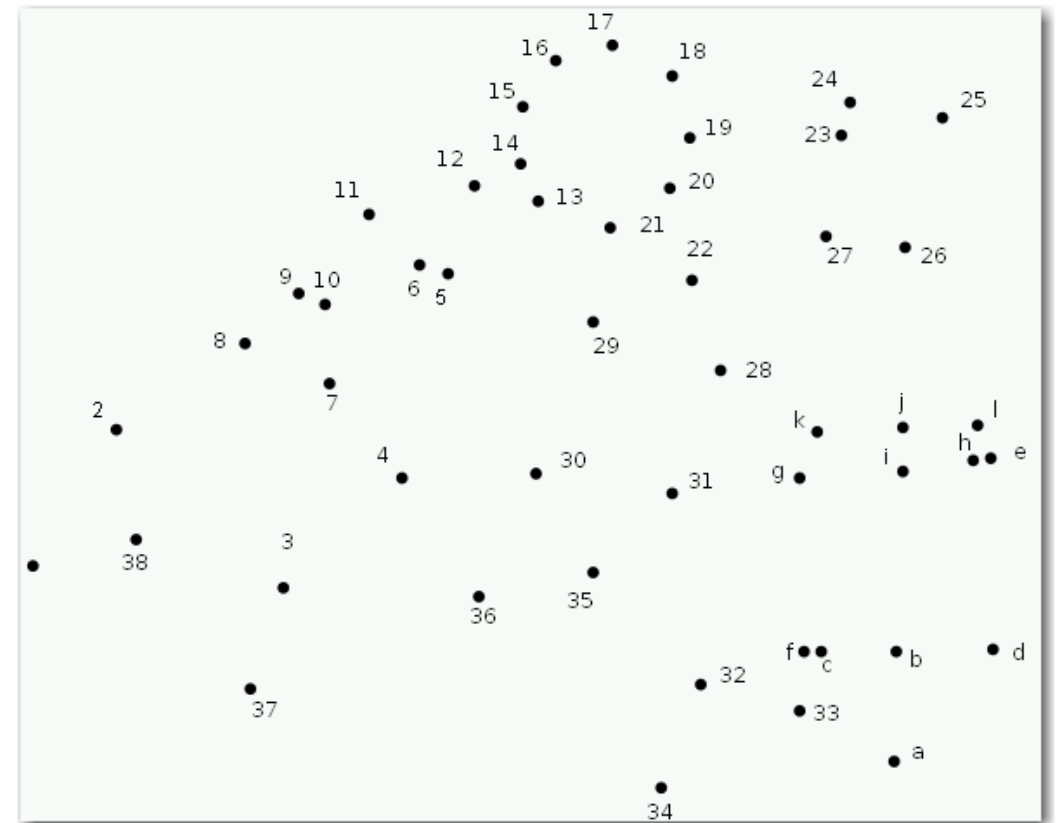
Keyboard recording “...results in shallower processing.” The “...tendency to transcribe ... verbatim rather than processing information and reframing it ...is detrimental to learning.”



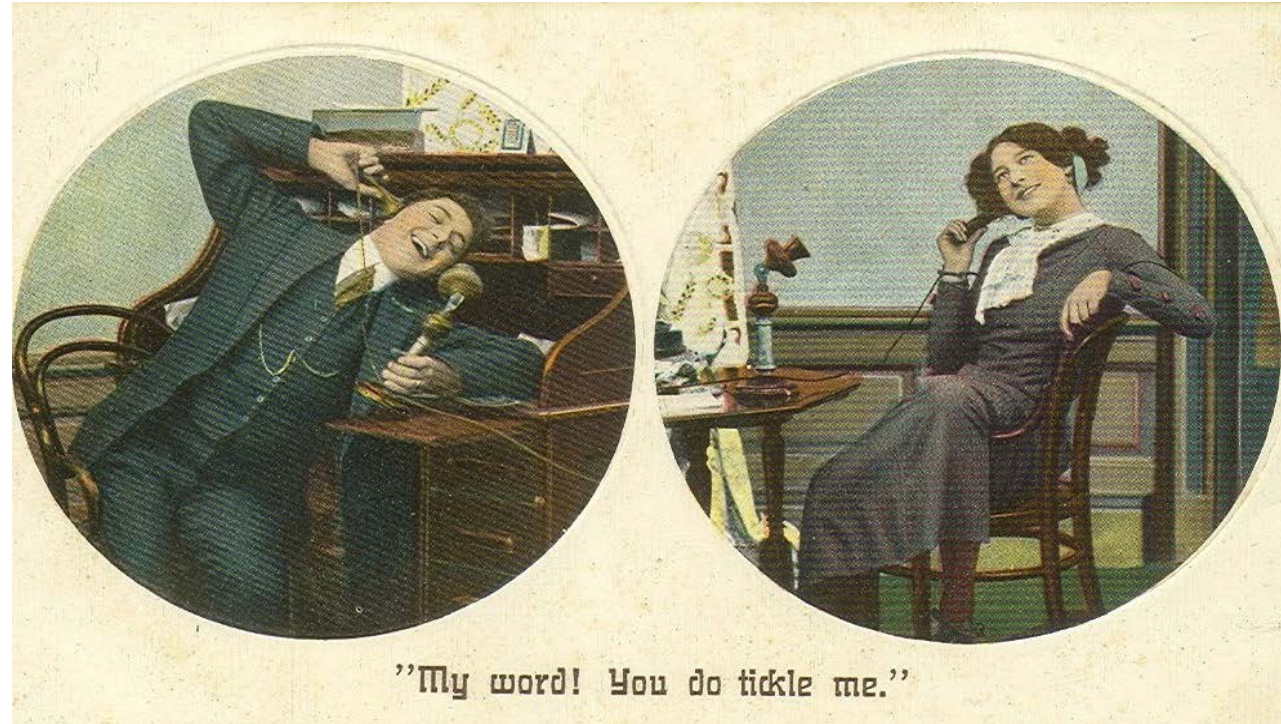
Muller PA, Oppenheimer DM. The Pen Is Mightier Than the Keyboard: Advantages of Longhand Over Laptop Note Taking. *Psychological Science* 2014 25: 1159-1168.

HF Can Guide How We Enter Information (Narrative is Important)

- To our own understanding
 - (“sense making”, establishing Situation Awareness)
- To our communications
 - To Others – who care for patients
- To our patients
- We “connect the dots” with our narrative.



HF Will Encourage “Synchronous Analogue Communication”



Better Clinical Outcomes – including less ER visits!

Mundt MP, Gilchrist VJ, Fleming JF, Zakletskaia LI, Tuan W-J, Beasley JW. Effects of Primary Care Team Social Networks on Quality of Care and Costs for Patients with Cardiovascular Disease. *Ann Fam Med* 2015;13:139-148

Hess DR, Tokarczyk A, O'Malley M, Gavaghan S, Sullivan J, Schmidt U. The value of adding a verbal report to written handoffs on early readmission following prolonged respiratory failure. *Chest*. Dec 2010;138(6):1475-1479.

HF Can Make the Case For Redesign to Support “Synchronous Analogue Communication”

- Encourage and support “Synchronous Analogue Communication” (i.e. talking with each other!)
 - Understanding is “...hampered by ...a presumption that the ... function of a handoff is one-way information transmission.”
 - There is a loss of “...co-construction of the understanding of the patient.”
 - Good care depends on accurate, succinct information.

Cohen MD, Hilligoss B, et al. A handoff is not a telegram: an understanding of the patient is co-constructed. *Critical Care*. 2012;6:303

HF Can Help Redesign Systems to Facilitate Team Care.

- A high-performing primary care team will have:
 - A stable team structure
 - Co-location of team members
 - Staffing ratios adequate to facilitate new roles
 - Efficient communication including team meetings, huddles, and minute-to-minute interactions
 - Less in-box stuff!
 - More rewarding dyadic conversations
 - Better team spirit

Ghorob A, Bodenheimer T. Building teams in primary care: A practical guide. *Families, Systems, & Health*, 2015; 33: 182-192. <http://dx.doi.org/10.1037/fsh0000120>

Sinsky, CA, Willard-Grace R, Schutzbank AM, Sinsky TA, Margolius D, Bodenheimer T. In search of joy in practice: a report of 23 high-functioning primary care practices. *Ann Fam Med*. 2013;11(3):272-278.

HF Encourages Dictation

“Some practices reported taking steps to address the causes of physician dissatisfaction with EHRs.

These steps were, most commonly, to allow multiple modes of data entry (including scribes and dictation with human transcriptionists) and to employ other staff members (e.g., flow managers) to help physicians focus their interactions with EHRs on activities truly requiring a physician’s training.”
(emphasis added)

Friedberg MW, Chen PG, Busum KR, et al. Factors Affecting Physician Professional Satisfaction and Their Implications for Patient Care, Health Systems, and Health Policy. Rand Corporation, 2013.

http://www.rand.org/content/dam/rand/pubs/research_reports/RR400/RR439/RAND_RR439.pdf



Beasley JW, Danford C. Video on dictating in the presence of the patient. <https://www.youtube.com/watch?v=KGHEdv0XGpE>
(Or Google: "Beasley Dictating")

My thanks to Mrs. C. who put up with me for 36 years!

HF Can Help Maintain Patient Engagement

- Clinicians rated as less effective when they spent more time looking at the computer and when there were more periods of silence in the consultation.
- Clinicians benefit from using communication strategies that maintain the flow of conversation when working with the computer
- Remember: Phys Gaze Computer = Patient Gaze Other

Street R, Liu L, Farber NJ, et al. Provider interaction with the electronic health record: the effects on patient-centered communication in medical encounters. *Patient Educ Couns*. 2014;96:315-9. doi: 10.1016/j.pec.2014.05.004. Epub 2014 May 14.

Montague E, Xu J, Asan O, Chewning B, Barrett B. Modeling Eye Gaze Patterns in Clinician-Patient Interaction with Lag Sequential Analysis. *Hum Factors*. Oct 2011; 53(5): 502–516.

Farber NJ, Liu L, Chen Y, et al. EHR Use and Patient Satisfaction. *JFP* 2015;64:687-695

HF Can Help Redesign Bring Lean Thinking to Physician Work

“Lean thinking begins with driving out waste so that all work adds value...” (Institute for Healthcare Improvement). **One type of waste to be reduced is the waste of physician time and attention.** There are several strategies that should be used to reduce this waste. Reasonable estimates of possible waste reduction include the following (with some overlap and based on an assumed 5-day work week):

Waste Reduction Strategies:

- Transcription with human assistance

 - Save 6 hours, 15 minutes each week

- Paper/verbal order entry

 - Save 3 hours, 20 minutes each week

- Automatic log-ins

 - Save 1 hour, 15 minutes each week

Ten hours and 50 minutes saved each week (over 2 hours per work day), and more with clinical coaches (scribes) and co-location of staff.

(Estimates from John w. Beasley, MD, Christine Sinsky, MD, Tom Sinsky, MD and Phil Bain, MD, James Jerzak, MD)

HF Can Protect our Young Physicians



- They think it's reasonable...
 - To have to type during patient care
 - To use templates
 - To get lots of in-box stuff
 - To do clerical Work After Clinic hours (WAC!)
 - To be distracted from patients
 - To have minimal team culture

We are responsible for how we use technology

“My patient notes have always been ***communications with myself*** and a message in a bottle to my partners. I wanted to remember the things that stirred and touched me as well as the size of lesions...” (emphasis added)

“The Rollout of the EHR...will require that we use templates as much as possible.”

Frey JJ. At a Loss for Words. In: A piece of my mind. JAMA 2007; 297:1751-1752



I-PrACTISE

Improving PrimARy Care Through
Industrial and Systems Engineering

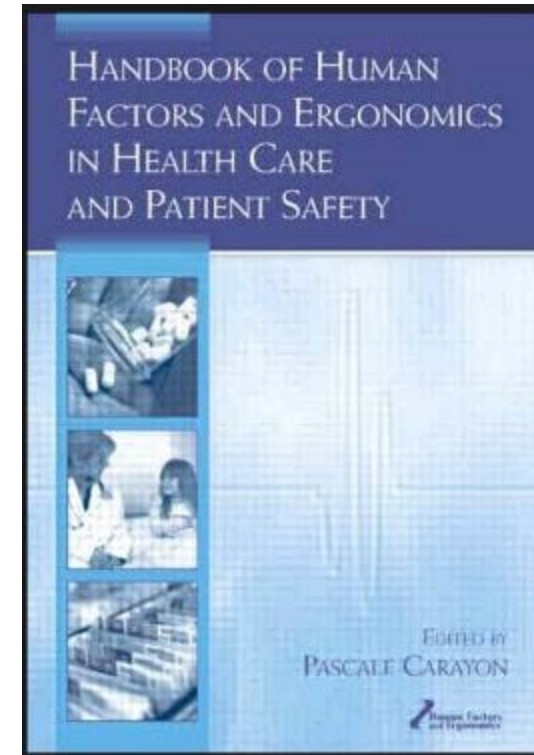
<https://www.fammed.wisc.edu/i-practise>

Information Chaos in Primary Care: Implications for Physician Performance and Patient Safety

*John W. Beasley, MD, Tosha B. Wetterneck, MD, MS, Jon Temte, MD, PhD,
Jamie A. Lapin, MS, Paul Smith, MD, A. Joy Rivera-Rodriguez, PhD, and
Ben-Tzion Karsh, PhD*

Development of a primary care physician task list to evaluate clinic visit workflow

Tosha B Wetterneck,^{1,2,3} Jamie A Lapin,^{2,4} Daniel J Krueger,^{2,4} G Talley Holman,⁵
John W Beasley,⁶ Ben-Tzion Karsh^{2,3,4,6}



Employed Family Physician Satisfaction and Commitment to Their Practice, Work Group, and Health Care Organization

Ben-Tzion Karsh, John W. Beasley, and Roger L. Brown

How Many Problems Do Family Physicians Manage at Each Encounter? A WReN Study

The Myth of Workflow in Primary Care: Implications for Health IT. Jamia, 2015

Quality of Work Life of Independent vs Employed Family Physicians in Wisconsin: A WReN Study