Patient-tailored Workflow Patterns from Clinical Practice Guidelines Recommendations

Lucia Sacchi, Adi Fux, Carlo Napolitano, Silvia Panzarasa, Mor Peleg, Silvana Quaglini, Erez Shalom, Pnina Soffer, Paolo Tormene
The MobiGuide Project

- MobiGuide is a Collaborative Large-scale integrating project, supported under the European Commission Seventh Framework Programme (2011-2015)
- Development of a **guideline-based** intelligent decision-support system for patients requiring close monitoring (Atrial Fibrillation and Gestational Diabetes)
- The system accompanies patients wherever they go and helps them wherever they are through the constant application of clinical guidelines also outside the hospital thanks to the use of mobile devices
Patients and CPG Recommendations

**Recommendations**

**Class I**

1. Antithrombotic therapy to prevent thromboembolism is recommended for all patients with AF, except those with lone AF or contraindications. *(Level of Evidence: A)*
2. The selection of the antithrombotic agent should be based upon the absolute risks of stroke and bleeding and the relative risk and benefit for a given patient. *(Level of Evidence: A)*
3. For patients without mechanical heart valves at high risk of stroke, chronic oral anticoagulant therapy with a vitamin K antagonist is recommended in a dose adjusted to achieve the target intensity INR of 2.0 to
Patient-tailored Workflow Patterns

Starting point of a process of care (workflow) that is parallel to the “original” guideline and completely patient-centric

Knowledge-based patient-tailored workflow patterns

The availability of a mobile device able to support the patient in his routine makes it possible to implement such patient-tailored workflow pattern in practice
Methodology

- GL Analysis
  - Extraction and formalization of the relevant recommendations
    - Tacit knowledge elicitation
      - Patient Profile
        +
          - Computerized CPG
            - Advices for Care Professionals
          - Patient-tailored workflow patterns
            - Advices for Patients

Knowledge Engineer + Clinical Expert
Methodology

- GL Analysis
- Extraction and formalization of the relevant recommendations
  - Tacit knowledge elicitation
  - Patient Profile
- Knowledge Engineer + Clinical Expert

- Care Professional
  - Computerized CPG
  - Advices for Care Professionals
- Patient
  - Patient-tailored workflow patterns
  - Advices for Patients
**Methodological Steps**

- **Analysis of the guideline and extraction of the relevant recommendations**
  - Identification of recommendations that will impact on patient behavior and imply a patient's direct involvement in the continuation of his treatment plan

"**Measurement of the heart rate at rest and control of the rate using pharmacological agents (either a beta blocker or nondihydropyridine calcium channel antagonist, in most cases) are recommended for patients with persistent or permanent AF**"

Advice for the doctor: prescribe rate control treatment and advise the patient to measure his HR at rest

Implication for the patient: regularly monitor HR and take the prescribed medications
Methodological Steps

“Measurement of the heart rate at rest and control of the rate using pharmacological agents (either a beta blocker or nondihydropyridine calcium channel antagonist, in most cases) are recommended for patients with persistent or permanent AF”

Knowledge on the therapy delivery process and on the frequency of HR measurements? Tacitly owned by the medical expert

- Extraction of patient-oriented tacit knowledge from CPGs
  - Based on doctors’ experience
The Patient Profile

The delivery of patient-oriented recommendations should consider:
  - the patient's personal schedule
  - influential events
  - therapies
  - personal preferences not accounted for in the guideline

- The patient profile includes information about:
  - Current personal status of the patient (regular/on holiday/job trip)
  - Meals time and bed time in week and in weekends
  - Preference on the desire to receive reminders
  - Preference on the desire to receive alerts in case of non-compliance

- Structure defined during design phase
- Personalization during face-to-face encounters
The Patient Profile - Personalization

User: Placeholder for username
Patient: Sergio Leone
Guideline: AF (guideline inactive)

CIG Customized Context: Meals Schedule-Routine
Personal Context Name: Regular Routine
Date: 21 agosto 2013

Save
The Guideline for Atrial Fibrillation: a Case Study

- Therapy-related patient-tailored WF pattern: to help the patient to comply with his treatment
The Guideline for Atrial Fibrillation: a Case Study

- **Therapy-related patient-tailored WF pattern**: to help the patient to comply with his treatment
- **Measurements-related patient-tailored WF pattern**: to remind the patient to take some measurements (weight, BG, blood pressure, etc)
blood pressure, etc)

- **Upcoming event patient-tailored WF pattern**: for dealing with personal situations highlighted by the guideline that may necessitate modulating patient's therapy (e.g. OAT)
The Guideline for Atrial Fibrillation: a Case Study Fibrillation

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  - **Measurements-related patient-tailored WF pattern:** to remind the patient to take some measurements (weight, BG, blood pressure, etc)
- **Personalized patient-tailored WF pattern:** for dealing with follow-up situation highlighted by the guideline that may
patient to comply with his treatment

- **Measurements-related patient-tailored WF pattern**: to

- **Upcoming event patient-tailored WF pattern**: for dealing with

  necessitate modulating patient's therapy (e.g. OAT)

- **Personalized packages**: for specific close monitoring and follow-up of patients
### Measurement of the HR at rest and control of the rate using pharmacological agents

- Measurement of the HR at rest and control of the rate using pharmacological agents [...] are recommended for patients with AF.

#### INR should be detected at least weekly during initiation of therapy and monthly when anticoagulation is initiated.

**Blood pressure control** may become an opportune strategy for prevention of AF.

#### Criteria for HR control vary with patient age but usually involve achieving ventricular rates between 60 and 80 bpm during moderate exercise.

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#### In patients with AF who do not have mechanical prosthetic heart valves, it is reasonable to interrupt anticoagulation for up to 1 wk without substituting heparin for surgical or diagnostic procedures that require interruption of OAT for longer than 1 wk in high-risk patients.

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Take 5 mg of Coumadin once a day before dinner.

A patient specific drug calendar is generated considering drug prescription and Patient Profile.

Context: Regular Routine
Dinner time during week: 19:00
Reminder desired: yes
Alert time(before administration): 10 min
Alerts for non-compliance desired: yes

Reminder generated at 18:50 every day: “Please remember to take one pill of Coumadin”

Check patient compliance to drug prescription.

Patient can provide non-compliance motivation: side effects, drug unavailability, etc.

An alert is sent to the patient.
Calendar Triggered Upcoming Event WF Pattern

The patient selects the day when he wants to store an event

Table

<table>
<thead>
<tr>
<th>EventName</th>
<th>Event Type</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental checkup appointment</td>
<td>Minor Surgery/Diagnostic Procedure</td>
<td>Talk to your doctor to agree the anticoagulation therapy stopping strategy if the appointment with the dentist is confirmed</td>
</tr>
</tbody>
</table>
Conclusions

The goal of this system is to improve patient's compliance to the prescribed recommendations related to the self-management of his disease

   A more compliant behavior improves patient's health state
   A more compliant behavior indirectly affects the rate of acute events requiring hospitalizations or accesses to emergency units

Personalized measurements thresholds and frequency of alerts
Find a trade-off between enhancing personalization and patient's compliance

Reducing the phenomenon of alert fatigue → Patient Calendar + Patient Profile