Extending Functionalities of a Commercial Electronic Health Record (EHR) by Leveraging Application Programming Interfaces

Marcelo Lopetegui, MD, MS, Randi Foraker, PhD, Jeremy Harper, MBI, Dave Ervin, BA, Philip Payne, PhD

EHR Embedded Real-Time Data-Driven Module for Clinicians

Feasibility Study of an
Study proposed by a clinical researcher:

- Patient-clinician communication plays a critical role in the health care process

- Chronic diseases among top causes of morbidity and mortality. Most can be prevented or controlled by behavioral changes

- Graphical patterns enhance understanding and recognition of information
Study proposed by a clinical researcher:

- Optimizing clinician-patient communication offers a genuine opportunity to improve patient care
- Clinicians can produce changes in lifestyle when promoting healthy behaviors
- Visualizations tend to facilitate the understanding of information for non-technical audiences

Researcher envisioned a usable, **dynamic**, **fast** and **non-disruptive** health score calculator and **visualization** module that would **enhance** the **communication** process between healthcare providers and patients, **facilitating** discussions to promote health and prevent or manage disease.

- "Health Calculators"
- Single scalar output
- Long forms
- Manual data entry, time intensive
Research

Problems when requesting a new feature for your project

- Infrequent updates
- Limited customization
- Limited visualizations
Study the feasibility of delivering personalized and real-time data-driven tools to clinical researchers by leveraging commercial electronic health records’ existing tools.
METHODS

Proposed model

- EHR
- API
- Web Server
- DWH
- Browser Engine
- Application Programming Interface
- Data Warehouse

- Full Customization
- Real-time Data
- Historic Data
## Life's Simple 7

**SEVEN SIMPLE STEPS TO LIVE BETTER.**

<table>
<thead>
<tr>
<th>Modifiable factors</th>
<th>Poor Health</th>
<th>Intermediate Health</th>
<th>Ideal Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking status</td>
<td>Yes</td>
<td>Former ≤ 12 months</td>
<td>Never or quit &gt; 12 months</td>
</tr>
<tr>
<td>Body mass index</td>
<td>≥30 kg/m²</td>
<td>25 - 29.9 kg/m²</td>
<td>&lt;25 kg/m²</td>
</tr>
<tr>
<td></td>
<td>No minutes/week</td>
<td>1-149 min mod, 1-74 min vig, or 1-149 min mod + vig</td>
<td>≥150 min mod, ≥75 min vig, or ≥150 min mod + vig</td>
</tr>
<tr>
<td>Physical activity</td>
<td>No minutes/week of moderate (mod)</td>
<td>No minutes/week of vigorous (vig)</td>
<td></td>
</tr>
<tr>
<td>Healthy diet score</td>
<td>0 – 1 components</td>
<td>2 – 3 components</td>
<td>4 – 5 components</td>
</tr>
<tr>
<td>Total cholesterol</td>
<td>≥240 mg/dL</td>
<td>200-239 mg/dL or treated to goal</td>
<td>&lt;200 mg/dL</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>SBP ≥140 mmHg or DBP ≥90 mmHg</td>
<td>SBP 120-139 mmHg or DBP 80-89 mmHg or treated to goal</td>
<td>SBP &lt;120 mmHg and DBP &lt;80 mmHg</td>
</tr>
<tr>
<td>Fasting glucose</td>
<td>≥126 mg/dL</td>
<td>100-125 mg/dL or treated to goal</td>
<td>&lt;100 mg/dL</td>
</tr>
</tbody>
</table>

**Additional Criteria:**

- *≥65 y.o.*
- *No smoking*
- *BMI ≥ 25 kg/m²*
- *Physical activity ≥ 150 min mod, ≥75 min vig, or ≥150 min mod + vig*
- *Healthy diet score ≥ 4 components*
- *Total cholesterol < 200 mg/dL*
- *Blood pressure SBP <120 mmHg and DBP <80 mmHg*
FEASIBILITY STUDY

EHR

DWH

POST

patient_id
Smoking status
weight
height
blood pressure

EHR

BPA

Smoking status
Body mass index
Physical activity
Healthy diet score
Total cholesterol
Blood pressure
Fasting glucose

>65 y.o.
**Patient Id**
- Smoking status
- Weight
- Blood pressure

**EHR**

**Application**

**DWH**

**Data Warehouse**
- Patient id
- Total cholesterol
- Fasting glucose
- Medications
- All missing

1. Data conciliation
2. View rendering
3. Logic & interactivity

**Smoking status**
- Body mass index
- Physical activity
- Healthy diet score
- Total cholesterol
- Blood pressure
- Fasting glucose

**The Ohio State University**
Wexner Medical Center
Non-disruptive
Real-time data
Non-Intrusive
Visualizations
Interactive
LIMITATIONS

Requires 3 areas of expertise

- Web Developer
- Vendor specific API programmer
- Data Analyst

No Authentication in our prototype

Browser engine version

THE OHIO STATE UNIVERSITY
WEXNER MEDICAL CENTER
Our initial findings open an expanded range of potential applications for this concept, extending EHR functionalities, maximizing the use of available data, finally enhancing clinical research.

Given that Epic® is one of the largest EHR providers across the nation, our concept is applicable to a vast population and use cases.
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