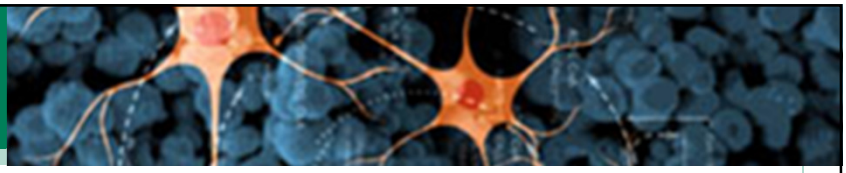

A mobile in-hospital application supporting insulin dosing for patients with diabetes type 2

In-hospital glucose management at the point of care

within the scope of the FP7 ICT Project - REACTION

REACTION

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Motivation

In-hospital glycemic control of **non-ICU** patients with **T2DM** is often considered secondary in importance;
focus often on primary condition that caused the hospitalization

But [1] **…**

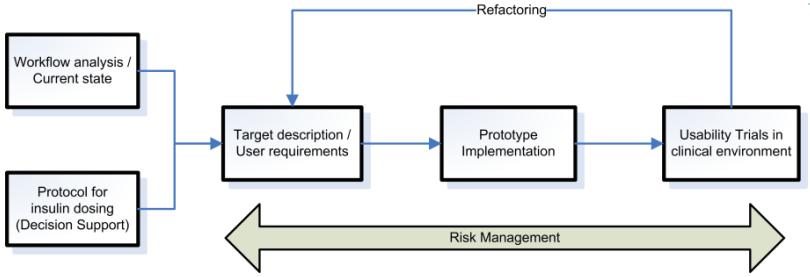
- in-hospital **hyperglycaemia** important marker of poor clinical outcome and increased mortality among diabetic patients
- **treatment** of diabetes and hyperglycaemia results in **reduced mortality, morbidity** and **length of hospital stay**

→ support of diabetes management at the **point of care** including

- close monitoring and **visualization** of blood glucose
- **workflow** and **insulin dosing** support for clinicians and nurses

[1] CLEMENT, S., BRAITHWAITE, S. S., MAGEE, M. F., AHMANN, A., SMITH, E. P., SCHAFER, R. G. & HIRSCH, I. B., (2004) Management of Diabetes and Hyperglycemia in Hospitals. Diabetes Care, 27, 2, 553-591.

Methods



- **Find common language:** interdisciplinary team (physicians, nurses, technicians, IT-Experts)
- **Develop what nurses and clinicians need:** user-centred design approach
- **Improve by experience:** iterative development; mock-ups and early prototypes as trigger for clinical personnel
- **Make it safe for patients and users:** continuous risk management in the team (MDD-S), clinical trials
- **Motivation/Empowerment the users:** usability testing, training of clinical personnel

Main requirements

- Provide glucose management directly at the **point of care** (tablet with touch screen)
- Automated **decision support for insulin dosage (DSS)** (based on 3-4 BG measurements a day, SC insulin delivery)
- **Workflow support** and **reminder** for open tasks
- **Documentation** and **visualization** of the most important **parameters**
- **No data** storage on the **mobile device**
- **Distributed/time-independend access** to data from any place in the hospital
- Avoidance of manual (and multiple) inputs; direct connection to the hospital and laboratory information system → **integration of system**

Insulin Dosing Protocol

- Clinical, technical and usability **requirements** for a in-hospital **non-ICU T2DM** dosing protocol
  - safe and effective
  - simple protocol – easy to handle and traceable for clinical personnel
  - fit into workflow for patient treatment at a general ward
  - possibility to integrate into mobile clinical workflow system

→ start with **basal/bolus protocol** of the published **RABBIT 2 trial**[2],[3]

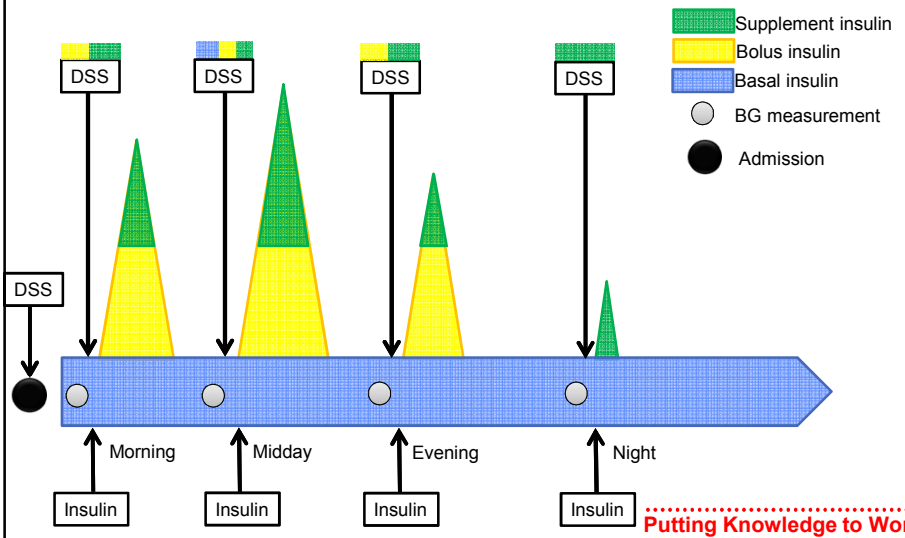
- Transformation of protocol to a **deterministic, robust algorithm** for the electronic system
  - Extension of unknown/incomplete actions (e.g. parameters for daily dose calculation)
  - Consideration of possible side effects (e.g. missing blood glucose values)
- Integration into **workflow** and **insulin dosing** support system for a **general ward**

[2] **UMPIERREZ**, G. E., SMILEY, D., ZISMANN, A., PRIETO, L. M., PALACIO, A., CERON, M., PUIG, A. & MEJIA, R. (2007) Randomized Study of Basal-Bolus Insulin Therapy in the Inpatient Management of Patients with Type 2 Diabetes (RABBIT 2 Trial). Diabetes Care, 30, 9, 2181-2186.

[3] UMPIERRREZ, G. E., HOR, T., SMILEY, D., TEMPONI, A., UMPIEREZ, D., CERON, M., MUNOZ, C., NEWTON, C., PENG, L. & BALDWIN, D. (2009) Comparison of Inpatient Insulin Regimens with Detemir plus Aspart Versus Neutral Protamine Hagedorn plus Regular in Medical Patients with Type 2 Diabetes. Journal of Clinical Endocrinology Metabolism, 94, 2, 564-569.

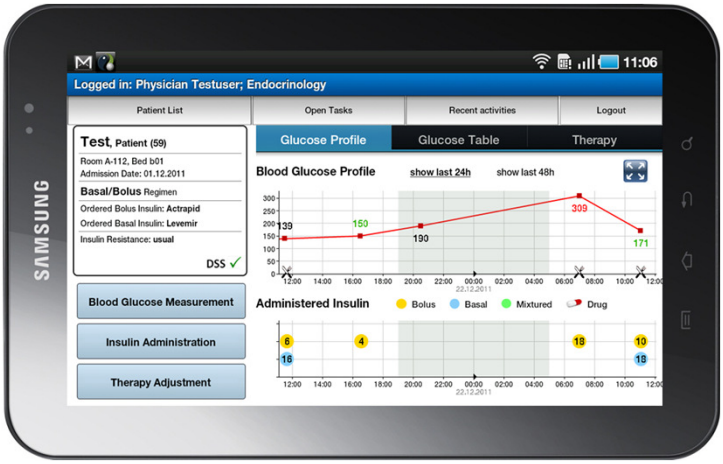
Methods

Basal/Bolus Protocol



Results (3rd iteration)

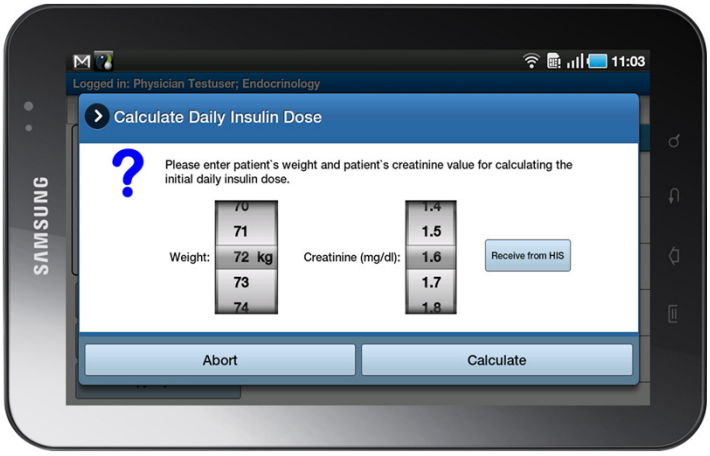
main screen



Putting Knowledge to Work

Results

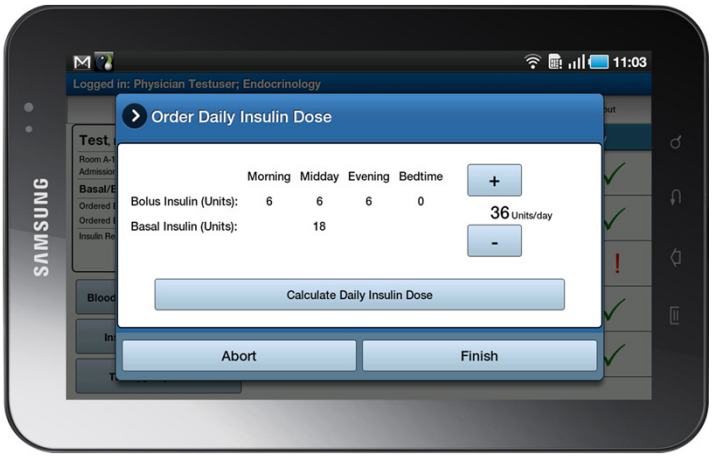
input parameters for initial calculation of daily insulin dose



Putting Knowledge to Work

Results

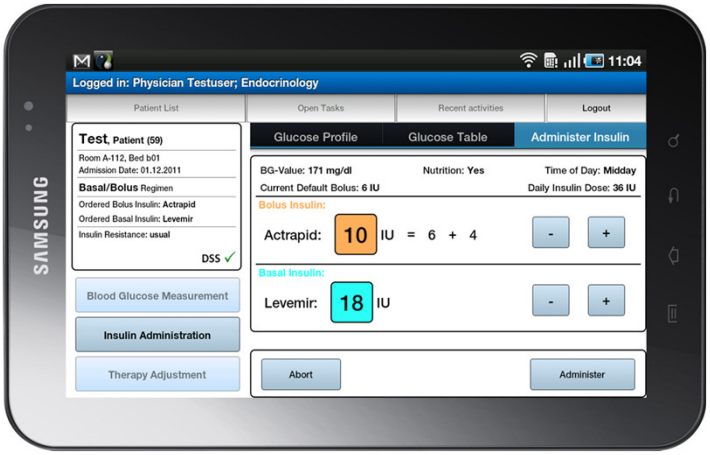
output of initial daily insulin dose calculation



Putting Knowledge to Work

Results

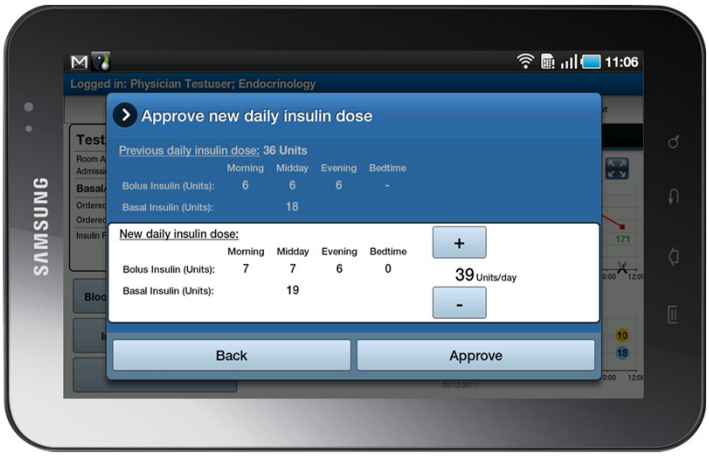
pre-meal insulin dose suggestion by decision support



Putting Knowledge to Work

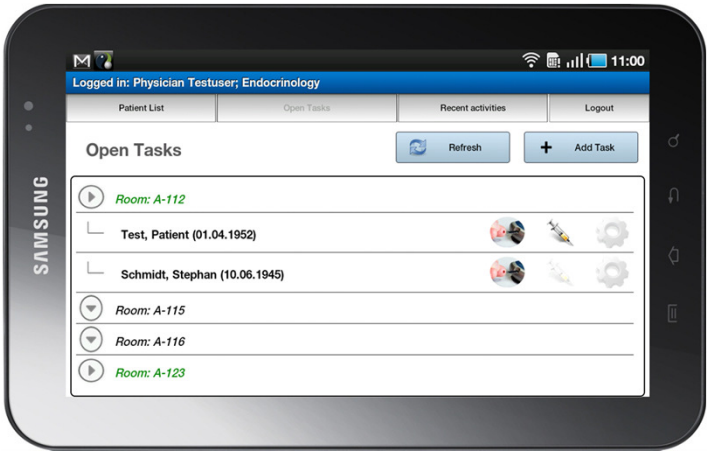
Results

Therapy adjustment – new daily insulin dose



Results

Open Tasks Management



Summary

- Simple to use mobile software solution for non-ICU T2DM patients
- Support of workflow of nurses and clinicians at point of care
- Basal/Bolus protocol for dosing support
- Focus on reduction of functionality and usability
- Results of usability study (9 nurses/5 clinicians) are very positive
- Results of clinical trial are expected in spring 2012 – first results are promising

Outlook

- on-going:
  open, single-centre, controlled trial (37 patients in each group) to investigate the **efficacy, safety and usability** of the insulin dosing protocol **on paper** at the Department of Endocrinology of the Medical University of Graz (MUG)
- Mid of 2012:
  clinical trial at MUG to prove **safety and feasibility** of the software solution
- Begin of 2013:
  plans for clinical trial at hospitals associated with consortium-partner

JOANNEUM RESEARCH

REACTION

Medical University of Graz

Thank you!

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Homepage: http://www.reactionproject.eu/news.php