MobiGuide Patterns

This document provides detailed information about the monitored patterns and conditions, and

about plan changes and notifications (recommendations) to patients and care providers used in the

two CIGs.

Table 1. Examples of temporal data patterns (declarative) from the AF and GDM CIGs

Type of pattern	Pattern description
AF	
IF THEN ELSE	BP NOT in range (diastolic>90 OR systolic>140) AND last BP not in range
IF THEN ELSE	No measurement during day
IF THEN ELSE	INR within range (2-4.5 inclusive)
FILTER CONDITION	VisitObjective IN (”RhythmControl_with_pharmacologicalCardioversion”,”RhythmControl_with_direct_current_cardioversion”)
FILTER CONDITION	INR measurement prescription exists
MONITORING CONDITION	6 bad QoD values
MONITORING CONDITION	new risky event Or (risky event within less than 5 days)
COMPLETE CONDITION	CCC (context) change
GDM	
IF THEN ELSE	Patient has scheduled visit in the next 5 days
IF THEN ELSE	It is the first time the patient is unbalanced since her last visit
IF THEN ELSE	Patient not compliant for 3 or more different (OR SAME) BG in PAST week
FILTER CONDITION	BP diagnosis = normal and Normal BP
MONITORING CONDITION	2 positive ketonuria values in one week
MONITORING CONDITION	Monthly Good Compliance to BG measurements = True
ABORT CONDITION	Gestational BP ≡ (gestational_age > 20 weeks) AND ((2 BAD BP from twice-a-week monitoring plan) Or (2 BAD BP from once-a-week monitoring plan))

Table 2. Examples of conditions/criteria from the AF and GDM CIGs

In plan	Condition Type	concept name
AF		
AF-V1	Complete condition	new visit
Sensor monitoring	Complete condition	CCC change
BP monitoring	Complete condition	CALLBACK BP-once a day=True {the call back is the complete

		condition of the plan}
BP monitoring	filter condition	Current context=Routine
BP monitoring	filter condition	ccc = Semi-routine OR incPA context
Risk events monitoring	filter condition	risky-event prescription = yes
Weight monitoring	filter condition	Is there a weight prescription?
INR monitoring	filter condition	Is there INR measurement prescription?
PIP monitoring (PIP = pill in the pocket)	if-then-else	if drug taken = false
PIP monitoring	if-then-else	Sensor worn reply = OK.
Sensor monitoring	if-then-else	TherapyChanged=TRUE {monitoring frequency was changed}
Sensor monitoring	if-then-else	sensor worn==ok.Sensor monitoring
PIP monitoring	if-then-else	SymptomsLevel=unacceptable OR acceptable
Sensor monitoring	if-then-else	AF.Diagnosis=AF permanent?
PIP monitoring	monitoring condition	SymptomsLevel=unacceptable OR acceptable
Sensor monitoring	monitoring condition	Monitor HR out of range (One measurement of HR>130)
PIP monitoring	monitoring condition	Monitor Sensor usage time was less than 20 minutes
Sensor monitoring	monitoring condition	MonitorECG out of range (i.e., an AF episode)
BP monitoring	monitoring condition	CCC change
BP monitoring	monitoring condition	monitor for 6 bad QoD values
GDM		
Normal BP	if-then-else	If 2nd BAD BP: sBP >= 140 and/or dBP >= 90
ChronicBP	if-then-else	Target-organ damage=True
Gestational BP	if-then-else	(protenuria=true) && (sBP > 150 and/or dBP > 100)
BG monitoring	if-then-else	There are some high glucose values, did you eat more than you should have?=yes
BG monitoring	if-then-else	Patient not compliant for 3 or more different (OR SAME) BG in PAST week
Normal BP monitoring	abort condition	Gestational BP ≡ (getational_age > 20 weeks AND ((2 BAD BP from twice a week) Or (2 BAD BP from once a week))
BG monitoring - daily	complete condition	BGMonthly Good Compliance
Ketonuria monitoring - daily	complete condition	Call back: ketonuria negative for two weeks
Normal BP	complete condition	GoodBPMeasurments Past2Weeks=True

BG monitoring – twice a week	complete condition	Call back: abnormal BG in twice a week schedule=True
Chronic BP	Filter condition	BP diagnosis =chronic
Gestational BP	Filter condition	BP diagnosis = gestational
Normal BP	Filter condition	BP diagnosis =normal and Normal BP
BG monitoring - Routine	Filter condition	Current context=Routine
BG monitoring – twice a week	Filter condition	Current context=Routine
Ketonuria monitoring	monitoring condition	Call back: ketonuria negative for two weeks
Ketonuria monitoring	monitoring condition	Call back from patient eating enough carbohydrates = true
Normal BP	monitoring condition	(BP diagnosis =normal) and Normal BP
Chronic BP	monitoring condition	sBP >= 140 and/or dBP >= 90

BP – blood pressure; BG – blood glucose; IncPA – Increased Physical Activity

Table 3. Examples of notifications (recommendations) to patients from the AF and GDM CIGs

plan	SubPlan	Notification (recommendation) text
AF		
risky events monitoring	monitor new risk event Or (risk event within less than 5 days)	Warning: if your appointment will occur within 5 days remember to contact your doctor as soon as possible to agree on the anticoagulation therapy management
risky events monitoring	monitor new risk event Or (risk event within less than 5 days)	Talk to your doctor to agree on the anticoagulation therapy management if the appointment for the risky procedure you will undergo in 5 days is confirmed
Sensor monitoring	Projection SENSOR_PLAN_3XWEEK_24H	You wore the sensor for less than 6 hours. Please remember that the recommended monitoring time is 24 hours
Sensor monitoring	SENSOR_PLAN_ONCE_DAY_NO_ECG	You wore the sensor for less than 20 minutes. Please remember that the recommended monitoring time is 30 minutes
Sensor monitoring	SENSOR_PLAN_ONCE_DAY_W_ECG	You wore the sensor for less than 20 minutes. Please remember that the recommended monitoring time is 30 minutes

Sensor monitoring	BP-TWICE-a week PROJECTION	The patient has shown two consecutive BP values out of range. The BP monitoring plan will be switched to daily measurements"
QoL monitoring	QoL monitoring - every month	Please fill in the questionnaire on quality of life
GDM		
BG monitoring	when 2 abnomal BG values in a week= true" from daily monitoring) OR ("when 2 abnomal BG values in a week= true" from twice a week monitoring)	Please, check if you have an appointment with your doctor in the next two weeks
BG monitoring	("when 2 abnomal in a week= true" from daily) OR ("when 2 abnomal in a week= true" from twice)	Your blood glucose measurements are abnormal. We will contact you shortly to provide a new appointment with your doctor.
ketonuria	Monitor Ketonuria Daily	Remember that you should eat the amount of carbohydrates prescribed by your doctor
ketonuria	call back from patient eating enough carbohydrates = true	Your ketonuria measurements are still abnormal. We will contact you shortly to provide a new appointment with your doctor.
Diet Monitoring	Diet Monitoring	Remember that it is important that you keep following your nutritional prescription to assure your well- being
exercise monitoring	exercise monitoring	Congratulations! Regular physical activity practicing helps to keep good metabolic control. Keep doing it.
BP	chronic BP	Your blood pressure levels are abnormal. We will contact you shortly to provide a new appointment so that your doctor can adjust your treatment
BP	Gestational	Your blood pressure levels are too high. Please, ask your obstetrician or go to the Obstetrics and Gynecology Emergency Department in the next hours
BP	Gestational	Please, check if you have a new appointment scheduled in the next 1-2 weeks

The following examples demonstrate how various time-oriented clinical states, conditions, and patterns are modeled in our Temporal-Abstraction Knowledge (TAK) language. The examples use the semantically and syntactically clearer TAK-2 version, although in the beginning of the MobiGuide project we were still using an earlier version, TAK-1.

TAK representation of the abstract concept "2 or more positive ketonuria in past week"

```
<KnowledgeItem>
<KBID>312</KBID>
<ID>5155</ID>
<Title>2+ ketonuria=pos PastWeek</Title>
<OutputType>Boolean</OutputType>
<PatternData>
  <Components>
      <id>5021</id>
      <TimeConstraint>
          <Start>
             <TimeShift>
                <double>-7</double>
                <granularity>days</granularity>
             </TimeShift>
          </Start>
      </TimeConstraint>
  </Components>
  <PeriodicConstraints>
      <Cardinality>
          <min>2</min>
      </Cardinality>
  </PeriodicConstraints>
</PatternData>
</KnowledgeItem>
```

Note that 5155 is the ID of the abstract pattern (2 or more positive ketonuria values in the past week) and 5021 is the ID of the raw concept "ketonuria".

Asbru procedural specification referring to the abstract concept 5155, defined above:

```
<semi-formal-plan-body>
  <single-action isMandatory="true"is-projected="true">
  <monitoring-plan comments="">
    <trigger>
      <simple-expression name="2 positive in one week">
     <concept vocabulary=""name="2 positive in one week"
key="5155"path="" concept-type="pattern"/>
      <text/>
    </simple-expression>
     </trigger>
     <action-plan>
       <plan-activation comments="">
         <plan-schema>
         <plan-pointer id="19993"name="ask patient and call back
"DeGeLSite=""/>
       </plan-schema>
     </plan-activation>
   </action-plan>
```

```
    </monitoring-plan>
   </single-action>
  </semi-formal-plan-body>
```

Note that according to the CIG, once the patient had two positive values of ketonuria in the past week, he/she will be asked whether he/she is eating enough carbohydrates.