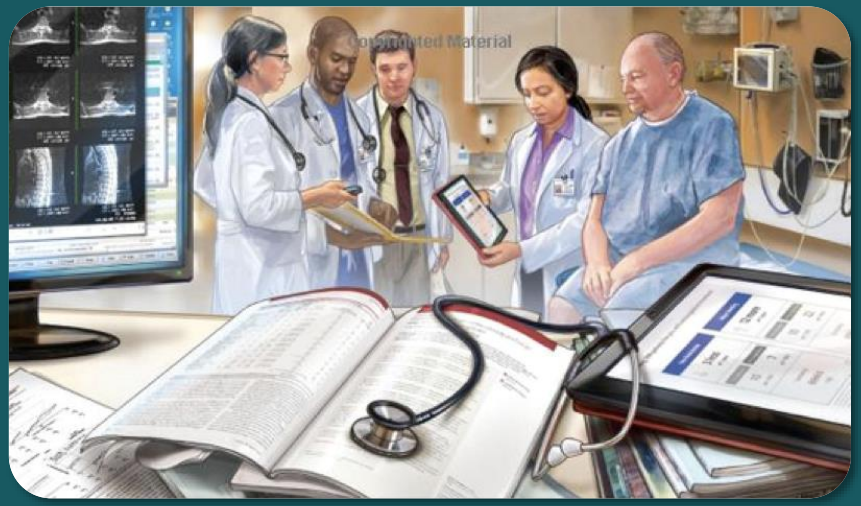
Clinical decision support systems: too many expectations, too little evidence?

Problems and emerging solutions, through an EBHC lens



Per Olav Vandvik, on behalf of wonderful colleagues, for Sicily November 8 2019

Declaration of interests: Head of MAGIC Evidence Ecosystem foundation, hosting MAGICapp and BMJ RapidRecs

Imagine John, just hospitalized in Oslo with high risk TIA

59 yrs stressed engineer, acute dizzy with weak left arm and leg 8 hours

How make sure John gets **the right treatment, at the right time** in 2019?

Cite this as: *BMJ* 2018;363:k5130

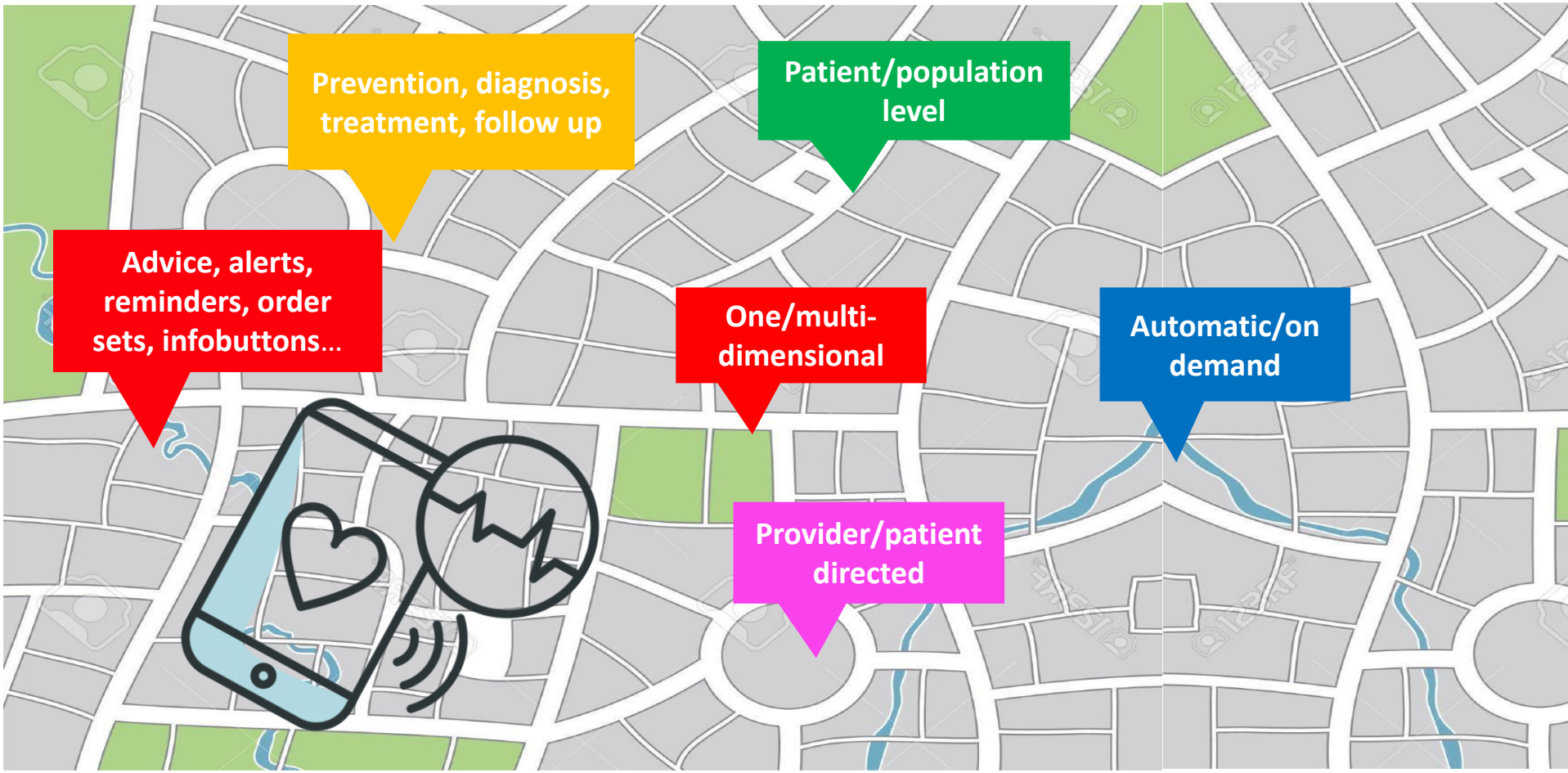
Recommendation 1: Dual vs single antiplatelet therapy

See patient decision aids MAGIC app

Clinical decision support system (CDS), one definition:

" Tools that incorporate established clinical knowledge and updated patient information to enhance patient care; they encompass an array of strategies supporting a variety of topics" **(NIH)**

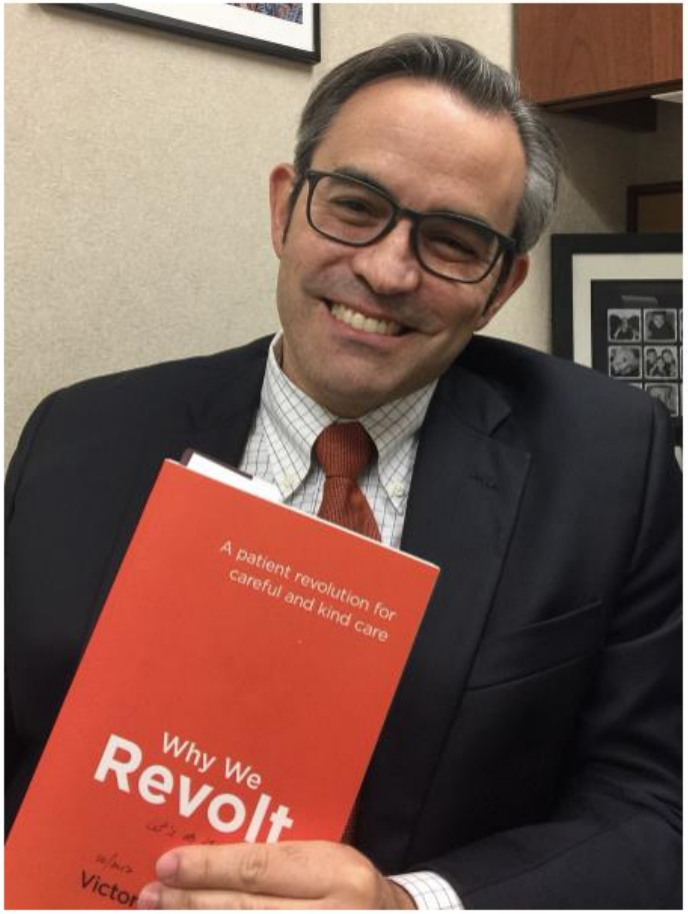
CDS - A GPS on the learning healthcare system highway



Problems with CDS in Electronic Health Records (EHRs)

EHRs designed for what purpose? To care for our patients? For EBHC?

CDS: 40+ years of huge investments, great promise + **too many expectations?**



"We just got an EHR in my hospital. I love it! For the first time I can understand the patient-notes from my colleagues"

Gordon Guyatt (anecdotal evidence;-)

CDS over 40 years – No evidence of progress

No clear learning curve, despite modern CMS (Roshanov BMJ 2013)

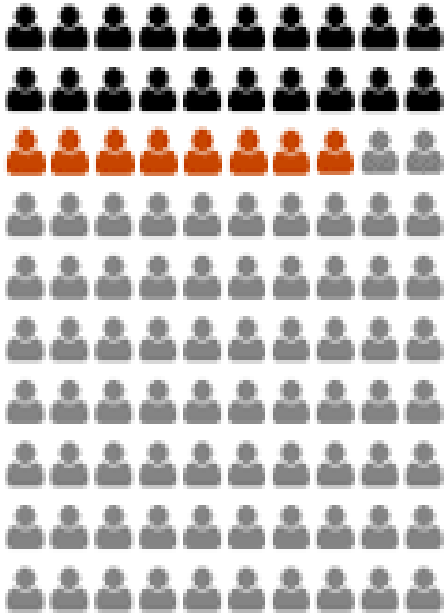
Annals of Internal Medicine | REVIEW

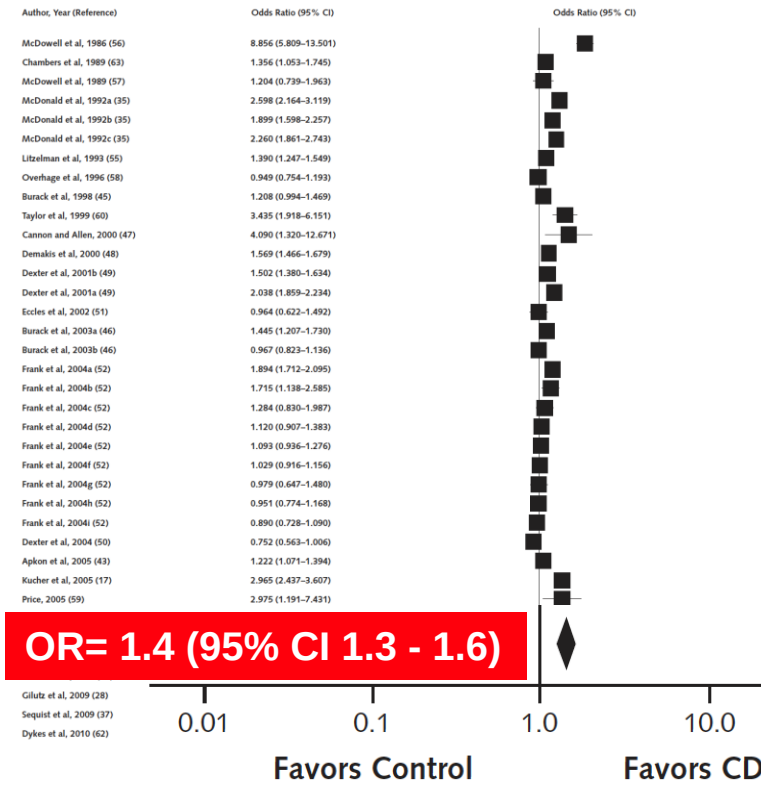
Effect of Clinical Decision-Support Systems

A Systematic Review

Tiffani J. Bright, PhD; Anthony Wong, MTech; Ravi Dhurjati, PhD; Erin Bristow, BA; Lori Bastian, MD, MS; Remy R. Coeytaux, MD, PhD; Gregory Samsa, PhD; Vic Hasselblad, PhD; John W. Williams, MD, MHS; Michael D. Musty, BA; Liz Wing, MA; Amy S. Kendrick, RN, MSN; Gillian D. Sanders, PhD; and David Lobach, MD, PhD

Effect of CDS on adherence		
8 more		
no CDS	with CDS	
20 per 100	**28** per 100	
Certainty		
HIGH		



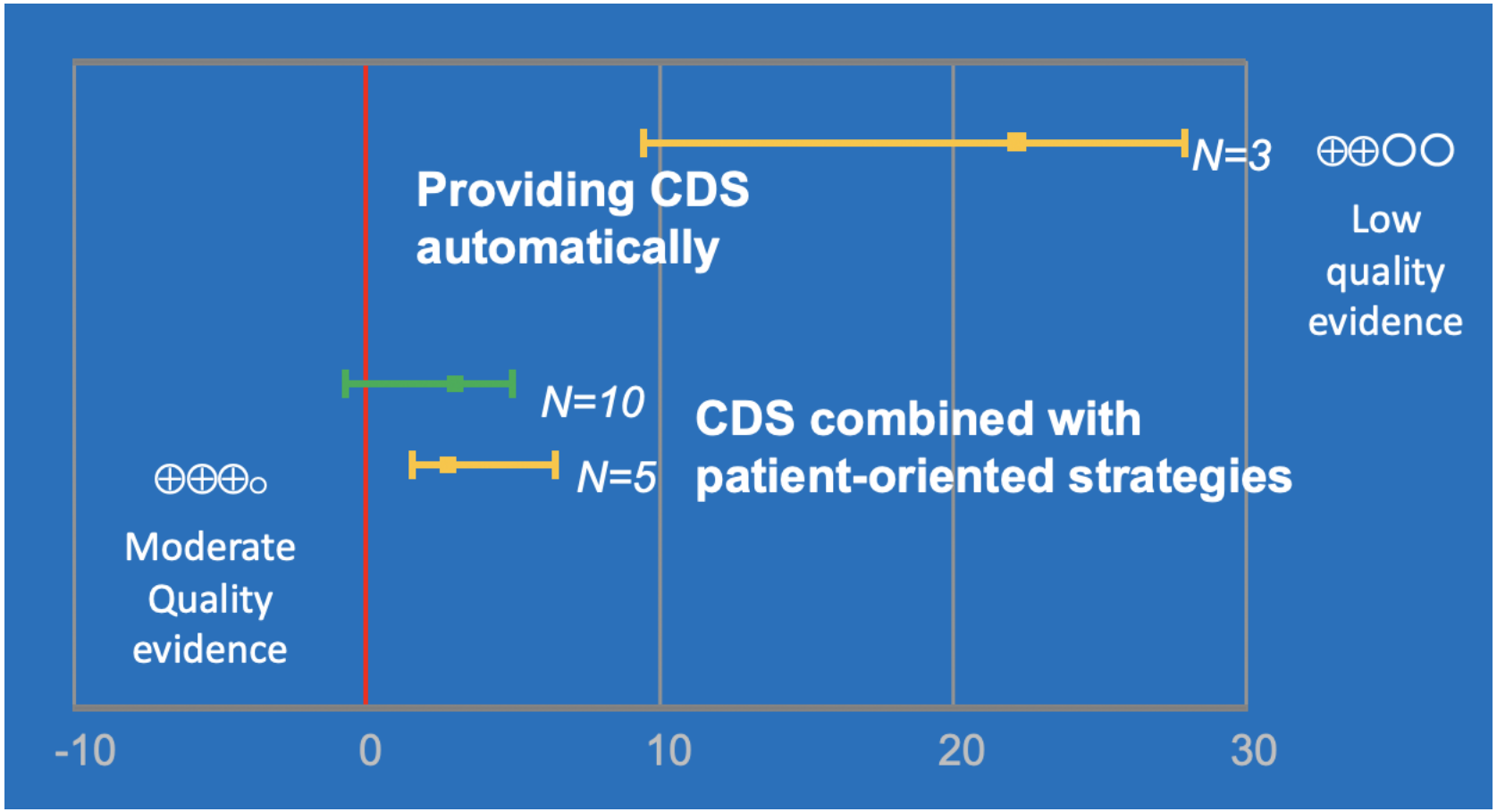


CDS interventions that work: Variable and uncertain effects

66 trials: Mostly low certainty evidence across 14 factors

Van de Velde *et al. Implementation Science* (2018) 13:114
https://doi.org/10.1186/s13012-018-0790-1

Implementation Science



How can CDS go wrong? Killer features

The 4000 clicks a day problem Hill, Am J Emerg Med 2013

Physicians spend more time on computer than with patients

Attention theft Alsos, Stud Health Technol Inform 2008

Inappropriately shifting focus of consultation

Automation bias Goddard, J Am Med Inform Assoc. 2012

Negatively influenced treatment plan through inaccurate CDS

Too much – too late situation Hayward, J Am Med Inform Assoc 2013

Fatigue alerts and CDS available too late in the workflow

Too many expectations? YES! Too little evidence?

Best current evidence: disappointing effects and unintended consequences

Time to give it up?

Any emerging solutions?

Let us breathe and (literally) step back for a few minutes

Key problems with evidence, beyond CDS

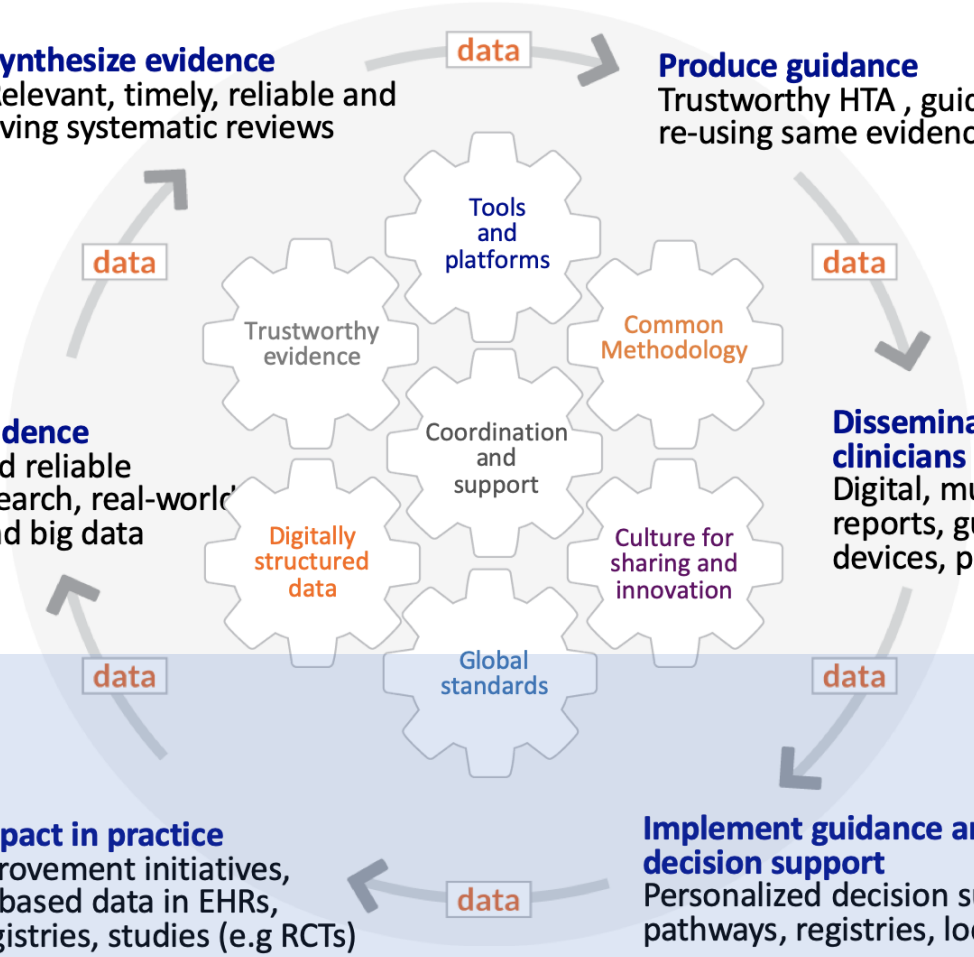
Medical informatics just one siloed community, among others

HIMSS20

International Forum on QUALITY & SAFETY in HEALTHCARE Paris 2014

Progress in evidence-based medicine: a quarter century on

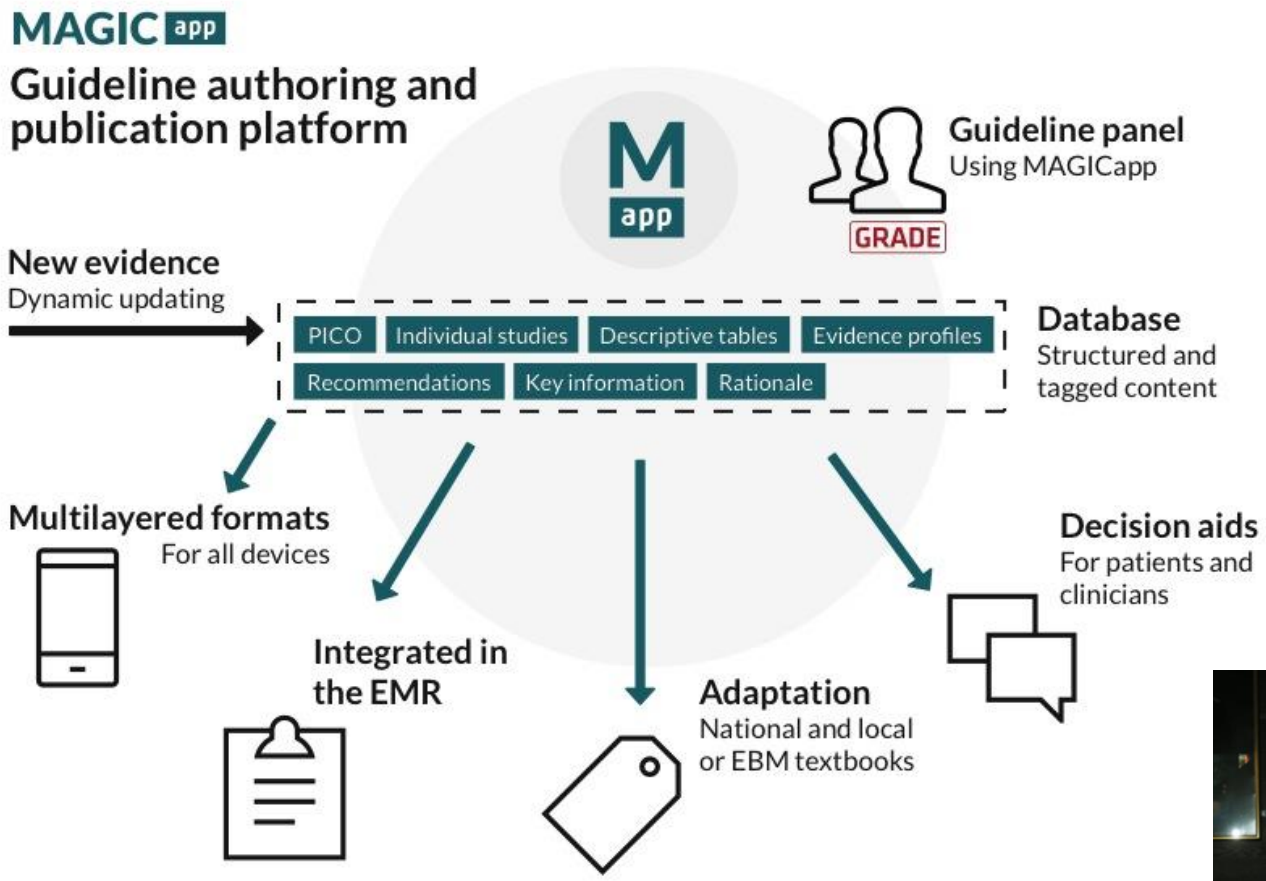
Benjamin Djulbegovic, Gordon H Guyatt



MAGIC app

CDS through trustworthy and computable recommendations

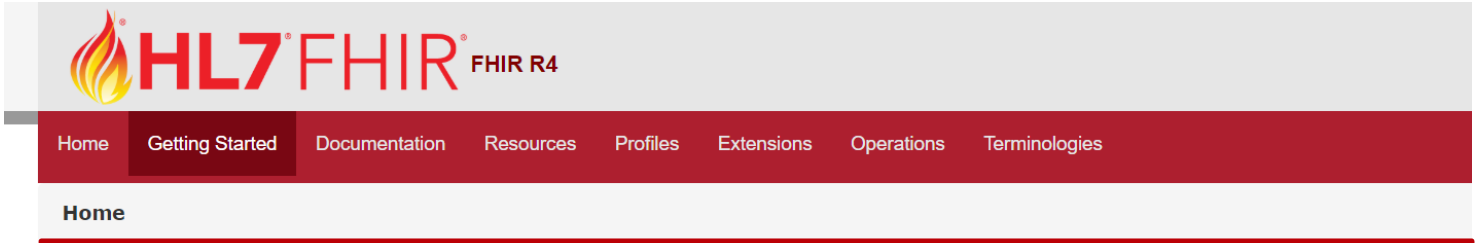
being the entities, moving away from flat formats (e.g. PDFs) to be chopped up in CDS



www.magicapp.org)

Some emerging solutions lending promise for CDS in EHRs

1. How to access and exchange patient data?

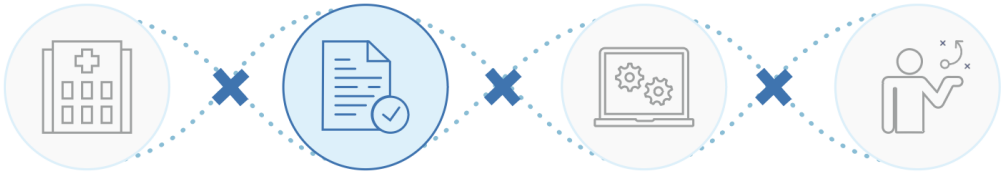


FHIR: Fast Healthcare Interoperability Resources

- International standard for accessing patient data from EHRs and other repositories
- EBM on FHIR, CPG on FHIR under development
- Allows sharing of data between systematic reviews, guidelines, CDS in the EHR ++, through interoperable platforms (e.g. Covidence, Revman, MAGICapp, EBMeDS)

2. Systematic implementation of guidelines with CDS

GUIDES based on best current evidence on what works



THE CONTENT PROVIDES TRUSTWORTHY EVIDENCE-BASED INFORMATION

2.1 domain 2

Rationale

CDS-guided decisions about diagnosis, prevention, treatment and follow-up must be based on the best current evidence available, typically from clinical practice guidelines that meet standards of trustworthiness.[79] It is important that CDS decision support is clear about the benefits and harms of the management options available, the certainty of the evidence, the importance of the outcomes for patients, and the acceptability and feasibility of the intervention.[79, 80]

Providing such information can help healthcare providers and patients to make better-informed healthcare decisions, and helps them to critically

How to evaluate

Consider the following questions:

- Do the organisation(s) and people that developed the decision support have credibility?
- Is the advice supported by up-to-date scientific evidence and is the type and quality of this evidence clear to the user?
- Is the decision support clear on the benefits and harms of the different management options?

Examples

Positive examples could include:

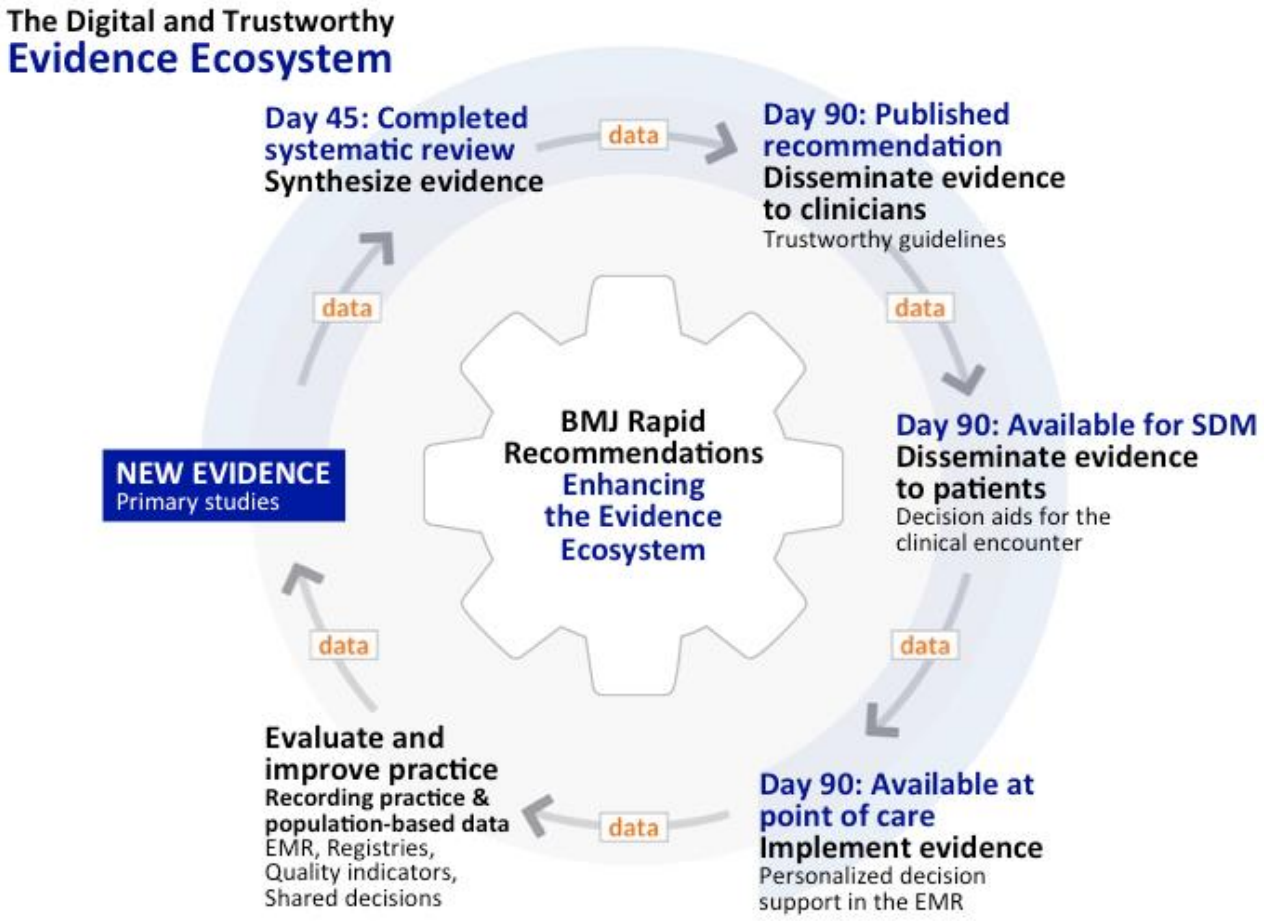
- An expert panel is developing the decision support using trustworthy guidelines and a comprehensive review of the available evidence. Formal methods are helping the panel to reach consensus.
- The decision support is backed up by detailed recommendations that clearly communicate the strength of the recommendations and the balance between the desirable and undesirable effects of adherence to the management options.
- The methods to develop and update the decision support are explicitly described and

Enabling CDS context | Appropriate CDS content | Effective CDS system | Effective CDS implementation

3. Trustworthy and computable guidelines plugged into CDS ++

BMJ Rapid Recommendations feeding the evidence ecosystem

How can John with high risk TIA get the right treatment at the right time?.....



Trustworthy, accessible and timely guidelines and decision aids

in innovative, multilayered formats disseminated globally for downstream use

Computable recommendations in MAGICapp allows plugging into EHRs as CDS

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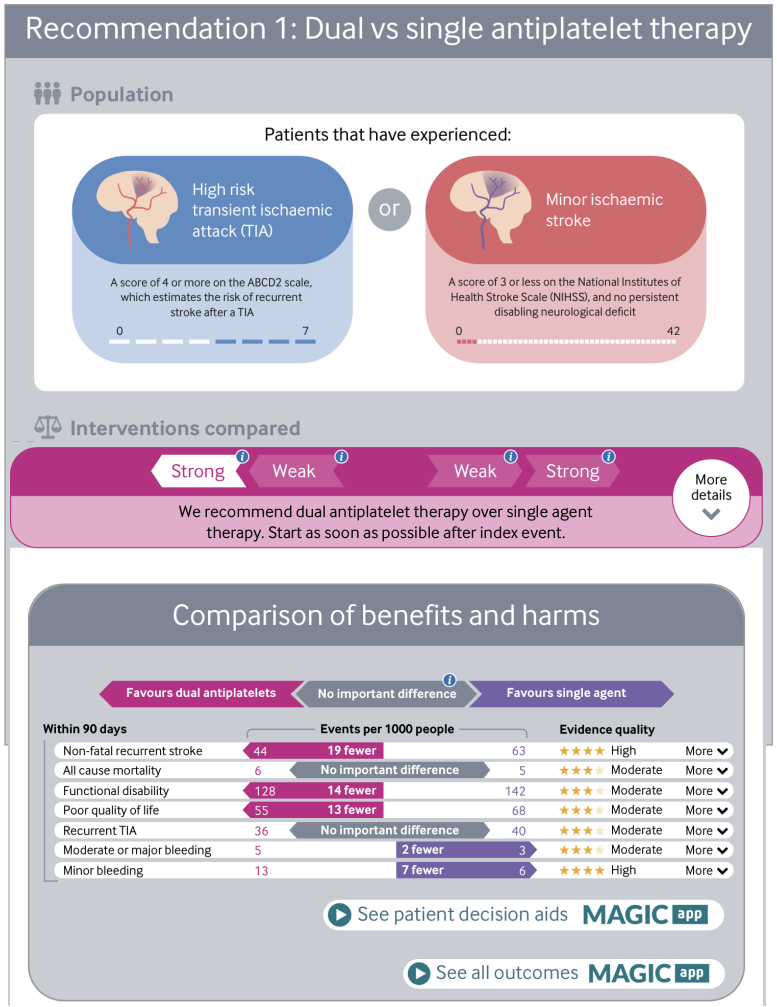
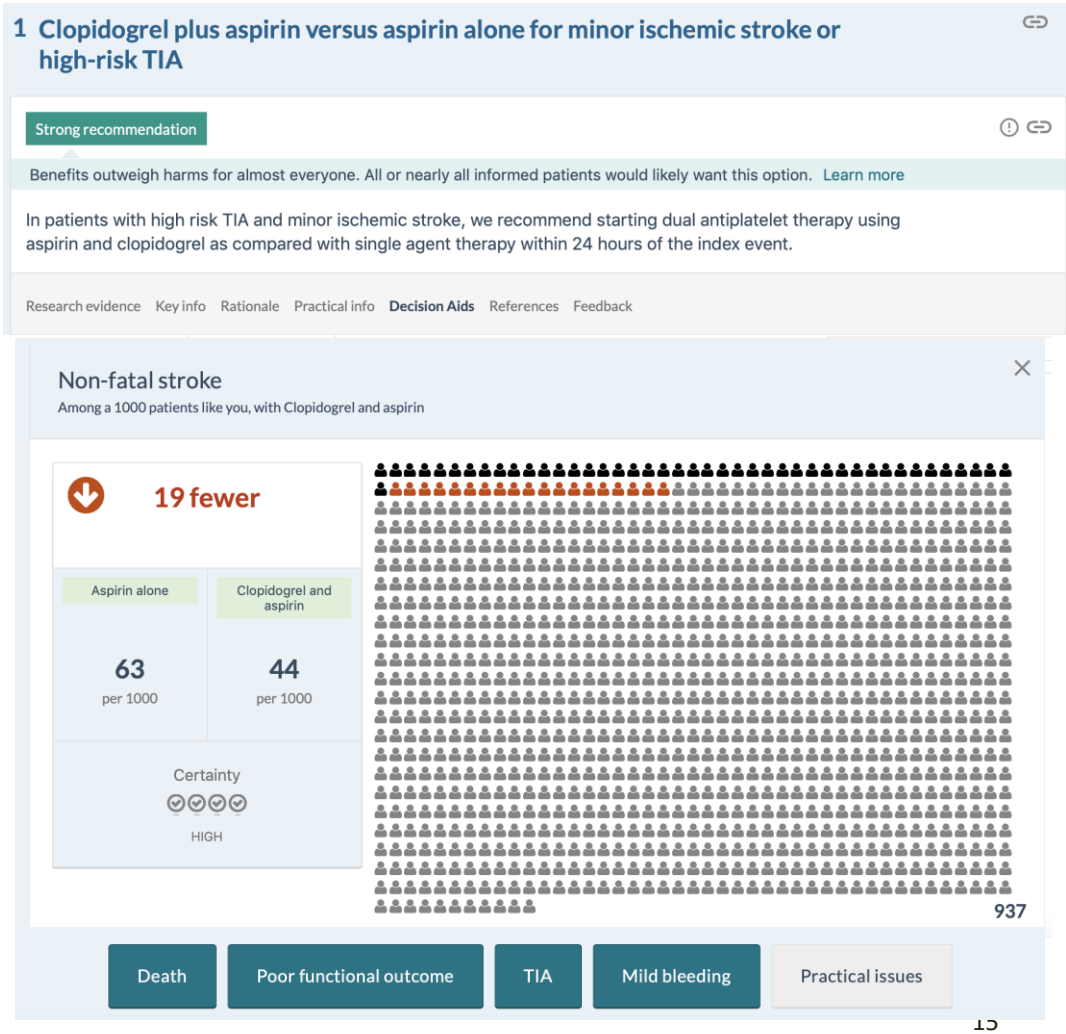
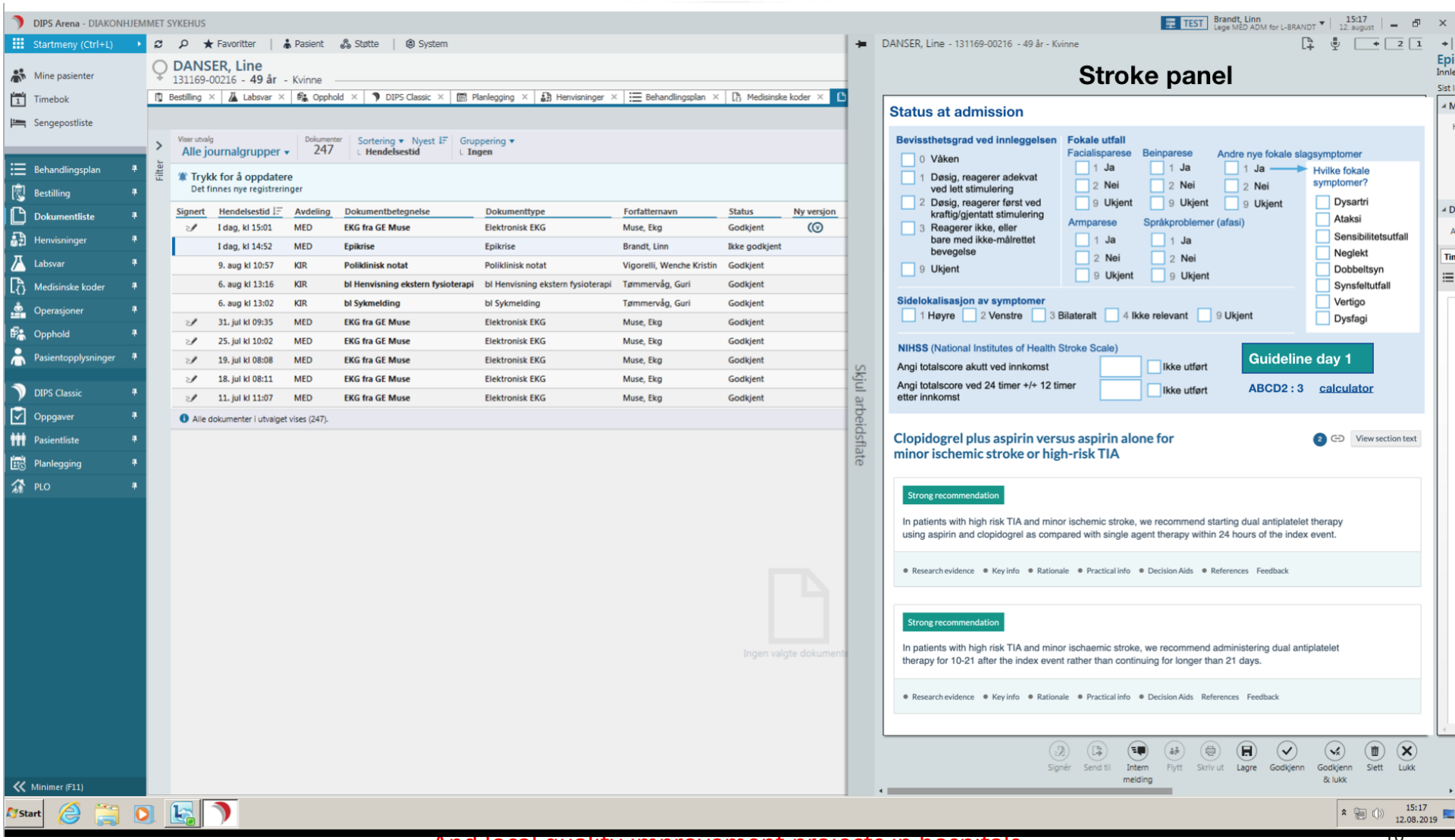




Computable evidence plugged into practice

National guidelines, CDS (in combined pathway and registry) and other tools



And local quality improvement projects in hospitals

4. CDS for guideline implementation (EBMeDS)

Individualized approach, health impact of recommended actions

Patient data integrated with medical knowledge in structured EHRs

Healthcare GPS Dashboard

Change Patient Data (Predicted Cardiovascular Risk)

Change Patient Values (Relative Importance of Outcomes)

Expand All

Health Improvement Opportunities	Health Impact			
Stop smoking	7.2	Expand	Detailed view	
Start statin	3.6	Expand	Detailed view	
Start antihypertensive medication	3.3	Collapse	Detailed view	
Reduces risk of heart attack or stroke by **5.2%**	with a Relative Importance of **80**	contributes a Health Impact gain of **4.1**.		
Side effects (e.g., dizziness, fatigue, passing out) in **7.0%**	with a Relative Importance of **12**	contributes a Health Impact loss of **0.8**.		
Get physically active	2.9	Expand	Detailed view	
Start aspirin	1.4	Expand	Detailed view	

Linked to decision aids and integrated care plans for patient choices

4. CDS through the Health Benefit Analysis Suite (EBMeDS)

Population health approach

Analyze care gaps, prioritize and treat patients with most benefit

Case study Finland primary care: 17427 patients, structured EHR data into CDS

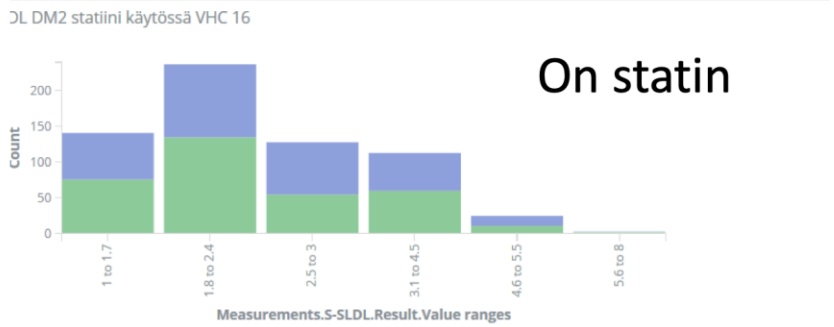
Type 2 diabetes: LDL cholesterol and statin medication - is statin medication cost-effective in my group practice?

N = 389
(care gap)

Number of patients with type 2 diabetes

1,312

Count



Starting statin medication for 389 people with type 2 diabetes would prevent

- 3 deaths
- 11 strokes
- 8 myocardial infarctions in 10 years

= 12.5 death equivalents (adjusting for importance of outcomes)

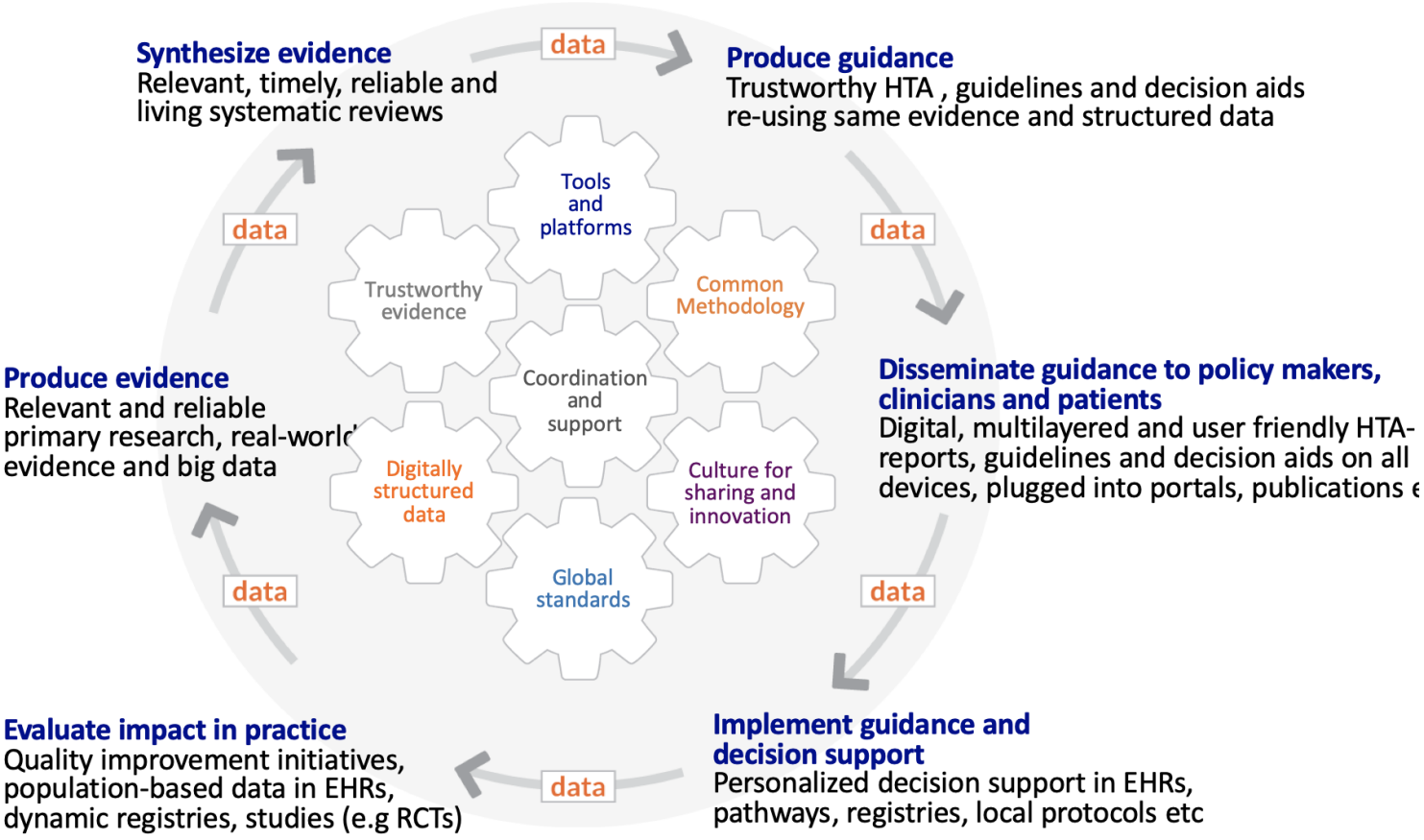
12.5 deaths are avoided for an average of 5 years = 62.5 QALY
Cost of statin for 10 years 160 000 – 300 000 €
Cost per QALY (if only drug cost considered) = 2500 – 5000 €.

In high-income countries, cost per QALY up to 80 000 € is considered acceptable

5. Countries realize need for new infrastructure and orchestration

CDS in a learning health system, key actors lining up in the US right now

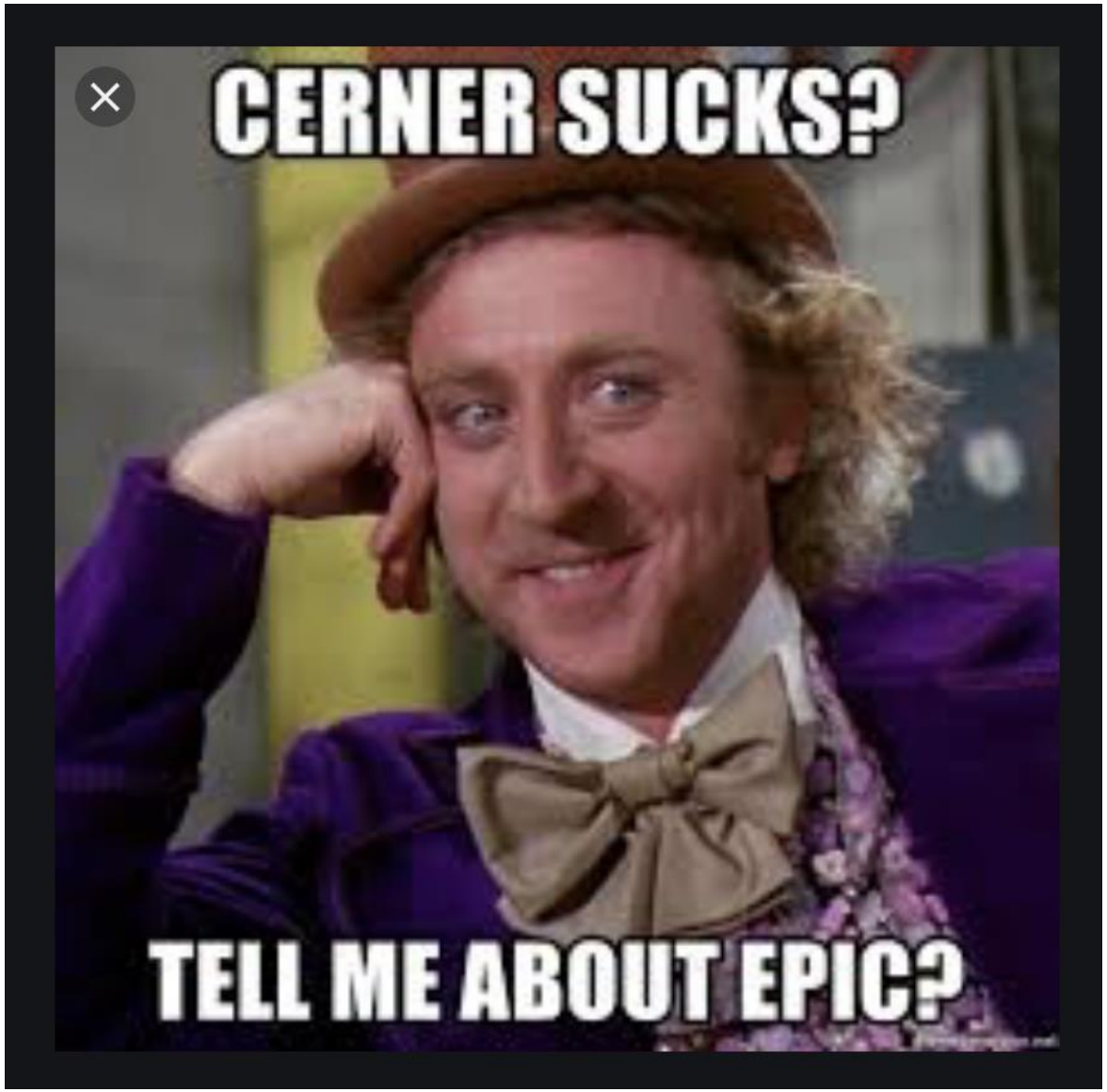
International focus, trustworthy guidance, aligned Evidence Ecosystem vision



Warrants that actors can explicitly agree on and make use of specific:

Standards | Methods | Platforms | Processes

New expectations and more unintended consequences for CDS?

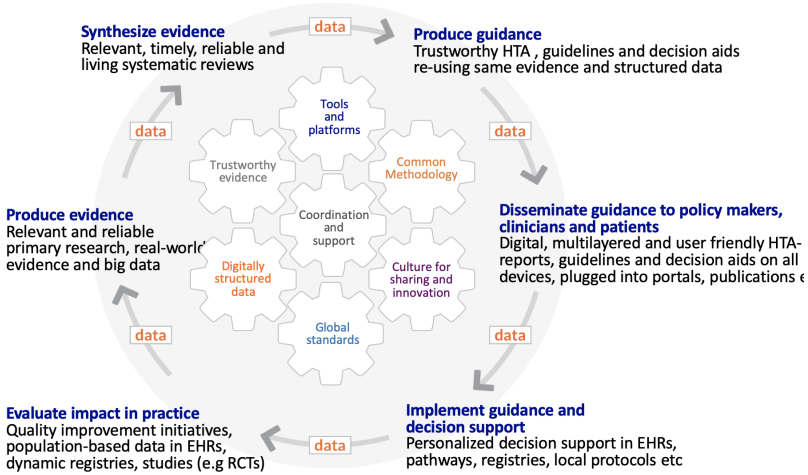


Take home messages on CDS, through an EBHC lens

- Too many expectations? Yes!
- Too little evidence? Limited benefits/ unintended consequences so far
- Problems with CDS but exciting times

- Emerging solutions for CDS, through advances for EBHC, guidelines and eHealth. Too little evidence here….

- Trustworthy, living CDS fully linked into the evidence ecosystem: Wouldn´t that be great?
- EBHC folks hook up with medical informatics folks to get it right?



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www.magicproject.org www.magicapp.org

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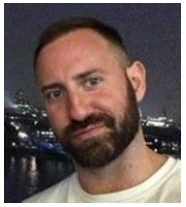

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