

HIMSS Europe CIO Summit

Presented by

HIMSS Analytics Europe

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MD, PhD, Editor-in-Chief

Disclosure: I am a salaried employee of Duodecim Medical Publications Ltd., the company that develops and licenses EBM Guidelines and the EBMeDS decision support service.

Decision support tools in clinical practice – topics of the presentation

- What makes electronic health records CDS-friendly
- What clinicians want
- How to make guidelines actionable via clinical decision support

What clinicians want?

- Summary of essential patient data
- Reminders that really improve patient safety
- Automation of routine work – saving time
- Support to make better clinical decisions

Definition of clinical decision support (CDS)

- Providing health care professionals and citizens **person-specific information and guidance based on data in electronic health records or personal health records**
- Example:

The patient has asthma and is using a non-selective beta-blocker – switch to selective beta-blocker [which has fewer adverse effects]

Research Paper ■

Clinical Decision Support Capabilities of Commercially-available Clinical Information Systems

ADAM WRIGHT, PhD, DEAN F. SITTIG, PhD, JOAN S. ASH, PhD, SAPNA SHARMA, MBI,
JUSTINE E. PANG, BLACKFORD MIDDLETON, MD, MPH, MSc

Abstract **Background:** The most effective decision support systems are integrated with clinical information systems, such as inpatient and outpatient electronic health records (EHRs) and computerized provider order entry (CPOE) systems.

Purpose: The goal of this project was to describe and quantify the results of a study of decision support capabilities in Certification Commission for Health Information Technology (CCHIT) certified electronic health record systems.

Methods: The authors conducted a series of interviews with representatives of nine commercially available clinical information systems, evaluating their capabilities against 42 different clinical decision support features.

Results: Six of the nine reviewed systems offered all the applicable event-driven, action-oriented, real-time clinical decision support triggers required for initiating clinical decision support interventions. Five of the nine systems could access all the patient-specific data items identified as necessary. Six of the nine systems supported all the intervention types identified as necessary to allow clinical information systems to tailor their interventions based on the severity of the clinical situation and the user's workflow. Only one system supported all the offered choices identified as key to allowing physicians to take action directly from within the alert.

Discussion: The principal finding relates to system-by-system variability. The best system in our analysis had only a single missing feature (from 42 total) while the worst had eighteen. This dramatic variability in CDS capability among commercially available systems was unexpected and is a cause for concern.

Conclusions: These findings have implications for four distinct constituencies: purchasers of clinical information systems, developers of clinical decision support, vendors of clinical information systems and certification bodies.

■ J Am Med Inform Assoc. 2009;16:637-644. DOI 10.1197/jamia.M3111.

Choices offered by the CDS system

Write order

Defer warning

Override rule/keep order

Cancel existing order

Cancel current order

Edit current order

Edit existing order

Set allergies

Write letter

Write note

Edit problem list

Enter weight, height, or age

Only 1 out of 9
existing US systems
was able to offer all
the choices

Essential patient data

- Problem list (diagnoses)
- Medication list
- Test results and measurements
- Risk factors (e.g. smoking)
- Procedures
- Treatment plan

in standardized, coded format

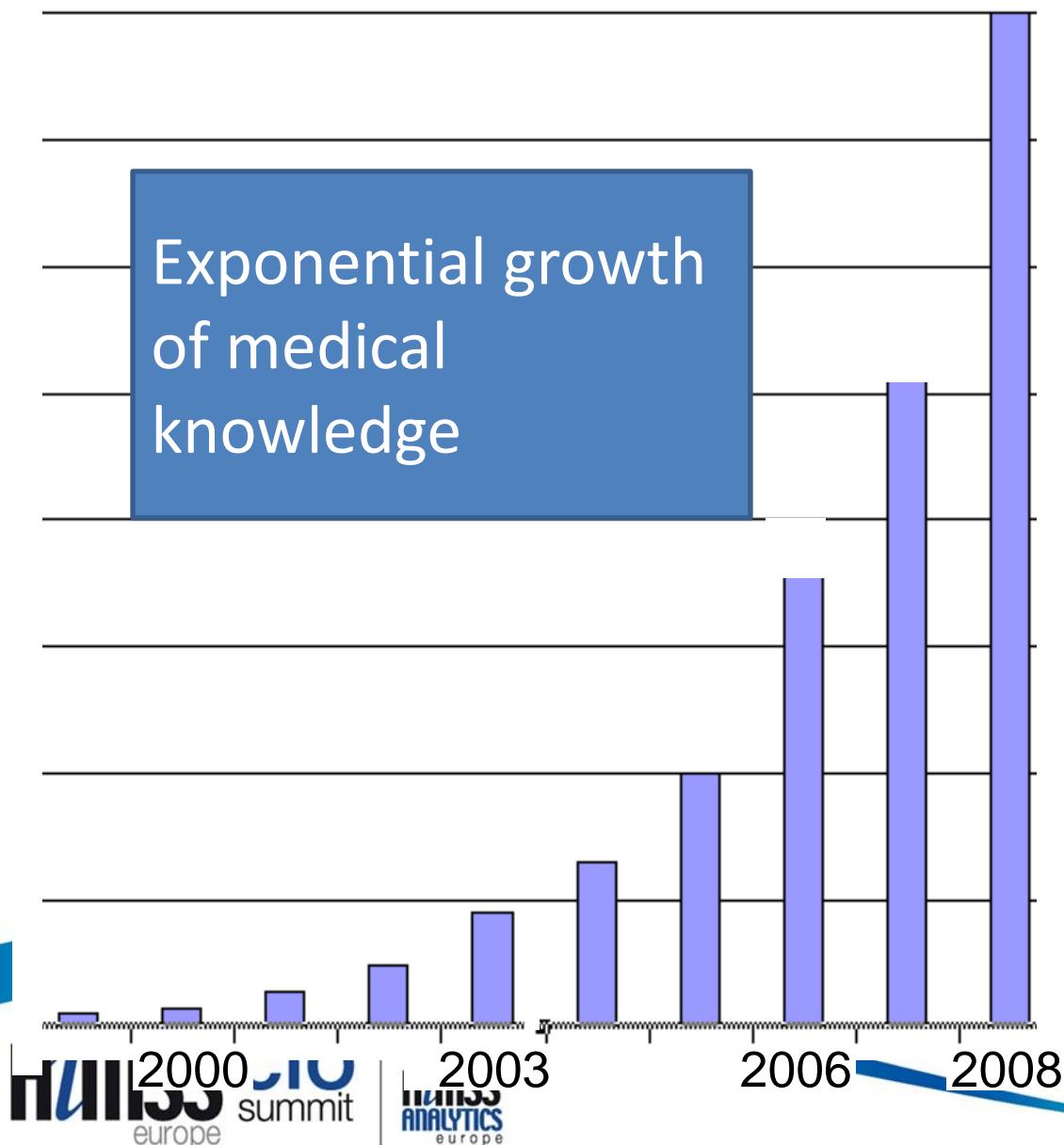
Essential patient data

- Problem list (diagnoses)
- Medication list
- Test results and measurements
- Risk factors (e.g. smoking)
- Procedures
- Treatment plan

Only one version for one patient

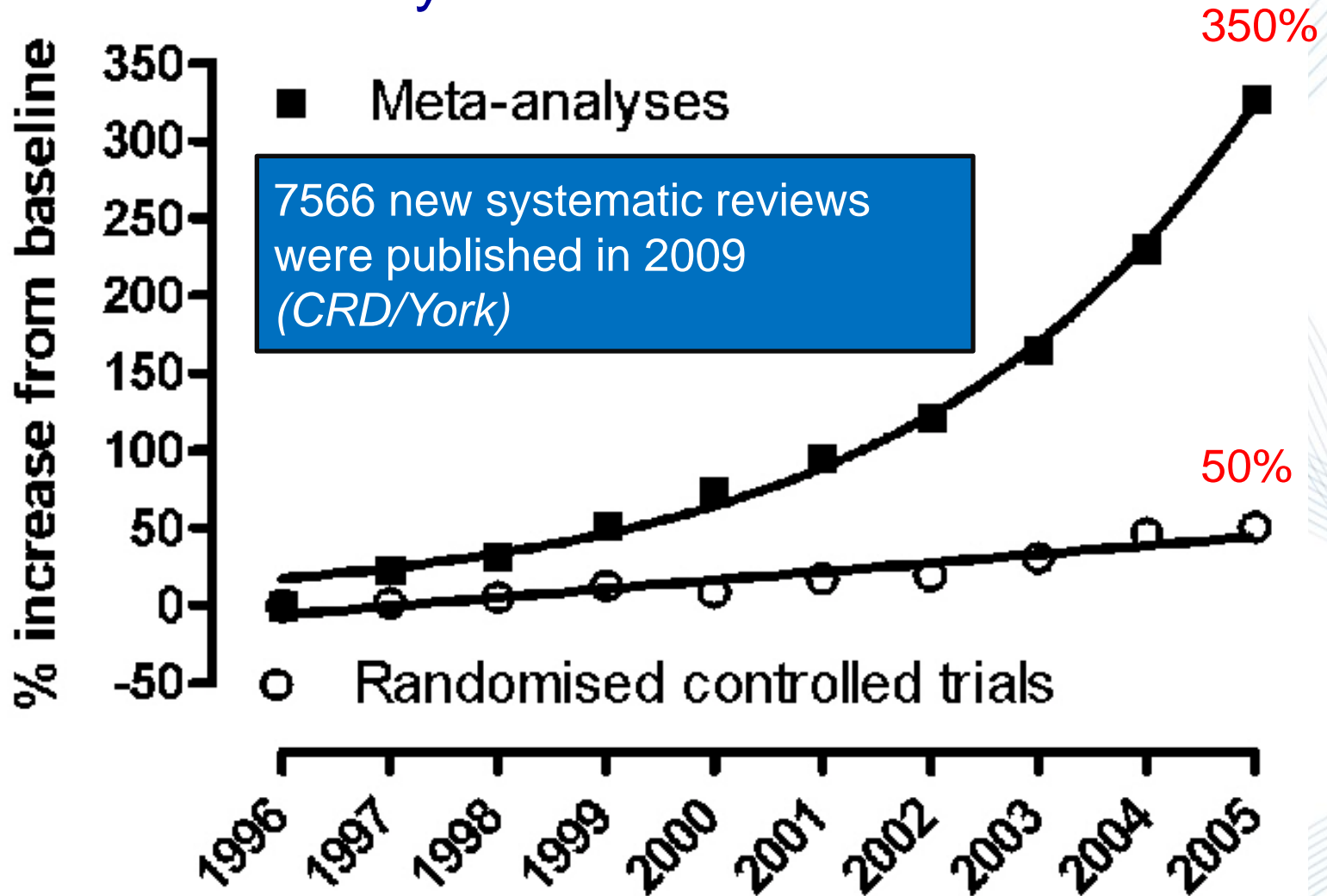
GenBank contents: 80 billion = 80 000 000 000 base pairs in 2008

<http://www.ncbi.nlm.nih.gov/Genbank/>



The doubling rate of genome data is 18 months

Increase (%) in the number of published RCTs and meta-analyses



Translation time

- Translation of ~500 **reminders** takes about 45 hours
- ...while the translation of **full guidelines** takes one year.

Example of a multilingual CDS tool
that can be integrated with any
electronic health record

[Demo website of EBMeDS](#)

EBMeDS – Context-Sensitive Guidance at the Point of Care

Basic Patient Information

Name:

Gender: Female Male

Date of birth:

Smoking: Not known No Yes Finished

Patient data analyzed

Measurements +

Measurement	Code	Value	Unit	Date	Ordered
Height	8302-2	70	in	2011-06-21	<input type="checkbox"/>
Weight	29463-7	165	lbs	2011-06-21	<input type="checkbox"/>
Total cholesterol	2093-3	245	mg/dL	2011-06-21	<input type="checkbox"/>
HDL cholesterol	2085-9	31	mg/dL	2011-06-21	<input type="checkbox"/>
Triglycerides	2571-8	165	mg/dL	2011-06-21	<input type="checkbox"/>
UARC	1459-1	20	mg/mmol	2011-06-21	<input type="checkbox"/>

Medication +

Reminders

- This patient has cardiovascular disease and an LDL-cholesterol concentration (181 mg/dL) above the target value - the target value is below 100 mg/dL, and the optimal value is below 80 mg/dL.
- The patient has type 1 diabetes and no fresh fundus photography.
- The patient has conditions (Type 1 diabetes) that may be associated with problems in brain health. The WebNeuro tool helps to recognize such problems and need for treatment. Initiate [WebNeuro assessment](#) for adults?

Electronic forms

Real-time reminders triggered

Näytä työ...

Javascript is used as executable scripting language – works in all operating systems

Full screen | Print article | Feedback

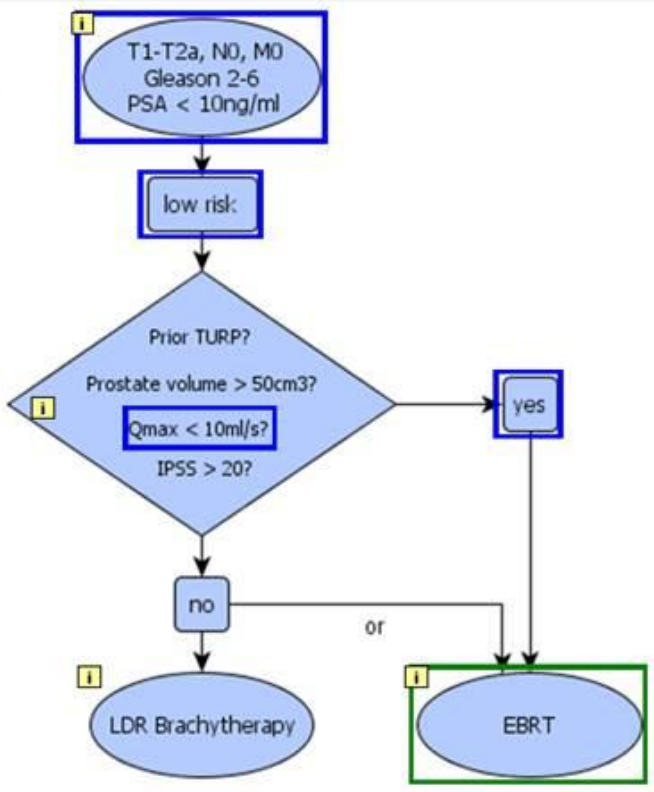
Radiotherapy for low risk prostate cancer

Interactive Algorithms
16.2.2011

This guideline is modified from the NCCN guidelines by Department of Oncology, Helsinki University Hospital. The input data (clinical stage, PSA, Gleason score) indicate that this patient has **low risk** for disease progression. Please check the correctness of the input data before making decisions on treatment.

Prostate Cancer Calculator and Decision Support Tool **1**

Article ID: gph00023 (000.000)
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Interactive algorithms show what is the best treatment option for this patient with current data

What is needed for building a generic CDS service?

- Best available evidence
- Shared ideas (free on the web)
- Ability to use rules developed by others as templates for local rules
- Translating output into different languages
- Mapping between EHR coding systems
- Functioning application



FOUNDED BY BRIGHAM AND WOMEN'S HOSPITAL AND MASSACHUSETTS GENERAL HOSPITAL



SIEMENS



Air Force



Phillips



THE UNIVERSITY of TEXAS HEALTH SCIENCE CENTER AT HOUSTON





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SIEMENS

NextGen
Healthcare Information Systems, Inc



Collaboration is needed in CDS content development – also in Europe

Phillips



UCSD

KAISER PERMANENTE

OREGON HEALTH & SCIENCE UNIVERSITY

BRIGHAM AND WOMEN'S HOSPITAL
A Teaching Affiliate of Harvard Medical School

MAYO CLINIC

HARVARD MEDICAL SCHOOL

THE UNIVERSITY of TEXAS
HEALTH SCIENCE CENTER AT HOUSTON

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How to make reminders tolerable

- Increase **thresholds** above those suggested by guidelines
- Use only data that has been **reliably coded** in the EHRs
- Make reminders of **strong** recommendations that everyone would follow

= improve specificity (at the cost of sensitivity)

The Virtual Health Check

Patient Search | Patient demographics | Appointments | Library | Reports | Virtual Health Check | Logout | Last login time: 9/4/2009 12:32:20 PM

Choose executed health check

Doctor in charge: Ilkka Kunnamo
Care unit: Duodecim

SSN	Name	Care recommendation
040432-0404	Lisa Jones	Reminders: <ul style="list-style-type: none">The creatinine level is increased (190 $\mu\text{mol/l}$). Furosemide is recommended instead of a thiazide diuretic at least when the creatinine level exceeds 200 $\mu\text{mol/l}$. (scr00005)
060629-0606	Martha Kinsley	Reminders: <ul style="list-style-type: none">The patient has a diagnosis of congestive heart failure, but no information on left ventricular ejection fraction. (scr00272)The patient's weight has increased more than 2 kg (79 kg) . The dose of furosemide should be increased. (scr00005)
050548-0505	Robert Lawson	Reminders: <ul style="list-style-type: none">The patient is overweight (BMI 33.1) and been performed during the last two years. (scr00490)The patient is overweight (BMI 33.1), and performed during the last 2 years. Consider (scr00490)
030459-0405	Sam Meady	Reminders: <ul style="list-style-type: none">Selective beta-blockers are better tolerated than non-selective beta-blockers in patients with asthma or COPD.
030369-0303	Homer	Reminders:

In a virtual health check all CDS rules are executed in a population of patients, and resulting reminders are listed.

Two purposes for the VHC

- **Clinical:** find people who need interventions and contact them
 - Persons identified
- **Analytic:** create statistics on quality of care and about the target group for clinical interventions
 - Anonymous

Example of a virtual health check for a population of 16 000

- **Cardioselective beta-blockers for patients with asthma:**

No reminder (selective beta-blocker in use) 32

Reminder: Asthma – switch to selective beta-blocker? 4

Guideline compliance = 0.89
(n = 36)

89% of patients with asthma and beta-blocker used the right type of beta-blocker.

Target group: nurses and other health care professionals

- More contacts than physicians
 - More time per contact
 - Responsible for care for chronic conditions
- CDS must include guidance for all professionals, particularly nurses

Target group: citizens

[Home](#)[Login](#)[Have you forgotten your password?](#)

ELECTRONIC HEALTH EXAMINATION

Welcome to the electronic health examination and personal coaching!

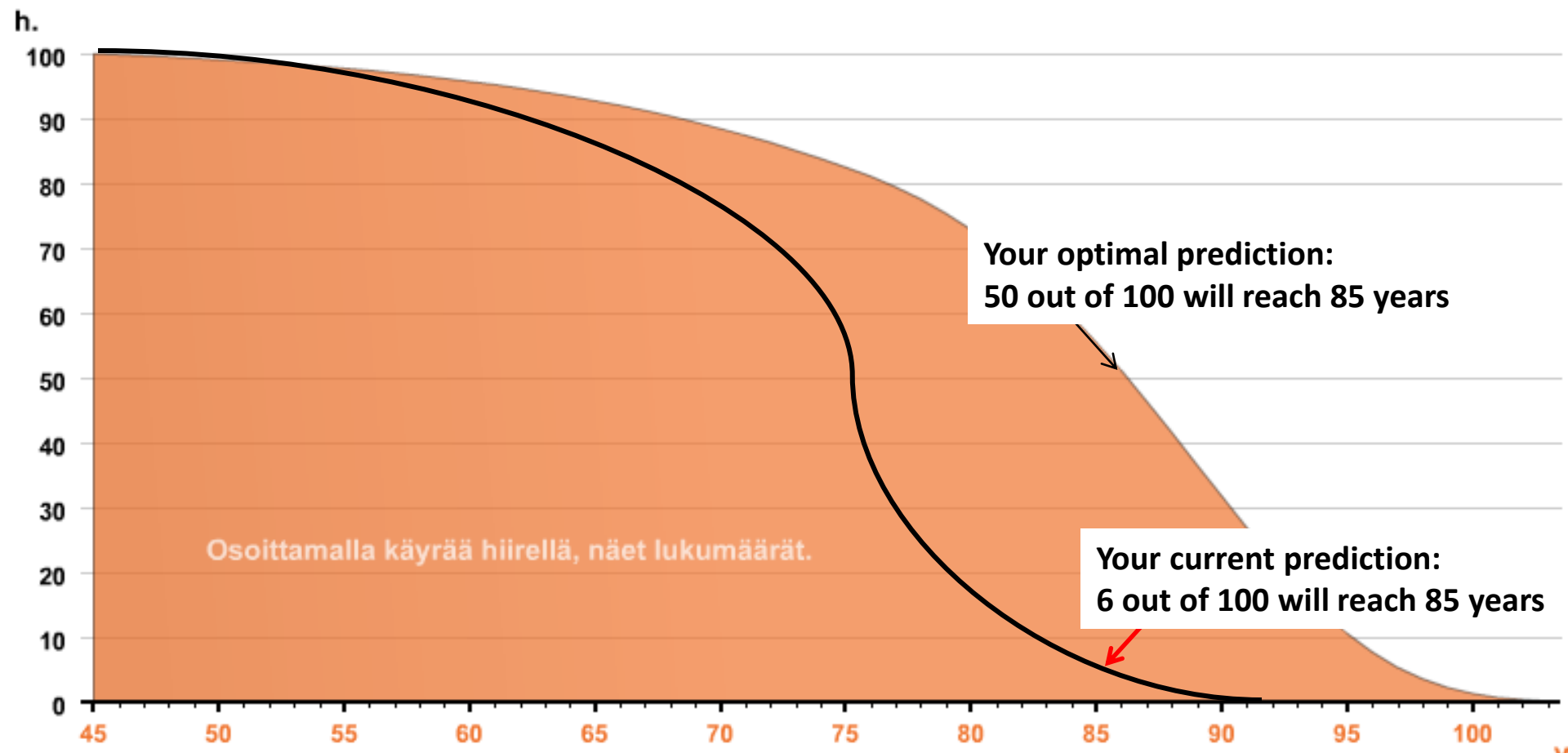
Through the electronic health examination you receive information about factors affecting your health. You can see how lifestyle affects your estimated life expectancy and your risk of suffering from life shortening and quality of life damaging sicknesses. After completing the electronic health examination you receive a report and additional information on the factors affecting your health and on the opportunities to change them, thereby increasing the number of active days in your life. By taking into use the electronic health coaching you can set yourself goals and monitor your developments. The program gives you help and guidance on your lifestyle changes, based on your monitoring.

[Try Electronic health examination » ►](#)

Almost one million Finns (a fifth of the population) used the website



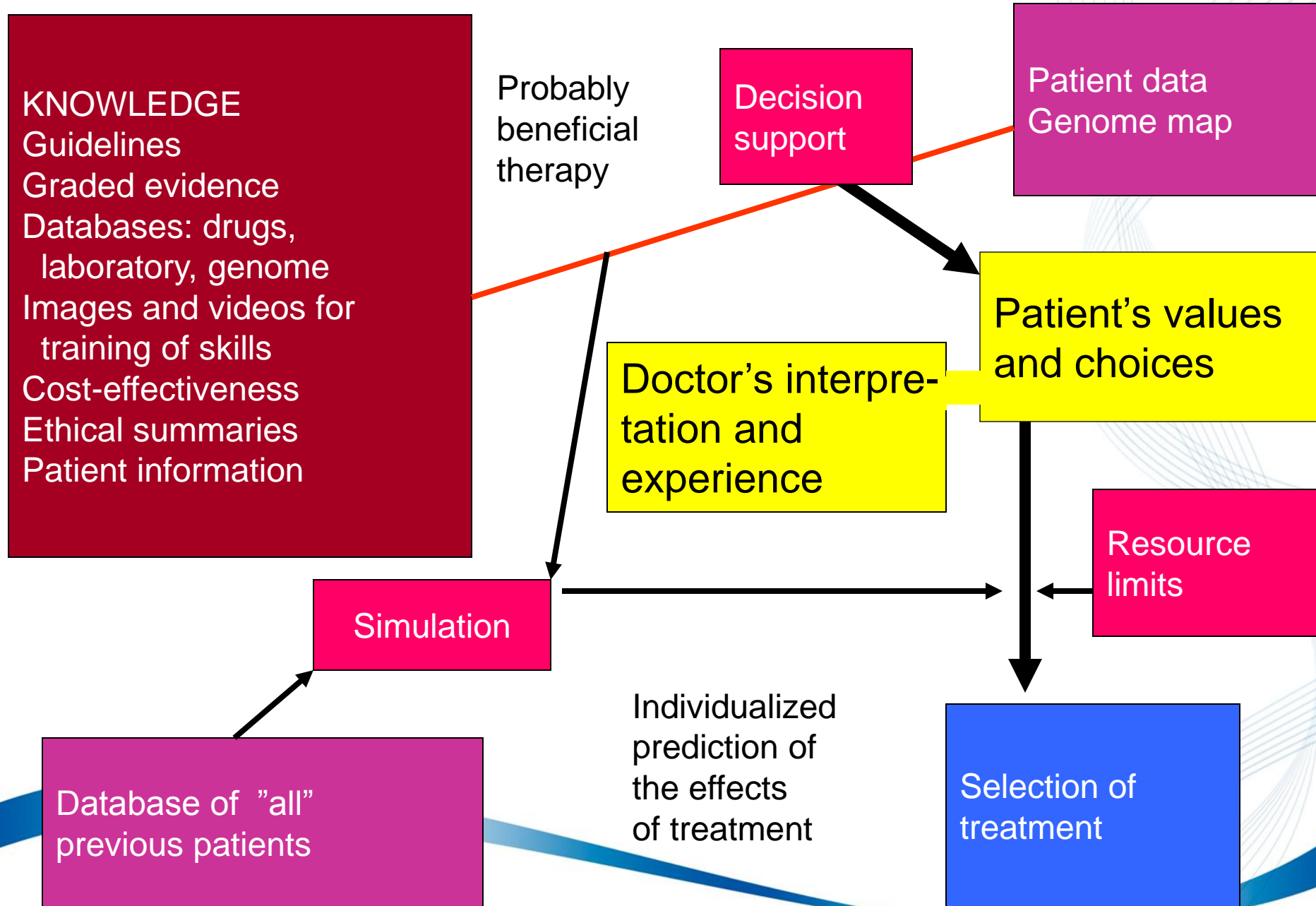
The curve shows how many out of one hundred of your kind will reach the below indicated age



Your optimal prediction:
50 out of 100 will reach 85 years

Your current prediction:
6 out of 100 will reach 85 years

Selection of medical interventions in 2020



A scenic view of a rocky island with dense green trees in a lake under a blue sky with scattered clouds. The island is the central focus, surrounded by calm water. The sky is bright blue with a few white clouds. In the foreground, there are some green leaves and branches on the left side.

Thank you!

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