

Appi@Home: towards an integrated, mobile health-based, caremodel for pain patients

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Background



Appi Home

- **Chronic pain (> 3 months)**
 - **Most frequent medical condition worldwide**
 - 8,53% of population (~960,000 patients in Belgium)
 - Therapeutic approaches are still extremely challenging
 - **Multifactorial pathology**
 - **Interdisciplinary approach necessary**
 - “cure” in most cases impossible
 - **Preventive actions needed ...**
 - **Prevention of occurrence of sensitization within nervous system**
 - First 8 weeks are crucial (*window of opportunity*) - **(sub)acute pain**
 - To prevent the chronification process
 - Aggressive, multimodal, focused treatment necessary
 - Curing and re-integration should be considered as primary outcomes

➔ ***Now largely out of scope within pain centers (< 5%)***

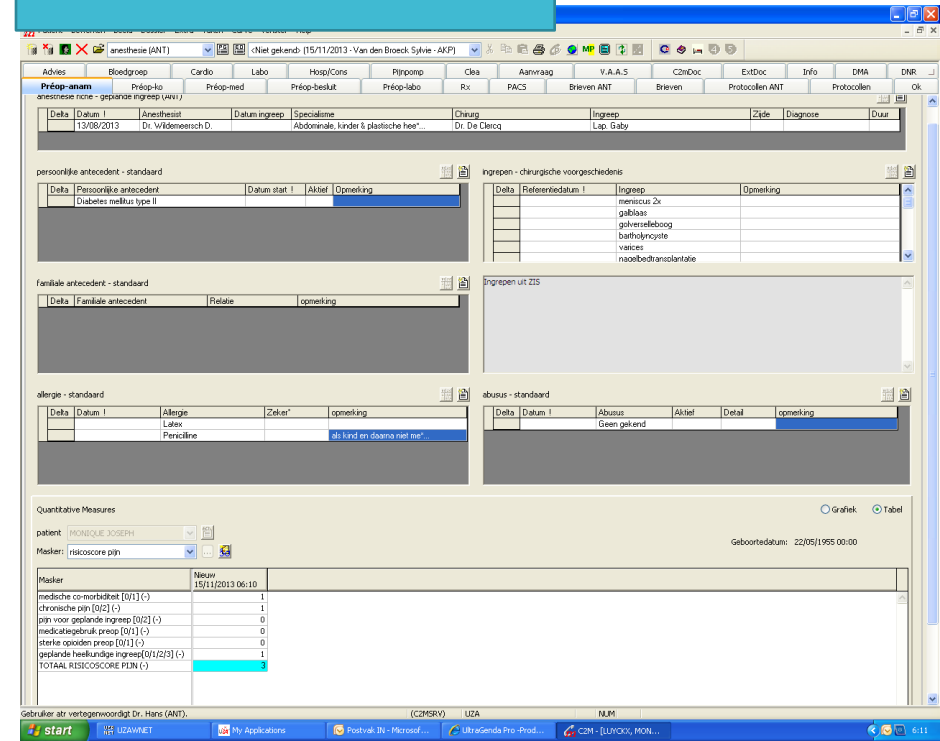
Differentiating elements



Appi Home

- **Early detection of patients at risk is mandatory**
- **Intensive follow-up of objective, functional, parameters at home**
 - Online portal (questionnaires, medication intake, scoring, ...)
 - Telemetric devices (physical activities, sleep characteristics, ...)
 - **Leading to a more efficient follow-up of patients**
 - **Dynamic interactions**
 - **Speedy decisions on therapeutic approaches**
- Focused on sub-acute pain complaints
 - After surgery, trauma, chemotherapy, ...
- Awareness & **Patient empowerment** & Family involvement
- **Functional re-hab and re-integration !**

Early detection of patients at risk for chronification of pain (Antwerp Personalized Pain Initiative)



Risk factors	Impact factor	0	+1	+2	+3
Medical co-morbidity (eg. diabetes mellitus)		X	X		
History of chronic pain (eg. CRPS)		X		X	
Pain already present before (surgical) intervention		X		X	
Use of medication (analgetics and non-analgetics)		X	X		
(chronic) use of opioids (step 3 medication)		X	X		
Surgical interventions with risk of chronification		X	X	X	X
Min. / Max. score		0 / 10			

Beginning (2014)

- Chronification of Pain (COP)
 - IWT-TBM grant 2014
 - Patients after shoulder surgery or inguinal hernia repair
 - Patients discharged with electronic pain pump
 - Continuous follow-up at home during 7 days after surgery
 - Continued follow-up up to 12 weeks after surgery
- Development of online portal
 - Secured portal: <https://cop.uza.be>
 - Patients – completion of questionnaires, pain scaling, sleep quality
 - Health care professionals – completion of medical information
 - **Privacy by default !**
 - **Integration into daily clinical practice by default !**

General guiding principles

- Principles outline that our app, and devices, to be used by patients and doctors adhere to following standards:
 - have a clinical evidence base to support their use (EBM);
 - follow evidence-based practice guidelines to ensure patient safety and quality of outcomes;
 - support establishment or continuation of valid doctor-patient relationships;
 - support care delivery that is patient-centered and promotes care coordination;
 - support data portability and interoperability;
 - and require health practitioners who are using the app to be dedicated to the information being gathered (change in operating mode).

Online portal

- Convenient, secure and 24x7 accessible platform
- Patient provides (non-shared) e-mail address
- Receives e-mail with access information and unique code
- Patient changes code upon first visit
 - Completion of personal (contact) information
 - **Careful lecture and acceptance of IC**
- Platform contains (first development)
 - Questionnaires (12 different in total)
 - Pain diaries
 - Ratings for sleep quality

Aanmaken van een nieuwe patiënt

Uw e-mail adres

Bevestig

RSZ

Voornaam

Achternaam

Startdatum **Ziekenhuis**

Telefoonnummer **GSM nummer**

IC Goedgekeurd

Datum IC verklaring

Annuleer

Ok

Welkom

Zorgverstrekkers

Vragenlijsten

Mijn pijnniveau

Mijn patienten

Nieuwe patient

Instellingen

Documentatie

Uitloggen

Groep	Subgroep	Periode	Aantal	Status	
Pre-Operatieve Evaluatie	Socioprofessionele situatie	-7 dagen	15	Published	Selecteer
Pre-Operatieve Evaluatie	Pijn	-7 dagen	17	Published	Selecteer
Pre-Operatieve Evaluatie	Multidimensionele Pijnvragenlijst - Deel 1	-7 dagen	28	Published	Selecteer
Pre-Operatieve Evaluatie	Multidimensionele Pijnvragenlijst - Deel 2	-7 dagen	22	Published	Selecteer
Pre-Operatieve Evaluatie	Oswestry Disabilty Index Deel 1	-7 dagen	10	Published	Selecteer
Pre-Operatieve Evaluatie	Oswestry Disabilty Index Deel 2	-7 dagen	10	Published	Selecteer
Pre-Operatieve Evaluatie	Coping met pijn	-7 dagen	44	Published	Selecteer
Pre-Operatieve Evaluatie	Pijn Cognitie Lijst-2003	-7 dagen	40	Published	Selecteer
Pre-Operatieve Evaluatie	HAD-schaal	-7 dagen	14	Published	Selecteer
Pre-Operatieve Evaluatie	Zelf-beoordelings vragenlijst	-7 dagen	20	Published	Selecteer
Post-Operatieve Evaluatie - Na 4 weken	Socioprofessionele situatie	28 dagen	23	Published	Selecteer
Post-Operatieve Evaluatie - Na 4 weken	Pijn	28 dagen	14	Published	Selecteer
Post-Operatieve Evaluatie - Na 4 weken	Multidimensionele Pijnvragenlijst - Deel 1	28 dagen	28	Published	Selecteer
Post-Operatieve Evaluatie - Na 4 weken	Multidimensionele Pijnvragenlijst - Deel 2	28 dagen	22	Published	Selecteer
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Groepcode Vraagselectie

Sub-groep

Type:

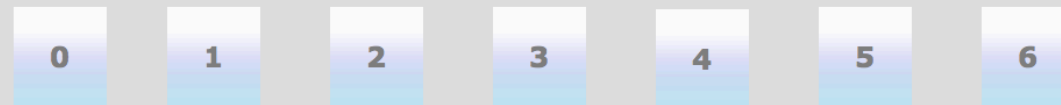
Dhr. Guy Hans
Pre-Operatieve Evaluatie
Multidimensionele Pijnvragenlijst - Deel
1

Hoofdstuk 1 Multidimensionele Pijnvragenlijst

Deze vraag betreft LIES- OF SCHOUDERPIJN waarvoor geopereerd wordt.

Onderstaande vragenlijst gaat over de pijn die U voelt en de invloed die zij heeft op uw dagelijks functioneren. In deze lijst krijgt U een aantal vragen voorgelegd. Onder elke vraag is een schaal aangebracht waarop u uw antwoord kunt aangeven. Lees iedere vraag zorgvuldig en klik op het cijfer dat voor u van toepassing is.

Vraag 1 van 28: Geef aan hoeveel pijn u op dit moment heeft



geen pijn

heel veel pijn

Stoppen

Opnieuw

0%

Volgende

Dhr. Guy Hans
Post-Operatieve Evaluatie - Na 4 weken
Pijn Cognitie Lijst-2003

Hoofdstuk 1 Pijn Cognitie Lijst-2003

Wanneer iemand pijn heeft gaan er andere gedachten door zijn hoofd dan wanneer het hem goed gaat. Pijn en het denken daarover staan in nauwe relatie tot elkaar. Deze vragenlijst bevat gedachten die vaak voorkomen bij mensen die pijn hebben. Wij willen u vragen aan te geven in hoeverre deze gedachten ook voor u van toepassing zijn. Het gaat hierbij steeds om wat u de afgelopen week heeft gedacht.

Als u het met een gedachte volledig eens bent dan klikt u op het blokje "volledig eens". Als u het volledig oneens bent met deze gedachte, dan klikt u op het blokje "volledig oneens".

Vraag 1 van 40: Mijn gedachten zijn steeds op de pijn geconcentreerd.

Volledig
oneens

Tamelijk
oneens

Neutraal

Tamelijk
eens

Volledig
eens

Stoppen

Opnieuw

0%

Volgende

Uw ziekenhuis Universitair Ziekenhuis Antwerpen**Uw patienten**

Opgelet: enkel uw patiënten met pijn registraties komen voor in deze lijst

Tijdstip registratie	Uw pijn niveau	%	Opmerking
30/08/2016 09:58:25			
09/06/2016 10:59:12		4 %	
09/06/2016 10:58:39		3 %	einde periode remicade
26/05/2016 08:17:24		2 %	
13/04/2016 17:11:46		11 %	
07/04/2016 22:11:23		6 %	

Next step (2016)

- Broaden the scope to all patients suffering from (sub-)acute pain
 - Regardless of etiology
 - Much stronger focus on preventive medicine
 - Inclusion of more telemetric medical-grade devices
 - Dynamic interaction with patients and care-givers
 - Further development of online patient portal
 - Diaries ++
 - Integration into comprehensive care model
- Newly developed online portal: <https://appi.uza.be>



Physician informs patients about tele-monitor follow up and adds **Patient** to the system.



UZA Kennis / Ervaring / Zorg

Appi@Home ell@Home

ENG | NL | FR

Logged in, Joris Willems

Home Patient info Add patient Settings

Patient information * Required

Name : Name of the patient Social security nr. : Social security number

Firstname : Firstname of the patient Patient ID : Patients Center ID

Date of birth : DD-MM-YYYY 31 Informed consent : DD-MM-YYYY 31

Sex : --- Treating physician : ---

Length : Length cm

Address : Address Language : English

City : Location --- Reminder : Sms E-mail

E-mail : Email address

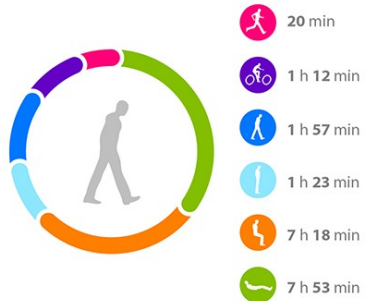
Mobile : Mobile nr.

Cancel Save



Patient receives **Tools** with BT tele-monitor devices, Smartphone and unique code known by the **Intra Muros Platform / Database** for automatic connection and identification.

Activity tracker



Blood pressure meter



Systolic
Diastolic
Heart rhythm
Heartbeat

Balance



Weight
BMI

Sleep monitor



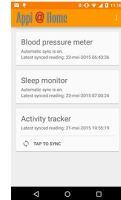
Sleep time
Heart rate
Respiration rate
Night time events
(snoring, bed exists, restless sleep, etc.)

Oximeter



SpO2
Pulse rate

Diaries



Pain scores
Medication score



Patient uses code to **Activate Connection** with **Intra Muros Platform**

Activity tracker



Sleep monitor



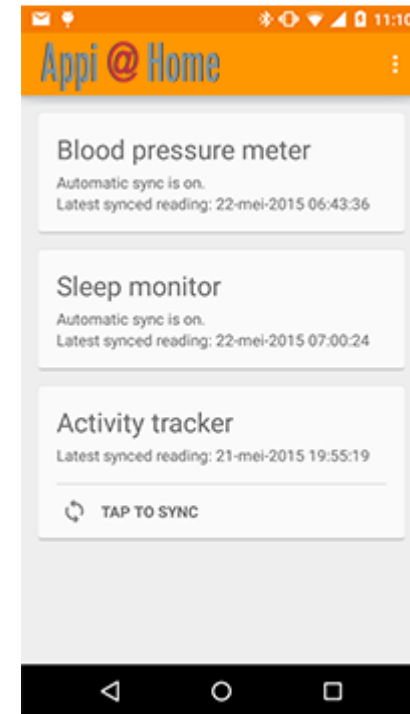
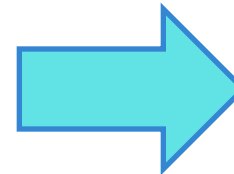
Blood pressure meter



Balance

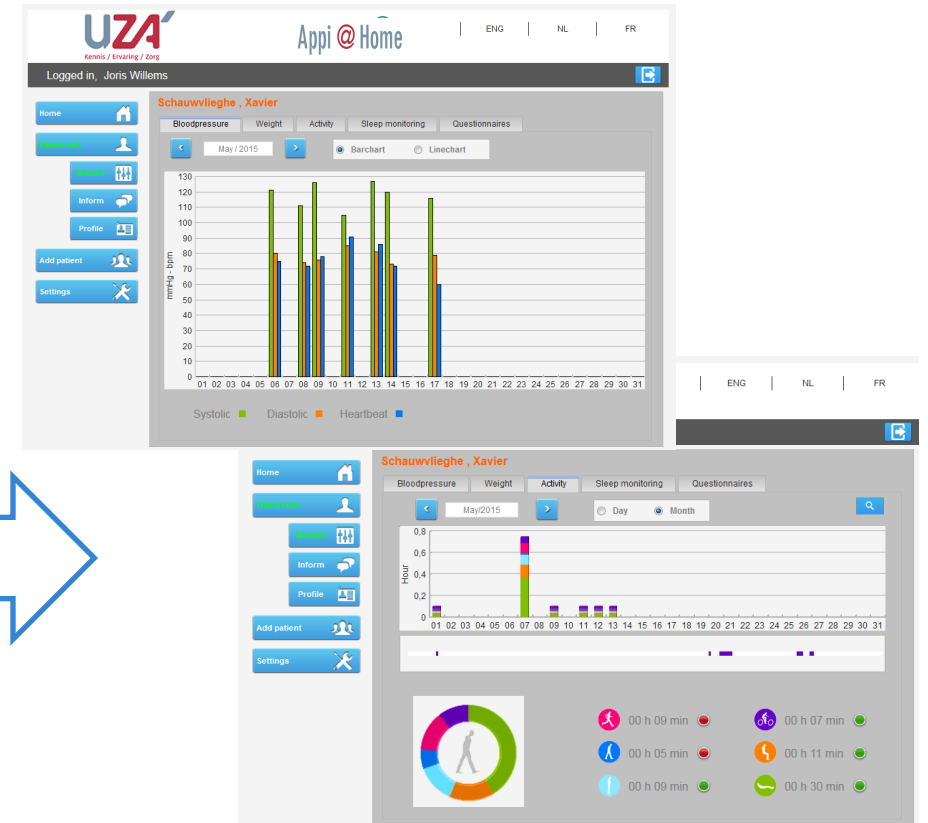
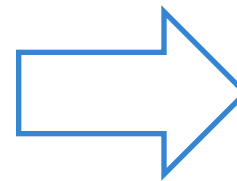
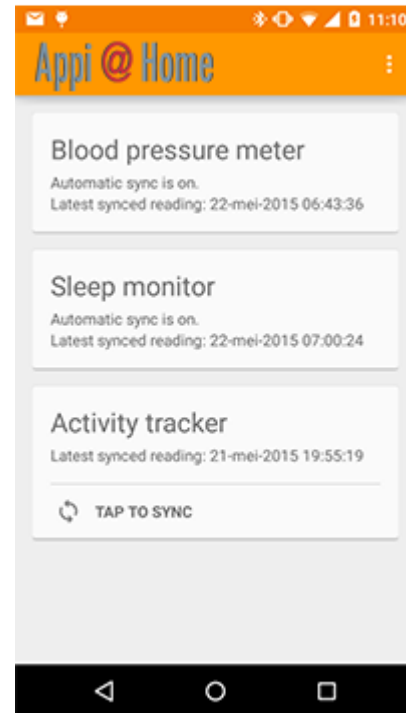
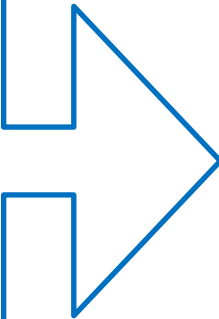


Oximeter





Patient Measures while the devices **automatically send the measured data to the Platform (intra-muros).**





Based on **Settings per Patient** : **Triggers & Alarms** can be pushed towards a control center. If activated, the patient can be informed automatically if measurements are outside limits.

The left screenshot shows the 'Bloodpressure' settings page. It includes a table for patient monitoring settings:

	Patient Follow up	Tele monitoring	Min.		Max
Systolic	<input checked="" type="checkbox"/>	<input type="checkbox"/>	80	mmHg	140
Diastolic	<input checked="" type="checkbox"/>	<input type="checkbox"/>	55	mmHg	80
Heartbeat	<input checked="" type="checkbox"/>	<input type="checkbox"/>	50	/pm	100
Heart rhythm	<input type="checkbox"/>	<input type="checkbox"/>			

The right screenshot shows a calendar view for May 2015. The calendar grid displays green status indicators for each day, indicating that the patient's measurements are within the set limits. The days are: Mon, 04; Tue, 05; Wed, 06; Thu, 07; Fri, 08; Sat, 09; Sun, 10; Mon, 11; Tue, 12; Wed, 13; Thu, 14; Fri, 15; Sat, 16; Sun, 17; Mon, 18; Tue, 19; Wed, 20; Thu, 21; Fri, 22; Sat, 23; Sun, 24; Mon, 25; Tue, 26; Wed, 27; Thu, 28; Fri, 29; Sat, 30; Sun, 31.

- Home
- Fulltext follow up
- Tide Monitor
- Messages
- Exporting
- Monitor settings
- Add patient
- Settings

Patient, Dries Oeyen (30-05-1993)

Other patient

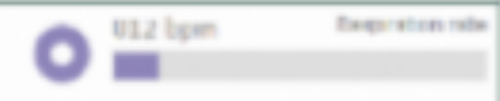
- about patient
- reports
- activity
- sleep
- Diagnose

15/12/2023



sleep time events

to bed at	20:15
Falling asleep after	24 min
Snoring time	10 min
Away from bed	0 min
Out of bed at	06:40



Appi@Home: Advantages compared to 'standard of care'

- Platform is placed **Intra Muros** (privacy of the data)
- Data is **Transferred Directly** towards an Intra Muros Database (encrypted)
- Combination of many parameters in **1 Centralized Platform (Hospital)**
- Connection towards **C2M** (electronic patient record) is possible

- Physician
 - Provides the tools to the patient to have an efficient tele-monitoring (more **detailed information**)
 - Has a **Clear Overview** and decides what parameters needs to be **Tele-Monitored** (triggers/alarms)

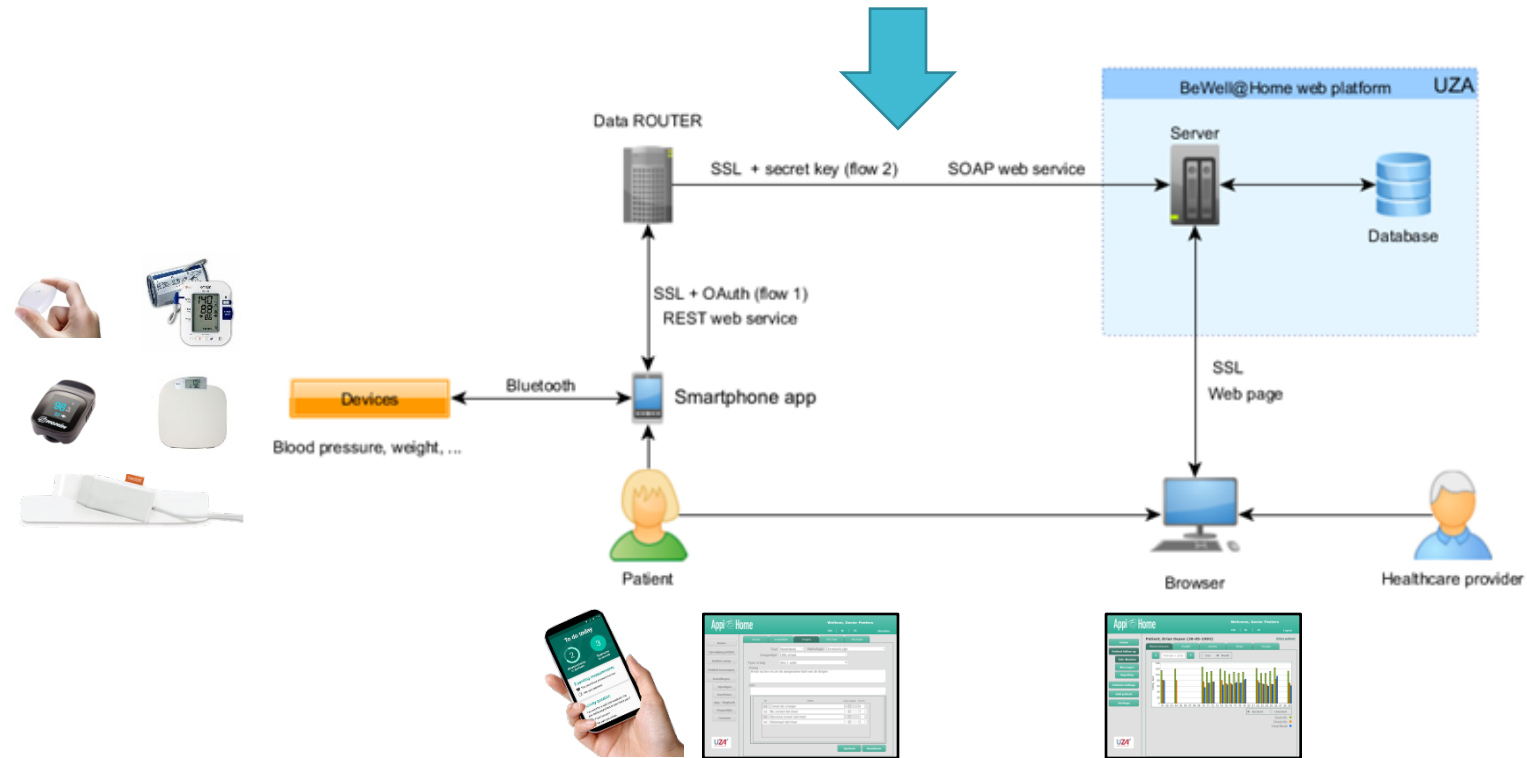
- GP
 - Can have an access for his patients – always and everywhere
 - Can receive a report (Medibridge – Hector)

- Patient
 - **Easy setup** as the system is a '**One Box Preset**' (already synchronised devices)

- **Entire system if applicable to many different pathologies (very generic structure)**

- **Different languages**

Communication through dedicated E-Health channels



Future perspectives

- To be implemented in all painful conditions
 - Neuromodulation (nation-wide implementation)
 - Communication through (mega-)HUBs
 - Development to shared online medical record
- To be implemented in hospitalized patients
- Boost health care delivery (efficacy)
- Further integration into Electronic Health Records
- Reduce costs
- Supporting fully integrated multidisciplinary care approaches

Thanks for your
attention !