Delft University of Technology

THR patient's emotional and physical assessment after early hospital discharge

Romero Herrera, Natalia; Jiménez García, Juan; Keyson, David; Havinga, Paul

DOI
10.5354/0719-837X.2018.50231

Publication date
2018

Document Version
Final published version

Published in
Revista Chilena de Diseno RChD Creacion y Pensamiento

Citation (APA)
Romero Herrera, N., Jiménez García, J., Keyson, D., & Havinga, P. (2018). THR patient's emotional and physical assessment after early hospital discharge. *Revista Chilena de Diseno RChD Creacion y Pensamiento*, *3*(4), 1-9. https://doi.org/10.5354/0719-837X.2018.50231

Important note
To cite this publication, please use the final published version (if applicable).
Please check the document version above.

Copyright
Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

Takedown policy
Please contact us and provide details if you believe this document breaches copyrights.
We will remove access to the work immediately and investigate your claim.

This work is downloaded from Delft University of Technology.
For technical reasons the number of authors shown on this cover page is limited to a maximum of 10.

NATALIA ROMERO HERRERA
FACULTY OF INDUSTRIAL DESIGN ENGINEERING
DELFT UNIVERSITY OF TECHNOLOGY
DELFT, THE NETHERLANDS
N.A.ROMERO@TUDELFT.NL
JUAN JIMÉNEZ GARCÍA
FACULTY OF ENGINEERING
ICESI UNIVERSITY
CALI, COLOMBIA
JIMENEZ.JK@GMAIL.COM
DAVID KEYSON
FACULTY OF INDUSTRIAL DESIGN ENGINEERING
DELFT UNIVERSITY OF TECHNOLOGY
DELFT, THE NETHERLANDS
D.V.KEYSON@TUDELFT.NL
PAUL HAVINGA
FACULTY OF ELECTRICAL, MATHEMATICS,
AND COMPUTER SCIENCE
UNIVERSITY OF TWENTE
ENSCHEDE, THE NETHERLANDS
P.J.M.HAVINGA@UTWENTE.NL

THR patient's emotional and physical assessment after early hospital discharge

Evaluación emocional y física del paciente con ATC después de un alta hospitalaria temprana

Abstract. Shorter hospitalisation is a strategy that healthcare services have adopted to solve the problem of high demand for hospitalisation under conditions of insufficient resources. Early discharge demands patients to self-manage their recovery at home, while recovery is still perceived a clinician's responsibility. This often results in an extra emotional and psychological load on patients. Due to the lack of measurements to include the emotional and psychological state of a patient in the home context, clinicians often oversee these issues in the evaluation of patients' recovery during hospital visits. This paper outlines the development of ESTHER 1.0, an electronic tool based on Experience Sampling Method, that encourages senior patients of Total Hip Replacement (THR) to self-report their experiences related to their perceived physical and emotional state during the first weeks of recovery at home. This paper describes the emotional assessment of a THR patient and reflects on the value of this knowledge to develop professional support beyond the clinical recovery.
Keywords: experience sampling method, home recovery, self-assessment

Resumen. El alta hospitalaria temprana es una estrategia que los servicios de salud están adoptando para resolver los problemas de alta demanda en condiciones de recursos insuficientes. Desafortunadamente, esta estrategia afecta negativamente a los pacientes durante su proceso de recuperación en el hogar. Mientras que la recuperación es tradicionalmente percibida como una responsabilidad propia de los profesionales de la salud, ahora se convierte en una responsabilidad compartida con el paciente, generando a estos últimos una carga emocional adicional. El uso exclusivo de métodos estandarizados durante los controles médicos resulta en una evaluación de la recuperación del paciente que no considera el impacto de los estados emocionales y psicológicos que este afronta en el contexto de su hogar. Este artículo desglosa el desarrollo de ESTHER 1.0, una herramienta electrónica basada en Método de Muestreo de Experiencia (ESM), que alienta al adulto mayor que se ha sometido a una artroplastia total de cadera (ATC) a auto-reportar sus experiencias durante las primeras semanas de recuperación en casa. Este artículo describe la evaluación emocional de un paciente con ATC y hace una reflexión sobre el valor de capturar este conocimiento para el desarrollo de ayudas profesionales que van más allá de una recuperación meramente clínica-funcional.
Palabras clave: autoevaluación, método de muestreo de experiencia, recuperación en el hogar.

Fecha de recepción: 11/12/2017
Fecha de aceptación: 21/03/2018
Cómo citar: ROMERO, N. ET ALL (2018) Patient's emotional and physical assessment after early hospital discharge. *RChD: creación y pensamiento, 3*(4), 1-9.
DOI: 10.5354/0719-837X.2018.50231

Revista Chilena de Diseño,
RChD: creación y pensamiento
Universidad de Chile
2018, *3*(4)
http://rchd.uchile.cl

Introduction

Nowadays, medical and economic developments allow more people to undergo Total Hip Replacement (THR) surgery looking for a better quality of life. Shortening hospitalization and displacing the recovery at home are currently implemented to cope the increasing high demand of total hip arthroplasties implanted every year in the world. Early discharge demands patients to self-manage their recovery at home, while recovery is still perceived a clinician's responsibility. Therefore, measuring both patients' health perceptions and satisfaction during recovery is becoming an important element in the evaluation of THR recovery (Grant et al. 2009, Busija et al. 2008, Dorr and Chao 2007, Fortina et al. 2005, Fielden et al. 2003). However, main stream measurements consist of clinical assessments of patients' functional recovery and physiotherapists' assessment from observed performance. Although they are validated instruments, they are inappropriate to assess the contextual factors that influence patients' recovery process at home.

Experience Sampling Method, ESM, (Hektner et al. 2007) is increasingly used in behavioural and social studies to support the recollection of experiences, emotional and psychological assessments related to a particular moment in time or a recent event by means of regular self-report entries (e.g. Groot (2010) and Hachizuka et al. (2010)). On the one hand, ESM tool opens the opportunity to connect objective measurements with subjective assessments and therefore offers a higher ecological validity compared to traditional methods. On the other hand, low compliance due to the high effort and lack of immediate benefit perceived by participants is a known pitfall of ESM interventions (Rek et al. 2013, Myin-Germeys et al. 2009, Scollon et al. 2003).

This paper presents ESTHER 1.0 an in-situ patient-centric assessment tool based on ESM with the purpose to assess patients' home recovery. It integrates patient's own assessment of the perceived physical and psychological aspects of their recovery on a daily basis. It aims to provide a description of the situation of the patient, the changes of determinant factors throughout the recovery period, and the contextual influences related to patients' emotional state and needs over time.

The remainder of the paper introduces the design of ESTHER 1.0 and the case studies to assess the tool. Based on the gained insights, this paper discusses the value of integrating patients' perceived physical recovery and psychological impact in informing homecare solutions for THR that support patients in their home recovery journey.

Methodology

ESTHER 1.0 is a socio-technical platform that enables senior THR patients to report the perceived physical and psychological status of the recovery after discharge (Jimenez Garcia et al. 2011). Mood states are considered a prominent psychological aspect to inform design solutions due to its pervasive influence on users' behaviour and general well-being (Desmet et al. 2016). Therefore, ESTHER 1.0 enables the collection of patients' mood states and perceived physical recovery to understand how mood states' influence and are influenced by the social, physical and psychological context of home recovery.

ESTHER 1.0 invites participants make a quick record at four different points during the day. The implemented protocol aims to support a study designed that capture patients' experiences during the first two weeks of rehabilitation at home right after surgery (see Table 1 for an overview). The protocol divides

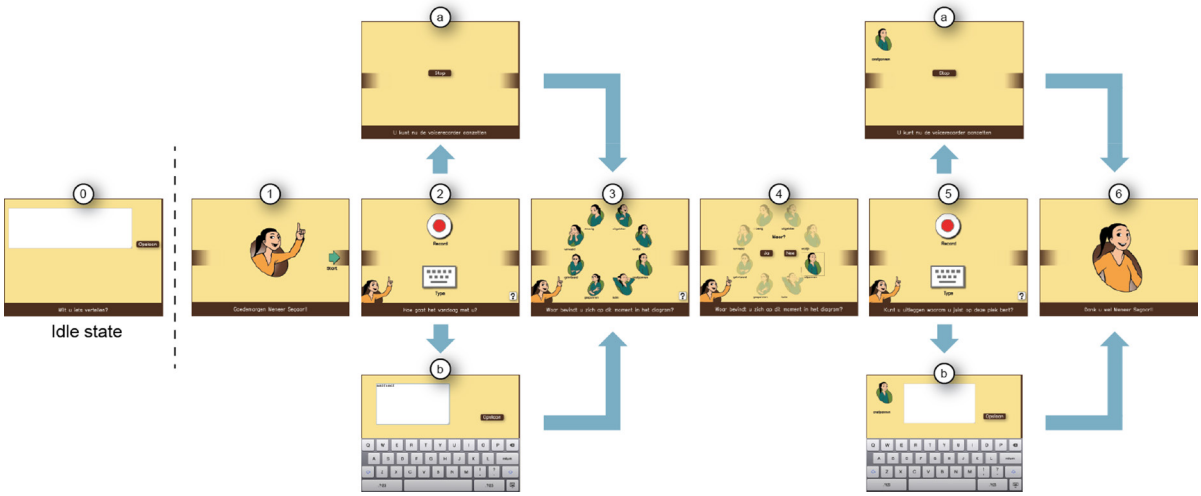


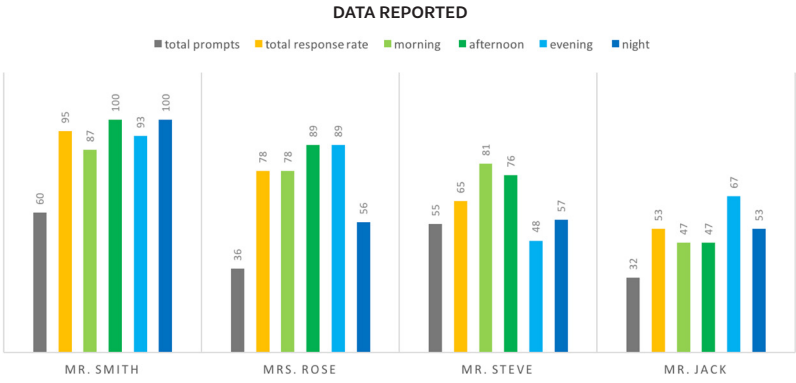
Figure 1. ESTHER 1.0 - Screenshots of the self-reporting flow chart. Source: Compiled by authors.

the day in 4 recognizable moments to trigger a prompt (exact hours, defined by the participant): 1) after waking up, 2) right before/after lunch, 3) tea time, and 4) before going to bed. Each prompt consists of an open question for participants to describe how are they doing (see screens 1 and 2 in Figure 1) followed by open/close question asking participants to assess their emotional state by means of a pictorial representation of moods (Desmet et al. 2016) and to explain their choices (see screens 3, 4, 5 in Figure 1).

Table 1. ESTHER 1.0 - ESM design features

ESTHER 1.0 STUDY DESIGN METHODOLOGY	
Sample period	15 days – right after discharge
Sample group	4 THR patients from same hospital (1 female)
Sampling protocol	Interval-contingent protocol (semi-fixed)
Sampling hours	Morning, noon, evening, night
Reminder	Visual prompt
Data collection	Description of the situation + micro-assessment of mood
Data management	Data stored in a central server
Self-reporting interface	Always on web interface running on full screen on a 9" tablet
Self-reporting platform	web server + database server + HTML5 / AJAX

A two-weeks intervention was designed to deploy ESTHER 1.0 in the context of home recovery of THR patients. The goal is to assess the quality of the data captured and participants' reporting experience. The recruitment involved seven THR patients in a period of one year. Patients were contacted through the Department of Orthopedics, Reinier de Graaf Hospital in Delft, The Netherlands and agreed to use the self-report tool during the first two weeks right after discharge. The recruitment procedure started with the last meeting before surgery where nurses asked consent to patients to participate in the study. Next, an introduction meeting with the researcher took place at the nurse's practice. Finally, a visit at home at the first or second day back home from surgery was used to introduce the tool and setup the prompting protocol. An interactive demo and practicalities about the reporting device were given to train participants how to self-report. After



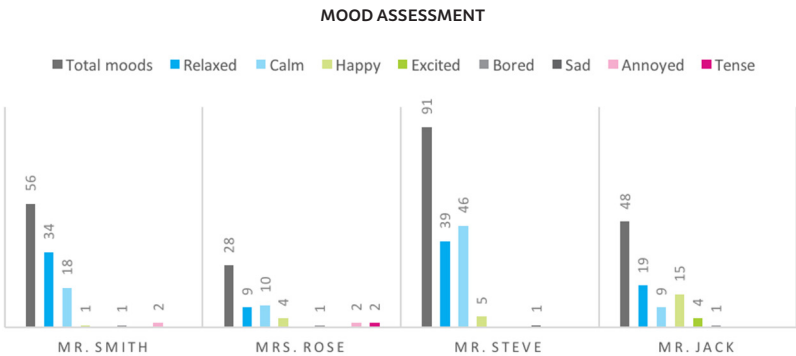


Figure 2. Overview of total reports and percentage of response rate. Source: Compiled by authors.

Figure 3. Overview of type of mood reported. Source: Compiled by authors.

the sampling period, a briefing interview to validate their reports and assess their reporting experience was conducted with the participant and partners, at their homes. Partners were expected to bring an external validation of participants' reported mood states. In one case, the partner was often involved in typing the reports dictated by the participant for convenience. For analysis, a coding scheme was developed in a two-stage process to increase inter-coder reliability: first two coders iterated redefining the coding scheme; the resulted coding scheme was used by a third coder where agreements and disagreements were discussed with the other two coders. Inter-coder reliability was calculated using the Miles and Huberman formula (1994, pp. 64) at the different stages. The final scheme (see Table 2) adds to the already known physical, psychological and social contexts (Grant et al. 2009) two other aspects: environment and overall health. Environment, describes the atmosphere at home of the patient commonly triggered by an external event (e.g. a car trip, a sunny day, bad news). Overall health, captures the general physical state of the patient, which is not particularly related to the hip function, but relate to the patient's recovery process (e.g. fever, swallowed legs, muscle aches).

Table 2. Final coding scheme

FUNCTIONAL	PSYCHOLOGICAL	SOCIAL	OVERALL HEALTH
[PN] Pain	[WoC] Ways of Coping	[SL] Social Life	[BD] Body
[MO] Mobility	[RS] Resources	[SR] Social Roles	
[RT] Rest	[RC] Recovery	[DP] Dependence	

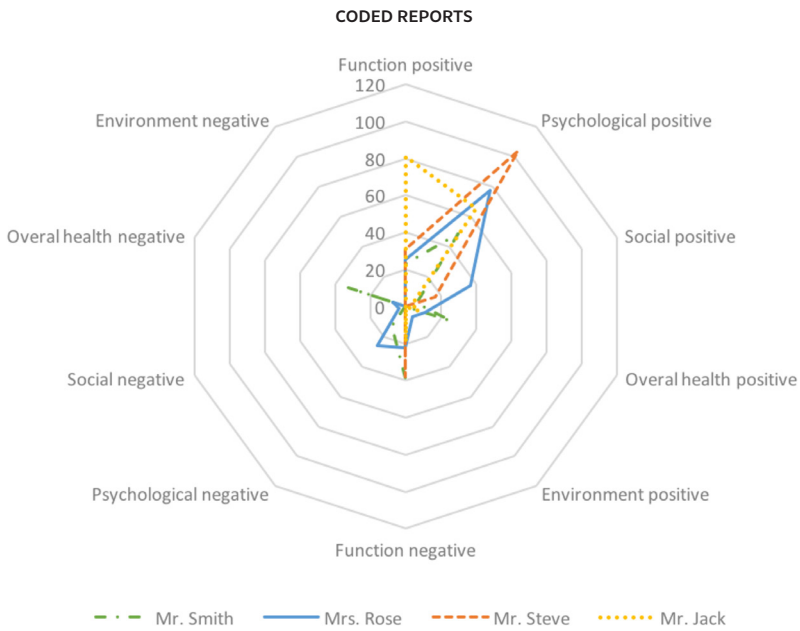


Figure 4. Profiles of relevant contexts that describe THR patients' recovery. Source: Compiled by authors.

The unit of coding analysis was composed by a timestamp and a text that describe the situation, the mood assessment and a text that explain the assessment. Each unit was analysed by coding both texts using the coding scheme. Each code was also signed as positive or negative to identify its effect on the recovery (e.g. a positive pain describes a report that informs less pain).

Results

Due to severe post-surgery complications of two participants and a surgery cancelation, the study involved 4 volunteers (1 female) which completed the 2-week's period (participants are referred by pseudonyms to protect their privacy): Mr. Smith (67 years old, no severe medical history, living with his wife); Mrs. Rose (68 years old, living with her husband, had a breast cancer surgery two years ago); Mr. Steve (56 years old, no medical complications, living with his wife); and Mr. Jack (52 years old, in good health, living with his wife).

The total amount of self-reporting days slightly varied between participants. Due to technical failures, Mrs. Rose's and Mr. Steve's data on the second week was not entirely recorded, and the four times a day prompt were inconsistent for Mr. Steve and Mr. Jack along the study. Figure 2 shows an overview of the data reported. For the analysis, only the first 8 days of all participants were coded with a total of 113 units (31, Mr. Smith; 27, Mrs. Rose; 29, Mr. Steve; and 26, Mr. Jack). Figure 3 shows an overview of the mood assessment of each participant. From visual inspection, it can be seen that the mood assessment was predominantly positive across participants. Relatively, Mrs. Rose had the highest percentage of negative reports (18% of total reports).

All five contextual dimensions of THR recovery were represented in the total set of reports: hip function 93%, psychological 83%, social 34%, overall health 84% and environment 6%. Figure 4 illustrates the multidimensional contextual profiles of each case by visualising the representativeness of the codes and their valence (positive and negative). There is a clear tendency across

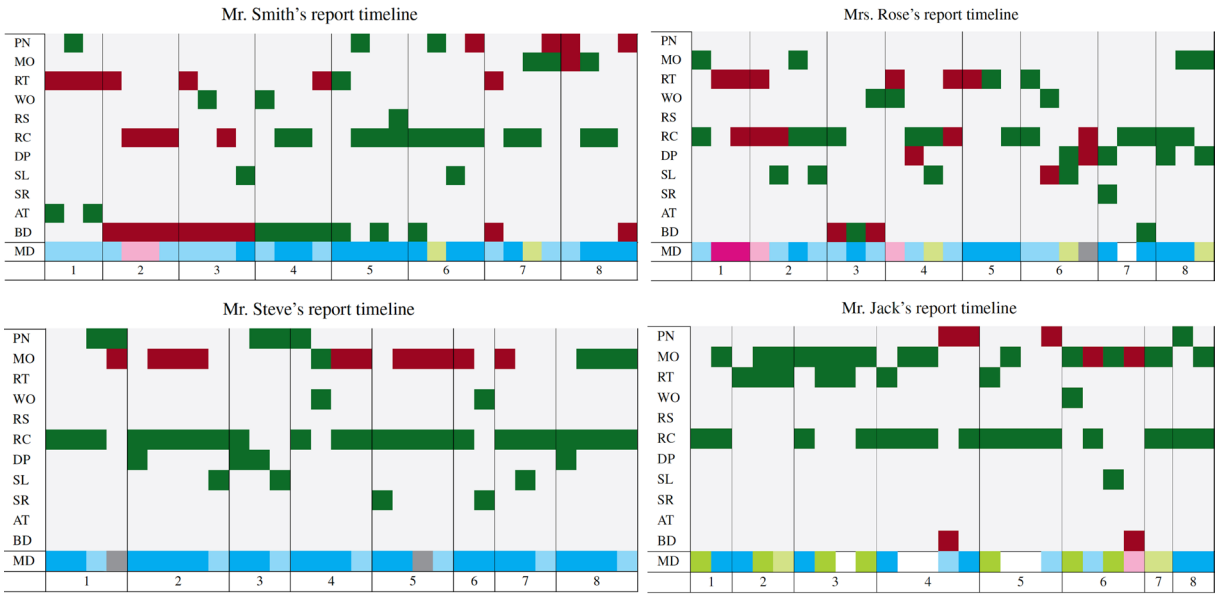


Figure 5. Reports and mood assessments overtime. Green reports represent positive experiences and red negative experiences. For mood assessment (MD), green represents excited, light-green happy, blue relaxed, light-blue calm, grey bored, dark-grey sad, light-pink annoyed and dark-pink tensed. Source: Compiled by authors.

cases to describe the recovery with a positive psychological mind-set. Negative psychological factors were only reported occasionally by Mrs. Rose and Mr. Smith. Mrs. Rose's recovery was uniquely described by the influence of a positive social context. Mr. Smith's recovery was predominantly described by an exchange of negative and positive overall health factors and functional factors. Mr. Steve was uniquely described by strongly psychological positive attitude despite occasionally positive and negative aspects on the functional context. Finally, Mr. Jack was primarily described by an overall positive functional and psychological state with some negative functional aspects.

These descriptions showed that participants focused on different problems depending on what is important for them. The medical background of Mrs. Rose (a history of cancer) showed that she was more cautious and able to resist pain as well as more patient and positive towards small improvements. This is reflected in her modest assessment of the functional aspect. On the contrary, Mr. Smith and Mr. Jack's self-confidence were evident in their reports referring to the frustration towards overall health problems as they felt at points that the progress was apparently decreasing and the doctor suggested them to slow down. The excess of self-confidence was explained by the relatively more negative functional reports. Mrs. Rose and Mr. Steve reported generally more experiences related to social aspects, which reflects that social roles and the importance of social contacts can affect some people more than others.

Figure 5 provides a colour coded representation of the text reports and mood assessments over time. Positive mood reports were generally dominant in the second half of the week, represented by relaxed states and initial signs of happy feelings. In contrast, the first week of three participants was characterised by negative moods reflecting participants' state of annoyance and stress during the first days after the operation, e.g. "I sleep rather badly and I'm worried for the night to come" - Stressed [Mrs. Rose]; "Like everyday I am here because I am not able to go anywhere else" - Bored [Mrs. Steve]. Mr. Jack's first week was however, represented as positive while in the second week the presence of an-

noyance was observed due to early perceived physical complains. This was later explained by an over-confidence of his physical abilities in the first week, which made him experience a recoil in his recovery in the second half. As a general remark, high arousal in mood assessment was rarely observed.
During the interviews, participants reported a general positive experience with ESTHER 1.0. Although the tool was not directly meant to support the recovery process, participants expected that support. Nevertheless, they reported the action of self-reporting as a meaningful activity that triggered reflection and helped them in becoming more aware of their progress. Mr. Smith, Mrs. Rose and Mr. Jack considered the tool as an entity they share their reports with. In particular, Mrs. Rose appreciated the opportunity the tool gave her to express some of her feelings without bothering her family members.
Regarding the appropriateness of the questions (prompts) participants reported that after one week it became difficult for them to say something relevant or new. The first week is experienced as a roller coaster of mood changes combined with clear signs of their physical recovery. But later, unless a complication arose, their emotions become more stable as uncertainty decreases and the recovery progress slows down; patients feel they know what to expect.

Discussion

The present study may be considered a costly endeavour, while it opens opportunities to generate knowledge around the complexity of patients' integral health situations. The close involvement of patients in the collection of data resulted in a unique dataset. On the one hand, it contains detail descriptions of patients' physical situation combined with micro assessments and explanations of their emotional state; on the other hand, it provides a view of patients' recovery overtime. The preliminary dataset identifies patients' recovery profiles that brings to surface the predominant individual concerns connected with emotional states. Firstly, the knowledge gathered from these profiles is a step further to extend the existing understanding on THR recovery by connecting contextual information (e.g. social, overall health, environment) to the recovery process. Secondly, the experiential richness of the first week is identified and characterised, which can lead to new insights in the personalisation of recovery support. Further development of this knowledge should strength the connection between patients' behaviour and experiences with their (health) background and first week of self-reports and assessment of their recovery.
Acknowledging that the medical and health research community require validated measurements for their protocols, the value and benefits of including patients' experience insights faces important challenges. Validating ESTHER 1.0 by comparing with existing measurements make difficult to test its subjective and overtime sensitivity. Two suggestions are proposed. First, based on the functional and experiential representation of the five dimensions defined in the coding scheme the tool could be redesigned by making explicit links between prompts and dimensions, therefore outcomes could be comparable to existing measurements. Second, a validation study covering a larger number of patients would help to analyse the predictive capabilities of a large set of subjective data at the individual but also cross-patients level.
ESTHER 1.0 was welcomed by patients in a stressful context where they are confronted with the difficulties of the first weeks after surgery. However,

after the first critical week, participants perceived the pressure to self-report, since nothing new was happening, and therefore the tool was experienced as less useful. In addition, patients could not link the purpose of the tool to their expectations to be helped in their physical recovery process. Two opportunities are identified in the direction of extending ESTHER 1.0 as a supportive tool. First, the benefits of visually displaying the reported data could help patients to self-reflect on their own process minimizing frustration and empower them to be more in control of their recovery. As observed during the ESTHER intervention, the moods reports were seen as one way to provide automatic visualizations (as seen in Figure 5) but more nuances could be provided if relations could be automatically identified with the reported data. Second, it is foreseen that by providing along the individual also community benefits it could encourage active participation in one's condition. One could for instance think of providing different visualisations with average recovery process overtime for different patient profiles. This could enable peer groups to form, and peer to peer support by helping and getting support from others that are coping with similar problems, as well as by accessing insights from previous patients' experiences.

Conclusion

ESTHER 1.0, Experience Sampling for Total Hip Replacement, is presented and discussed as an implementation of an in-situ experience sampling and assessment tool to describe and explain THR home recovery overtime. It provides an understanding of the situation of the patient, identifying individual determinants that influence the recovery. The initial findings can be aligned with the qualitative research of Grant et al. (2009), where Hip Function problems were observed to be more important at the beginning of the recovery. The reports indicated that a recovery could be better understood when both physical and emotional dimensions are connected. By making these relations to significant moments, the implementation of personalised and focalised support could be designed by looking at further classifications of these reports.

The future development of ESTHER as a supportive health system will address three main findings from this study: 1) the value of the subjective data collected using an in-situ tool that enables timed and situated patients' reports; 2) the potential use of self-reporting as a mean for patients to reflect on their process; and the 3) evident need for patients to understand their physical progress. Further design research activities will explore the opportunities and challenges to add patients' health sensed data from on-body sensor nodes, and validate the integration of both subjective and objective sources of data for patients, physiotherapists, medical professionals and researchers.

Acknowledgement

This work has been partially financed by SENIOR project consortium in collaboration with Department of Orthopaedics of Reiner de Graaf hospital.

References

Busija L., Osborne R.H, Nilsdotter A., Buchbinder R., & Roos E.M. (2008). Magnitude and meaningful- ness of change in SF-36 scores in four types of orthopedic surgery. *Health and Quality of Life Outcomes*, 6(1), 55.

Desmet, P. M. A., Vastenburg, M. H., & Romero, N. (2016). Mood measurement with Pick-A-Mood: Review of current methods and design of a pictorial self-report scale. *Journal of Design Research*, 14 (3), 241-279.

Dorr, L. D., & Chao, L. (2007). The emotional state of the patient after total hip and knee arthroplasty. *Clinical orthopaedics and related research*, 463, 7-12Fielden, J. M., Scott, S., & Horne, J. G. (2003). An investigation of patient satisfaction following discharge after total hip replacement surgery. Orthopaedic Nursing, 22(6), 429-436.

Fortina M., Carta S., Gambera D., Crainz E., & Ferrata P. (2005). Recovery of physical function and patient's satisfaction after total hip replacement (THR) surgery supported by a tailored guide-book. *Acta Bio Medica Atenei Parmensis*, 76, 152-6.

Grant S., St John W., & Patterson E. (2009). Recovery From Total Hip Replacement Surgery: "It's Not Just Physical". *Qualitative Health Research*, 19, 1612-1620.

Groot P. C. (2010). Patients can diagnose too: how continuous self-assessment aids diagnosis of, and recovery from, depression. *Journal of Mental Health*, 19, 352-362.

Hachizuka M., Yoshiuchi K., Yamamoto Y., Iwase S., Nakagawa K., Kawagoe K., & Akabayashi A. (2010). Development of a Personal Digital Assistant (PDA) System To Collect Symptom Information from Home Hospice Patients. *Journal of Palliative Medicine*, 13(6), 647-651.

Hektner J.M., Schmidt J.A., & Csikszentmihalyi M. (2007). *Experience Sampling Method: Measuring the Quality of Everyday Life*. Sage Publications: London.

Jimenez Garcia, J.C., Romero N., & Keyson, D. (2011). Capturing patients' daily life experiences after Total Hip Replacement. In *the 5th International Conference on Pervasive Computing Technologies for Healthcare*, 226-229, IEEE.

Miles, M., & Huberman, M (1994). *Qualitative data analysis: an expanded sourcebook*. Sage Publications.

Myin-Germeys I., Oorschot M., Collip D., Lataster J., Deles- Paul P., & Van Os J. (2009). Experience sampling research in psychopathology: opening the black box of daily life. *Psychological Medicine*, 39, 1533-1547.

Rek, M., Romero, N., & van Boeijen, A. (2013). Motivation to Self-report: Capturing User Experiences in Field Studies. In *Human Computer Interaction*, 111-114, Springer.

Scollon, C., Kim-Prieto, C., & Diener, E. (2003). Experience Sampling: Promises and Pitfalls, Strengths and Weaknesses. *Journal of Happiness Studies*, vol 4(1), pp. 5-34.