

Early Mobilization at the Paediatric Intensive Care Unit (PICU)
Assessing safety, feasibility, and acceptability in an exergame for the respiratory
function

A Mixed-Methods Pilot Study

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Abstract

Objective. This pilot study aimed to evaluate the safety, feasibility, and acceptability of the SilverFit Flow to assist early mobilization in the form of training the respiratory function at a PICU setting. **Method.** The study used a mixed-method design. Participants were recruited via a convenience sampling method at the PICU of the University Medical Centre Utrecht (UMCU). Patients were asked to participate in a trial to use the SilverFit Flow one, two, or three times. In total, four patients, four caregivers and four professionals were recruited. Descriptive statistics was gathered via observation and satisfaction forms. In addition, qualitative data was gathered via semi-structured dual interviews with the patients and caregivers and semi-structured interviews were done with the professionals. **Results.** Including patients for this study was much harder than expected due to various factors. In the end, the sessions with the SilverFit Flow took on average 20.1 minute (SD=5.9). One professional was needed in almost all sessions. The SilverFit Flow had no adverse events with a direct relation to the system. The issues that occurred during the sessions (N=13) were mostly that the game was too complicated for the patient (N=7). Professionals mainly gave enthusiastic reactions and mentioned that the SilverFit Flow would suit at the PICU. Yet they also mentioned some barriers (such as, low priority and the pain or energy of the patient) and some suggestions for improvements (such as, structuring the process and indicating provider champions). Both patients and their caregivers were very satisfied with the SilverFit Flow and indicated that the SilverFit Flow was fun, a good addition to care and a nice way of monitoring progress. Suggestions for improvement included making the game more targeted to the patients of the PICU and increase the structure of the implementation process of the SilverFit Flow at the PICU. **Conclusion.** This study suggest that the SilverFit Flow seems safe, feasible and acceptable to assist early mobilisation (via training the respiratory function) in children at the hospital. However, the study revealed that inclusion was difficult and therefore more research is needed, also in other PICUs. It is recommended to further research the implementation of the SilverFit Flow at a PICU.

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Introduction

In 2019, most recent numbers, 3136 children were admitted to the paediatric intensive care unit (PICU) in the Netherlands (Klein and colleagues, 2021). According to the annual report of the Dutch Paediatric Intensive Care Foundation (PICE), these children have an average length-of-stay of 5.7 days. The maximum length-of-stay that occurred for a patient at the PICU in 2019 was 213 days (Klein and colleagues, 2021). According to a systematic review of Wieczorek and colleagues (2015), children confronted with a critical illness and, therefore, admitted to a PICU experience many negative changes (e.g., decreased muscle mass and strength). In addition, cognitive status is negatively correlated with an admission to the PICU (Royer & Busari, 2021). For example, anxiety and depression are more common among children who were admitted to a PICU than other children (Royer & Busari, 2021). These negative changes experienced by patients are for the biggest part due to the underlying illnesses but can be reduced with the way how care is provided at a PICU. Traditionally, patients at a PICU are sedated and confined to bed for prolonged periods of time (Wieczorek et al., 2015; Wieczorek et al., 2016).

A shift in focus could be adding early mobilization to the standard care at PICUs. Mobilization of the patients at the PICU is defined by Chacon and colleagues (2015) and Wieczorek and colleagues (2016) as formulating and aiming to achieve physical therapy goals (Cuello-Garcia et al., 2018). “Early” is immediately when contraindications are absent and a set of systems-based safety criteria are met (Choong et al., 2017; Cuello-Garcia et al., 2018). Accordingly, early mobilization is immediately formulating and aiming to achieve physical therapy goals of patients at the PICU when contraindications are absent, and a set of system-based safety criteria is met. A primarily important physical therapy goal for early mobilization is the respiratory function (Walker & Kudchadkar, 2018). When the respiratory muscle is insufficient, other physical therapy goals (for example, leg/arm muscle training) for early mobilization are much harder to achieve (Walker & Kudchadkar, 2018; Wieczorek et al., 2015). Therefore, respiratory muscle training initially is treated as a crucial physical therapy goal for early mobilization of patients. Early mobilization is considered a safe and feasible intervention to tackle the negative consequences of admission to a PICU with traditional care (Piva et al., 2019; Wieczorek et al., 2015). Different short- and long-term benefits of including early mobilization at a PICU are peripheral muscle and respiratory strength, quality of life, decreased sedation (Wieczorek et al., 2015), improvement of the sleep-wake cycle, reduction of

hospitalization costs, increased family satisfaction, increased satisfaction of the multi-professional team (Johnston & Carvalho, 2020), decreased rates of delirium, a reduction in the number of ventilator days, the improvement in physical functioning and a reduction in the PICU and hospital lengths of stay (Johnston & Carvalho, 2020; Wieczorek et al., 2015).

Despite the many benefits, early mobilisation is not common yet (Wieczorek et al., 2015). Wieczorek have conducted a systematic literature review and found multiple barriers for the implementation of early mobilization at the PICU. Identified barriers for implementing early mobilization at the PICU are the need for physician orders, a lack of practice guidelines, a lack of provider champions, conflicting views regarding patient suitability for therapy, and poor communication regarding early rehabilitation in the PICU during medical rounds (Wieczorek et al., 2015). In addition, family caregivers and clinicians have certain impressions regarding early mobilization, which are disabling the process of implementing early mobilization, like for example, low prioritization of mobilization and low patient motivation (Zheng et al., 2018). Lastly, barriers are safety concerns of family caregivers and clinicians and insufficient equipment for early mobilization according to clinicians (Wieczorek et al. 2015; Zheng et al., 2018). All these barriers make it a problem to successfully implement early mobilization at the PICU.

A way to potentially reduce the barriers of early mobilisation could be exergames. Exergames are active computer and video console games and potentially provide a promising opportunity to contribute to young people's energy expenditure (Daley, 2009). Children generally show enthusiasm and enjoyment for active video game interventions (Biddiss & Irwin, 2010). This general enthusiasm and enjoyment might tackle the barrier of family caregivers' and clinicians' perception about the lacking motivation of children at the PICU for early mobilization exercises (Zheng et al., 2018). Secondly, an exergame could increase physiotherapy resources at the PICU, which could tackle the barrier of insufficient equipment. In addition, computer- and video console games have a variety of opportunities. Therefore, the exergame can be developed and adapted in a way that the equipment is sufficient. Even after implementation the software and hardware can often be adapted based on improvement suggestions. Thirdly, an exergame could reduce the barriers of a lack of practice guidelines and poor communication regarding early mobilization in the PICU during medical rounds. Because, via an exergaming system it is often possible to provide patients and professionals at the PICU with information to monitor the patients' progress and to store this data of the patients. In addition, practice guidelines can be included within the exergame via, for example, a step-by-step program while using the exergame for the first time.

Some studies already explored the potential of exergames at the PICU to assist early mobilization (Abdulsatar et al., 2013; Chacon et al., 2015; Hemphill et al., 2021; Lai et al., 2021). In these studies, different forms of exergames were used to assist early mobilization at a PICU. For example, Abdulsatar and colleagues (2013) used the Nintendo Wii Boxing, Chacon and colleagues (2015) used the Nintendo Wii Sports pack and Mario Kart, Hemphill and colleagues (2021) used a HTC VIVE headset with two controllers playing Beat Saber (Hemphill et al., 2021) and Lai and colleagues (2021) used a Oculus HMD combined with the system WalkinVR to play various games (e.g. Thrill of the Fight or Wolves in the Wall). Altogether, these studies showed that exergames to assist early mobilization are safe, but different feasibility issues arise for different exergame interventions. For example, the feasibility of the Nintendo Wii Boxing is challenging, because children at the PICU have complex chronic illnesses and dissimilar baseline functional and cognitive abilities (Abdulsatar et al., 2013). In addition, the Nintendo Wii Sports pack and Mario Kart were only feasible when patients had an appropriate age and were cooperative (Chacon et al., 2015). While more recent studies argue that with careful attention, exergames to assist early mobilization can be safe and feasible (Hemphill et al., 2021; Lai et al., 2021). Accordingly, feasibility issues sometimes arises when exergames to assist early mobilization at PICUs are implemented.

A targeted and more advanced exergame might reduce the feasibility issues for using an exergame to assist early mobilization at the PICU. Hemphill and colleagues (2021) already suggested to investigate what a good execution of an exergame to assist early mobilization at the PICU is. Several studies in other groups that struggle with rehabilitation therapy stated targeted and more advanced exergames as a solution to overcome barriers for physical exercising (Karssemeijer, 2019; van der Kolk et al., 2019; Stanmore et al., 2019). For example, exergames helped people with dementia to overcome barriers to physical activity (Karssemeijer, 2019). People with mild Parkinson's disease were able to aerobic exercise at home via advanced exergames (van der Kolk et al., 2019). And a last example, people above 55 years old were able to improve balance, and reduce pain and the fear to fall, with the OTAGO/FaME-based strength-and-balance-exergame (Stanmore et al., 2019). A targeted and more advanced exergame might therefore be a solution for the feasibility issues of exergames to assist early mobilization at PICUs. This raises the question what a good targeted and advanced exergame for early mobilization at PICUs looks like.

An exergame can be scored on the variable's safety, feasibility, and acceptability to assess whether an exergame is sufficiently targeted and advanced enough for clinical practice. **Safety** of an exergame intervention to assist early mobilization is commonly defined in science

through the occurrence of adverse events (Abdulsatar et al., 2013; Chacon et al., 2015; Gomes et al., 2020; Lai et al., 2021). Lai and colleagues (2021) defined adverse events via a university's institutional review board as “...*any untoward or unfavourable medical occurrence in a human subject.*” Different adverse events are falls, fainting, nausea (Lai et al., 2021), the need to increase medication or oxygen supply (Gomes et al., 2020), persistent tachycardia, tachypnea for age, increased work of breathing (Abdulsatar et al., 2013), arrhythmia, fall in oxygen saturation to < 85% (Abdulsatar et al., 2013; Kho et al., 2012), pain or discomfort (requiring more than the usual patient's sedation/analgesia), (musculoskeletal) injury (Abdulsatar et al., 2013; Chacon et al., 2015) hypo-or hypertension, (Abdulsatar et al., 2013; Chacon et al., 2015; Kho et al., 2012), and the accidental removal of a catheter, tube, drain, probe, or oxygen therapy device (Abdulsatar et al., 2013; Chacon et al., 2015; Gomes et al., 2020; Kho et al., 2012). An early mobility physical therapist can observe and determine whether an occurring adverse event is attributable to the study procedures (Abdulsatar et al., 2013; Lai et al., 2021).

The **feasibility** of an exergame to assist early mobilization includes a variety of outcomes to estimate what is necessary to implement an exergame. Outcomes include the frequency and type of technical issues experienced by using exergames with patients (Lai et al., 2021; Parke et al., 2020), the session setup time (min), session duration (min), and session clean up time (min) (Chacon et al., 2015; Lai et al., 2021). Additional feasibility outcomes are the number of staff necessary during the session, and the number of games played by the patient (Lai et al., 2021). Feasibility outcomes can better be interpreted with comparing it to the attitude of professionals towards the implementation of the exergame. The five main constructs of the Consolidated Framework of Implementation Research (CFIR) are important in determining a professionals' attitude towards the different aspects of the implementation of an exergame to assist early mobilization (CFIR Research Team, 2022). The CFIR consists of five main constructs:

- 1) the intervention, key attributes of the intervention influence the success of the implementation;
- 2) the inner setting, key attributes of the organisation in which the intervention takes place influences the implementation success;
- 3) the outer setting, key attributes from outside the organisation have an important influence on the success of implementation;
- 4) the process, key attributes of how the intervention is implemented has influence on its success; and

5) the individuals, the ones within the organisations that directly influence the implementation are key to the success of the implementation. (CFIR research team, 2022) These five constructs are extensively associated with effective implementation and are therefore useful to take into account when determining the feasibility through the professionals' attitude towards the exergame.

The **acceptability** of an exergame to assist early mobilization is about the users' satisfaction (Badke et al., 2019; Gomes et al., 2020; Parke et al., 2020; Wren et al., 2021). It is often measured by a satisfaction questionnaire in, for example, an interview with patients and/or caregivers (Badke et al., 2019; Gomes et al., 2020; Parke et al., 2020; Wren et al., 2021). Measuring safety, feasibility and acceptability helps determine whether the exergame is sufficiently targeted and advanced enough to support early mobilization at the PICU.

In sum, shifting focus by adding early mobilization to traditional care at PICUs could potentially increase health of patients. A first important physical therapy goal to increase health with early mobilization is good breathing. Nevertheless, implementing early mobilization have several barriers. These barriers might be reduced by an exergame. Exergames are considered safe in a hospital setting, but not always feasible. To overcome the feasibility issues, targeted and more advanced exergames are a potential solution. It raises the question what the best execution of a targeted and more advanced exergame to assist early mobilization at PICUs is. In determining what a good execution of a targeted and more advanced exergame is research should focus on safety, feasibility, and acceptability. For feasibility, implementation research is useful and consists out of five main constructs associated with effective implementation, the intervention, inner setting, outer setting, process, and individuals. In this study, the execution of an exergame is the SilverFit Flow (Appendix I). The SilverFit Flow is evaluated on the three variables, safety, feasibility, and acceptability. Research questions for this study are:

1. To what extend is the SilverFit Flow to assist early mobilization at the PICU safe in terms of adverse events rates?
2. To what extend is the SilverFit Flow to assist early mobilization at the PICU feasible in terms of objective outcomes and subjective professionals' experiences towards the five main constructs associated to effective implementation of an innovation?
3. To what extend is the SilverFit Flow to assist early mobilization acceptable in terms of users' satisfaction at the PICU?

The answers to the research questions form the basis to determine if the SilverFit Flow is targeted and advanced adequately to practically assist early mobilization at a PICU.

Methods

Design

This study was conducted at the PICU of the Wilhelmina Children's Hospital (part of the University Medical Centre Utrecht, UMCU), the Netherlands. From February 2022 to April 2022, patients at the PICU and their caregivers were asked to use an exergame to assist early mobilisation. In addition, professionals who worked with the exergames were asked to participate in post-session interviews. The exergame that was used during the sessions was the SilverFit Flow.

The study used a mixed-methods approach. Four different studies were conducted. An observation of the patients during the sessions, satisfaction of the patient forms immediately after the sessions, post-session dual interviews with patients and caregivers, and post-session interviews with professionals at the PICU. The post-session interviews with patients and caregivers took place in May 2022. The post-session interviews with professionals took place in June 2022.

The UMCU had obtained a "nWMO verklaring" of the Medisch Ethische Toetsingscommissie (METC) Utrecht (case no. 21/698) for this study. In addition, the study received ethical approval from the BMS ethical committee of the University of Twente (case no. 211403).

Participants & Procedure

The participants were recruited via a convenience sampling method. The participants in this study were patients, their caregivers, and professionals at the PICU. Patients were between eight and nineteen years old. All eligible patients during the time period were recruited for participation, and were, therefore, asked by professionals at the PICU to participate. Patients were not eligible when, for example, patients are not conscious, were not able to manage the Dutch language or did not consent to participate.

Patients and their caregivers had to agree on an informed consent to participate (Appendix II). When consented to participate, a patient was able to try out the SilverFit Flow. It was aimed to let patients try out a system on three separate moments. For safety reasons, at least one professional had to decide what moment a patient was eligible to participate. This professional had to be present during the sessions. In addition, the professional decided which game and settings were used and made a final decision if the patient could participate since the impact of the study on the participant had to remain minimal. On forehand of the sessions,

professionals received a video instruction on how to use the SilverFit Flow and they received the manuals of the system.

After the patients tried the SilverFit Flow, a researcher contacted the caregivers and planned a dual-interview the patient and their caregiver. After these dual-interviews, the professionals who used the SilverFit Flow at the PICU with patients were asked to participate. When agreed to participate, they were interviewed by the same researcher.

Exergame

The SilverFit Flow (see Figure 1 & Appendix I) offers exercises aimed at the rehabilitation of respiratory muscles. These are important muscles for early mobilization as good breathing has to be present in order to aim for other physical therapy goals (Walker & Kudchadkar, 2018; Wiczorek et al., 2015). It is a virtual therapy system and can be moved to be used in various locations. The exercises can be used in addition to, or as a change from, regular breathing training. The SilverFit Flow can only be used in combination with the supplied respiratory sensor (Appendix I). In addition, the SilverFit Flow is only useable for the following indications:

- Improving breathing techniques,
- Improving inspiratory and/or expiratory muscle strength
- Breathing rhythm training
- Building physical performance capacity

Figure 1. The SilverFit Flow materials and an example of one game ('diamantmijn')



The system offers a number of breathing exercises in game form.. The games have been developed in such a way that the desired exercise matches the visualization on the screen. It is possible to monitor the patient's performance to retrieve the progress made.

Materials & Data analysis

As mentioned earlier, four studies were conducted. The studies aimed to measure safety, feasibility, and acceptability of the SilverFit Flow. Table 1 shows which study contributes to which variable.

Table 1. Indication of which variable was measured per study

Study	Variable		
	Safety	Feasibility	Acceptability
1. Observations during sessions	X	X	
2. Satisfaction forms immediately after sessions			X
3. Interviews with patients and caregivers			X
4. Interviews with professionals		X	

Study 1: Observations during sessions

Observations were taken during the sessions. The present professional(s) measured and noted their observations on a pre-set observation form (Appendix III) after or during the sessions. Professionals received a protocol on how to fill in the observation form properly (Appendix IV).

Safety. The safety of the SilverFit Flow was assessed via a pre-set table in the observation form with different adverse events (e.g., arrhythmia, pain, or discomfort). The professional putted stripes behind an adverse event when it occurred during session time. The table ended with an open space to write down additional adverse events that occur. Microsoft Excel was used for registering the different adverse events that were noted in the pre-set table of the observation forms for professionals.

Feasibility. The feasibility outcomes in the observation forms for professionals were a variety of outcomes related to the experiences of professionals while using the SilverFit Flow with patients. The experiences were defined as how much effort and resources (e.g., duration of sessions, number of professionals necessary, issues occurred during sessions) were needed for professionals to use the SilverFit Flow with a patient. Additionally, the question was asked if the patient successfully used the SilverFit Flow in which answers varied in ‘yes, without any problems’, ‘yes, with some problems’, ‘yes, with many problems’ and ‘no, it did not work out’.

Means, standard deviations, medians, minimums, and maximums were provided for the number of staff that was necessary to do one session and for the number of games that were played. Means, standard deviations, minimums and maximums were given for all time related

questions in the observation forms (Table 3). A table (Table 4) was provided for which issues were noted in the observation form and the number of times an issue occurred. Microsoft Excel was used for registering data and identifying the descriptive statistics. The issues were also registered and counted in Microsoft Excel.

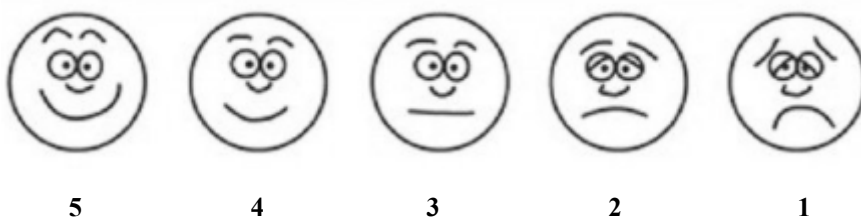
Study 2: Satisfaction forms immediately after sessions

The acceptability of the SilverFit Flow was assessed via satisfaction forms. Questions include how patients and/or caregivers felt about the exergame. For example, if the patients and/or caregivers liked or disliked the exergame. The more positive attitudes are the more acceptable the exergame is (Badke et al., 2019; Gomes et al., 2020; Parke et al., 2020; Wren et al., 2021).

The measuring of users' satisfaction is based on a variety of question from different appendices. At first, the third and fourth question of the observation forms for professionals were part of the satisfaction (Appendix III). Secondly, the third, fourth, and fifth question of the satisfaction forms for patients and caregivers were part of measuring satisfaction. (Appendices V & VI). Microsoft Excel was used for registering data and identifying the descriptive statistics for these questions. A table was provided to show the results for these three satisfaction questions (Table 5).

The third question of all forms was about how the patient experienced the session. Answers ranged from sad (1) to happy (5) on a five-point Likert scale. Emoticons showed which number represented what emoticon (figure 2).

Figure 2. The emoticons in the satisfaction forms



The fourth question of all forms was about if the professional, patient or caregiver thought the SilverFit Flow added positively to good exercising for the patient. Answers varied from yes (1), maybe/a bit (2), and no (3) on a three-point Likert scale. Means, standard deviations, median, minimum, and maximum scores for question three and four were shown.

The fifth question of the satisfaction form for patients and caregivers was used to identify if the patients experienced any burden in playing with the SilverFit Flow. Answers were binary (yes/no). When answered 'yes', patients and/or caregivers had to explain in a few words what burden the patient experienced. For question five, total numbers were shown, and the short explanations were provided when any burden was experienced.

Study 3: Interviews with patients and caregivers

Semi-structured interviews with patients and caregivers were used to measure the acceptability. The semi-structured interviews with patients and their caregivers were done via Microsoft Teams Version 1.0 by a study staff member. The interviews started with questions towards the patient and were followed by question towards the caregiver. Some questions were shown on a Microsoft PowerPoint slide (Appendix VII), and shared via screen-share of the Microsoft Teams application. From the third slide, the questions were no longer shared on screen. In this slide, the questions from the interview scheme (Appendix VII) started. The third slide stayed shared during the remaining of the interview.

The interview started with a complete open question about what the patient and caregiver thought of using the SilverFit Flow. This question is followed by open questions regarding, for example, improvements, if the SilverFit Flow was understandable, preferences for standard exercising or using the SilverFit Flow and why, and if the participant experienced pain or discomfort.

Interviews were audio recorded and transcribed verbatim. Once the transcript of Microsoft Teams was not downloadable. Therefore, the audio recording of this interview was uploaded to and transcribed via Amberscript. Microsoft Teams did not automatically make a distinguishing between patient and caregiver. The distinguishing was therefore made later on by the researcher. The audio recordings were used to correct insufficient transcripts. The scripts were analysed via Atlas.ti 22.3.1.0.

A content analysis was done on the answers of patients and caregivers to create a better understanding of their positive and/or negative attitudes towards the SilverFit Flow. The scripts were preliminary analysed, and text was divided into positive or negative attitude towards the use of the SilverFit Flow. Secondly, new codes were created for the positive and for the negative attitudes. Lastly, all codes were again analysed via reading all quotations to see which codes refer to the same thing. Close to equal codes were merged and redefined. A table (Table 6) was shown with the codes for the positive attitude, frequencies, number of interviews that indicated a code, definitions and an example quote from the dual interviews. In addition, a table (Table

7) was shown with the codes for the negative attitude, frequencies, number of interviews that indicated a code, definitions and example quote from the dual interviews. Quotations that were used in this study were translated via Google translate (Dutch-English).

Study 4: Interviews with professionals

Semi-structured interviews with professionals were used to measure the feasibility. The semi-structured interviews with professionals were done via Microsoft Teams Version 1.0 by a study staff member. An interview scheme was used for the interviews (Appendix VIII). The five main constructs of the Consolidated Framework of Implementation Research (CFIR) were used as a guideline for the questions in the interview scheme. The interview scheme was divided into five sections. Each section represented a CFIR construct. All sections ended with an overarching question regarding one of the five main constructs of the CFIR. Audio recordings were made during the interviews with professionals and there were transcripts of the audio recordings made. The transcripts were analysed via Atlas.ti 22.3.1.0.

The analysis of the interviews with professionals had a more deductive approach than the content analysis of the interviews with patients and caregivers. On forehand, the codes were created. Each of the five main constructs had three codes. Namely, 'facilitator', 'barrier' and 'suggestion'. 'Facilitator' stood for a positive statement regarding that main construct of the CFIR. 'Barrier' stood for a negative statement regarding that main construct of the CFIR. And 'Suggestion' stood for a neutral statement regarding that main construct, which indicated a suggestion for improvement. This made a total of fifteen pre-set codes. The transcripts were read and quotes that suited a pre-set code were bundled into the right code. After that, the transcripts were read a second time to include missing quotations and control if the quotations were put into the right code. The data in each codes were read and subcodes were made from these codes. In a table (Table 8) was shown which subcodes emerged per pre-set code. Quotations that were used in this study were translated via Google translate (Dutch-English).

Results

Low inclusion rate

On forehand, the number of included patients in this study was expected to be higher. In the beginning, the data gathering period was February 2022. In this time period, there was a low amount of eligible patients at the PICU department of the UMCU. Therefore, the data gathering period was extended from February to April 2022. Even these two added months did

not result in including the expected amount of eligible patients. Various causes formed the base of the low included patients' rate. Initially, the COVID-19 pandemic meant that the hospital wanted to keep as many people as possible out of the building. People of the research team did not enter the hospital to reduce the chance of spreading the COVID-19 virus. Therefore, including patients was solely possible by professionals at the PICU. Secondly, the UMCU did not have a lot of eligible patients during the inclusion period. In addition, not all patients were eligible or wanted to participate which resulted in a low group of patients to include at all. Thirdly, patient did not stay long at the PICU causing that the patients were already gone from the hospital before they were asked to participate.

Study group

A total of four patients, four mothers of the patients and four professionals of the UMCU participated in this study (Table 2). Patients were between eight and nineteen years old. In total, the patients were responsible for nine sessions with the SilverFit Flow.

Table 2. Demographics and contributions of patients, caregivers, and professionals

Participant	Number of sessions	Age	Sex
Patients			
Patient 1	1	8	Male
Patient 2	3	13	Male
Patient 3	3	13	Male
Patient 4	2	19	Female
Caregivers			
Caregiver 1	n.a. ¹	n.a.	Female
Caregiver 2	n.a.	n.a.	Female
Caregiver 3	n.a.	n.a.	Female
Caregiver 4	n.a.	n.a.	Female
Professionals			
	Function		
Professional 1	Intensivist	n.a.	Male
Professional 2	Nurse	n.a.	Female
Professional 3	Pedagogical staff member	n.a.	Female
Professional 4	Physiotherapist	n.a.	Female

¹n.a.=not assessed

Study 1: Observations during sessions

Safety. Overall, two adverse events were noted in the pre-set adverse events table. Two times a professional marked 'pain or discomfort (more than usual sedation/analgesia of the

patient) as an adverse event. In one of the two cases, the professional wrote ‘a little’ in the adverse events table. In the other case, the professional wrote down that they did the exercise in the first place because sighing and breathing through hurt. The SilverFit Flow was used as a method to distract the patient from his pain. Nevertheless, they had to stop because the patient experienced too much pain. Later, this patient played another two times with the SilverFit Flow. This time without adverse events.

Feasibility. The total session time varied from nine to thirty-five minutes with an average of 20.1 minutes (SD=5.9) (see Table 3). The installation (M=4; SD=2.2) and clean up (M= 3.1; SD= 1.3) time in minutes were relatively short. The shortest installation time, as well as the shortest clean up time, lasted for one minute. On most occasions, one professional was necessary to let the session with the SilverFit Flow take place. In one session, no professional was necessary, and two sessions needed at least two professionals. On average, 2.1 games (SD=1.1) were played per session.

Table 3. Mean, standard deviation and median for different feasibility outcomes of sessions with the SilverFit Flow (N=9)

Feasibility outcome	Descriptive statistic				
	Min.	Max.	Median	Mean	SD
Total session time (in min)	9	35	26.5	20.1	5,9
Installation time (in min)	1	10	5	4	2.2
Clean-up time (in min)	1	5	5	3.1	1.3
Needed professionals	0	2	1	1.2	1.2
Number of different games played	1	4	3	2.1	1.1

In the observation form the professionals reported four times that it was possible to let the patient play with the SilverFit Flow without any issues. In addition, four times the professionals reported that it was possible to let the patient play with the SilverFit Flow with a few issues.

In the observation form was asked to write down which issues occurred. In total, the professionals reported thirteen issues on the observation form (see Table 4). Technical issues were reported the most. Two technical issues were reported as having to reset/calibrate the system several times during the sessions. Seven technical issues were reported as the system or the game being too difficult for the patient.

Table 4. Total issues (technical, patient-related, and other) reported by professionals during or after the sessions with the SilverFit Flow (N=9).

Issues	Occurrence (in total numbers)	Notes
Technical	9	“Always to reset the system is annoying” “Calibrate went laborious” “The game (‘zeiltocht’) was too difficult” “He had the tendency to breath in and out too fast in the game (‘diamantmijn’)” “He mentioned that the game (‘diamantmijn’) was not reacting adequately” “He breathes too quickly for the game (‘sterrenpad’)” “Diamantmijn” “The games (‘speerwerpen’/‘sterrenpad’) were hard” “The game (‘zeiltocht’) laborious”
Patient-related	3	“A little bit of coughing and therefore some pain” “He didn’t want to continue, because breathing through/sigh was painful” “A little bit difficult to explain, because the patient was scared”
Other	1	“Had to do with instruct ability”

Study 2: Questionnaires immediately after sessions

On a scale from one (negative) till five (positive), patients, caregivers, and professionals rated the attitude of the patients towards the SilverFit Flow. On average, patient rated their attitude with the best score (M=4.4, SD=0.5), compared to professionals (M=3.8, SD=1.2) and caregivers (M=4.0, SD=0.7) (see Table 5). One time, from all eighteen answers to this question, the patients’ experience was rated with a sad emoticon (score 2-). A professional gave an one to the patients’ experience. On the question if the SilverFit Flow stimulates good movement among patients, the median score was three (3=yes). No score of one was given (1=no). Three times a score of two was given (2=a little bit/maybe). Once by a professional, once by a caregiver and once by a patient. One time a mother mentioned that her child had pain during the sessions. Nevertheless, in the notes she wrote that this was good because the pain came from coughing. She mentioned coughing was a good sign. Eight times the caregivers or patient mentioned there was no pain during playtime with the SilverFit Flow.

Table 5. The answers to the satisfaction form questions of professionals, caregivers, and patients for the sessions with the SilverFit Flow (N=9)

Question	Descriptive statistics				
	Min.	Max.	Median	Mean	SD
How positive was the patients’ attitude? (1=most negative ... 5=most positive)					
Professional (n=9)	1.0	5.0	5.0	3.8	1.2
Caregiver (n=4) ¹	3.0	5.0	4.0	4.0	0.7
Patient (n=5)	4.0	5.0	4.0	4.4	0.5
Does this stimulate good breathing? (1=no, 2=maybe/a little, 3=yes)					

Professional (n=9)	2.0	3.0	3.0	2.9	0.3
Caregiver (n=4)	2.0	3.0	3.0	2.8	0.4
Patient (n=5)	2.0	3.0	3.0	2.5	0.4

	Answers		
	Yes	No	Notes
Did the patient experienced pain?			
Caregiver (n=4)	1	3	“He had to cough, which hurts, but was a good sign”
Patient (n=5)	0	5	

¹ N<9 because not all patients or caregivers completed the satisfaction form after all sessions

Study 3: Interviews with patients and caregivers

In total, four caregivers, and three patients were included for the data analysis of the post-session interviews. One patient was not interviewed due to major disability problems. Interviews lasted from twenty-five minutes to forty-five minutes.

In table 6 is shown which codes were made to define the positive attitude of patients and their caregivers towards the SilverFit Flow. In table 7 is shown which codes were made to define the negative attitude of patients and their caregivers towards the SilverFit Flow.

Table 6. The codes for the positive attitude, frequencies, number of interviews that indicated a code, definitions and example quote from the dual interviews (N=4)

Code	Frequency of code	Number of interviews that indicated this code	Definition	Example quote
Care improvement	20	4	Mentioning the SilverFit Flow was better than previous therapy methods	<i>“I think lots of children would choose this instead of the breathing coach”</i>
Fun	32	4	Mentioning joy of the patient or caregiver about the SilverFit Flow	<i>“Because it was just fun”</i>
Performance visible	16	4	Mentioning that seeing what is achieved is positive	<i>“It motivates, she saw for herself that it went forward, it does something”</i>

Exercise	13	4	Mentioning that the breathing exercises are important to do	<i>“I can imagine that this instrument is good to practice with for chronical ill children with lung problems”</i>
Intervention	15	4	Mentioning positive features specifically about the SilverFit Flow	<i>“I saw the nurses with it, and it looked very plain and simple, it was also structured and clear”</i>
Comfort	5	3	Mentioning no pain or discomfort while playing with the SilverFit Flow	<i>“I did not feel pain”</i>

Code 1 – Positive attitude: Care improvement

The first code appeared twenty times in the dataset, which makes the code the second most appearing positive attitude code. It is also the first positive attitude of in total six positive attitude codes. The code ‘care improvement’ refers to the times the patient or the caregiver mentioned the SilverFit Flow was better than previous therapy methods. Other therapy methods could, for example, be the breathing coach or a breath training device. An example of a quotation within this code is: *“I did not bother doing this. For example, what I first had, what I showed you, I just really did not want to do that, and this was not so bad to do”*.

Code 2 – Positive attitude: Fun

The second code appeared thirty-two times in the dataset, which makes it the most frequent appearing positive attitude code. The code ‘fun’ refers to the moments that the patient or caregivers mentioned joy with playing the SilverFit Flow games. The joy could be within the patient. For example, when the caregiver mentioned: *“He quite liked it, yes”*. Or, when the patient mentioned this by himself: *“I liked getting more and more diamonds. I wanted diamonds”*. But the joy could also come from the caregivers. For example, *“I absolutely liked it, such an innovative and nice idea”*

Code 3 – Positive attitude: Performance visible

The third code appeared sixteen times in the data. The code ‘performance visible’ refers to the moments the patient or caregiver mentioned the positive effect of seeing reaction from the action that the patient does. A lot of times the words ‘stimulates’ and ‘motivates’ were found in the quotations of the code performance monitor. It is especially mentioned that it motivates or stimulates children to do their exercises. For example, *“I think it is a little distraction too. Children have something to see, something happens and so it is the combination of a stimulation to start and use your lungs well and you have a kind of distraction, a little game”*. On the other hand, it is also mentioned that seeing the action on a screen can be valuable for caregivers or even doctors: *“You just see that he breathes shallow, also for doctors this could be interesting”*.

Code 4 – Positive attitude: Exercise

The fourth code showed up thirteen times in the data of the interviews with patients and caregivers. The code ‘exercise’ refers to the patient or caregiver mentioning that the exercise of the SilverFit Flow is important to do. For example, *“I think the system is a good intervention to let children practice breathing, because the games offer a variety of breathing exercises”*.

Code 5 – Positive attitude: Intervention

The fifth code from the data appeared, almost similar to the code ‘exercise’, fifteen times. It is a code from the positive attitude quotations of the patient or caregiver. The code refers to patients or caregivers mentioning positive features specifically about the SilverFit Flow. For example, about the simplicity of the SilverFit Flow: *“It does not take long, and you can install it on your own level”*. But, also about the nice looks of the games for example: *“The diamonds in-game looked really nice”*.

Code 6 – Positive attitude: Comfort

The sixth code from the data appeared only five times. Compared to the other codes it is a quite lower appearance rate. The code ‘comfort’ refers to the patient or caregiver mentioning not feeling any pain or discomfort while playing with the SilverFit Flow. For example, *“I felt all right actually, not cramped or anything”*.

Table 7. The codes for the negative attitude, frequencies, number of interviews that indicated a code, definitions and example quote from the dual interviews (N=4)

Codes	Frequency of code	Number of interviews that indicated this code	Definition	Example quote
System related problems	48	4	Mentioning of problems to use the SilverFit Flow properly	<i>“It was very hard to take in the diamonds in the game”</i>
Process related problems	12	4	Mentioning insufficiencies regarding the implementation process	<i>“I wanted it to be played more frequently, or at least on a regular basis. Otherwise, my child did not profit to get better”</i>
Patient related problems	17	4	Mentioning that the patient could not play or did not want to play	<i>“He was just too sick, which made it impossible to continue”</i>

Code 7 – Negative attitude: System related problems

The seventh code is the first negative attitude code. In total, there are three negative attitude codes. The first negative attitude codes appeared also significantly more than the other negative attitude codes. The code ‘System’ appeared forty-eight times. The code refers to patients or caregivers mentioning difficulties in using the SilverFit Flow properly. Example quotes are *“The games did not correspond with my breathing”* and *“You had to change the blower nozzle, which costs time, if you did not have to do that, it would be great”*.

Code 8 – Negative attitude: Process related problems

The eighth code appeared twelve times in the data. It is the second code around the negative attitude of patients and caregivers. The code ‘hospital’ refers to patients or caregivers mentioning insufficiencies regarding the hospital and/or her employees, which decreased the positive attitude of patients and caregivers. For example, *“Before you start playing, there must be a sufficient explanation. Now, it was randomly figuring out what you had to do”*. In addition, the patients or caregivers indicated more general that they wanted to do it more frequently but this did not happen. For example, *“For good results, I think we had to do it more frequently”*.

Code 9 – Negative attitude: Patient related problems

The ninth code appeared seventeen times in the interviews with patients and caregivers. It is the third and last code of the negative attitude towards the SilverFit Flow of patients and

caregivers. The code ‘patient’ refers to the patient or caregiver mentioning that the patient could not play or did not want to play. At first, an example of a patient that could not play: “*All the other games were too difficult for her. Off course, she also had a weak moment with the morphine and all straight after the operation*”. On the other hand, within this code are a lot of quotations which more refer to the patient not wanting to play with the SilverFit Flow. For example, “*If he saw it, it was like ‘ooh not again’*” or when the researcher asked if the patient would also want the SilverFit Flow at home, the reaction was an instant no.

Study 4: Interviews with professionals

In total, four professionals were included for the data analysis of the post-session interviews. Each interview lasted for about one hour. Table 8 shows the positive, suggestion, and negative subcodes per CFIR construct.

Table 8. The subcodes divided in facilitator, suggestion, and barrier codes per CFIR construct from the quotations (N=484) out of the interviews with professionals (N=4)

CFIR construct	Codes		
	Facilitator (n=192)	Suggestion (n=127)	Barrier (n=165)
Intervention (n=103)	Added value (n=25)	Different elements (n=9)	Difficulty (n=9)
	Practical (n=17)		Sensibility (n=7)
	General (n=13)	Other (n=4)	Non-practical (n=12) Non-attractive (n=7)
Outer setting (n=108)	Interested (n=31)	Suitable patients (n=3)	Pain/tired (n=15)
	Stimulus (n=9)	Tips (n=3)	Hesitant (n=19)
	Beneficial (n=8)		Effort (n=5)
	Control (n=3)		Uninterested (n=7) Difficult (n=5)
Inner setting (n=65)	Enthusiasm (n=15)	-	Non-practical (n=5)
	More mobilization (n=10)		Effort (n=7)
	Profit (n=6)		
	Suitable (n=14)		
	Expanding (n=8)		

Process (n=129)	Information (n=6)	Accessible (n=12)	Free character (n=6)
	Intensivist (n=8)	Proceed (n=12)	No implementation (n=7)
	Enthusiasm (n=6)	Improvement (n=12)	Low priority (n=30)
		Structure (n=26)	Bad implementation route (n=4)
Individuals (n=79)	Responsibility attitude (n=11)	Champions (n=4)	Lack of champions (n=9)
	Current champions (n=2)	Physiotherapists (n=10)	Lack of cooperation (n=11)
		CTB ¹ (n=3)	
		Intensivists (n=2)	
		Nurses (n=2)	
		Combinations (n=11)	
		Criteria (n=10)	
		Parents (n=4)	

¹ Homebased ventilation centre

Code 1 – Intervention

Quotations regarding the intervention were specifically about SilverFit Flow itself. In total, there were 103 quotations for the facilitator, suggestion, and barrier intervention codes.

The facilitator quotes could be divided into three subgroups, added value, practical, and general. The group of practical quotes were about especially about the easiness of the SilverFit Flow. For example, “*Then it will show itself*” or “*For a lot of people, the SilverFit Flow is easy and accessible*”. The added value quotes were about the SilverFit Flow being a good addition to the PICU. Statements were made about the added value of being distracted from pain while doing important breathing exercises. In addition, the added value of the SilverFit was that patients were easier to motivate for breathing exercises. The more general quotes were about a general positive statement made about the SilverFit Flow. For example, “*It is challenging*” or “*My first impression was very good*”.

The barrier quotes could be divided into four subgroups, difficulty, sensibility, not practical, and not attractive. Difficulty was about the games being too difficult to correctly understand by children. For example, “*The difficulty is that it is complex to breath as controlled as the game wants you to do*”. Sensibility was about the game not reacting adequately. For example, “*I noted that in some games the game did not really respond when the patient did inhalations*”. Not practical quotes were about the time it took to implement the SilverFit Flow, but especially about the time it took to constantly calibrate the system. Not attractive quotes

were about the game did not expect the levels of how it would look like. For example, *“I can understand that if you have to do this multiple times, that it would start getting boring”* or *“It is not as nice as I expected on first hand”*.

The suggestion quotes could be divided into two subgroups, different elements and other. Different elements was about adding other visual elements. Although professionals mentioned that this was a minor issue, sometimes they found the visuals a bit childish for older children. They made suggestions to improve the game to the experience world of adolescents. For example, *“I am thinking about, for example adding a car that has to follow a track”*.

Code 2 - Outer setting

Quotations regarding the outer setting were about the patients and caregivers’ reactions and attitude to the SilverFit Flow. In total, there were 108 quotations for the facilitator, suggestion, and barrier outer setting codes.

The facilitators could be divided into four groups, interested, stimulus, beneficial, and control. The groups of ‘interested’ quotes were especially about patients reacting positive, active or engaging to using the SilverFit Flow. Only a few times the caregivers were responsible for a positive reaction. For example, *“It was noticeable that the children were generally positive”*. The ‘stimulus’ group were quotes about the patients reacting stimulated or motivated by the SilverFit Flow to do breathing exercises. For example, *“It distracted the patient from their fear of pain to do breathing exercises”*. Beneficial was about the patients or caregivers recognizing the importance of doing the exercises with the SilverFit Flow. For example, *“There were patients who did not want to do exercising, but did it because they said ‘I think it is important’”*. The group with control quotes were about the positive aspect of patients or caregivers gaining control over the situation or at least felt that they gained control.

The barriers could be divided into five subgroups, pain/tired, hesitant, effort, uninterested, and difficult. Pain/tired were statements about the patients or the caregivers did not want to participate (anymore) because of the (expected) tiredness or pain experienced during or after playing with the SilverFit Flow. For example, *“It costs a lot of energy, which resulted in not wanting to participate anymore”* or *“They did not wanted to participate because of their tiredness, or pain or discomfort, or because of the physical state at all”*. Hesitant quotes were about patients or caregivers reacting a bit dubitable towards the SilverFit Flow. For example, *“Caregivers have the tendency to be careful with their child and therefore do not react positive instantly”*. Effort quotes were about the patients or caregivers having the obligation to put some effort in participating. For example, *“Participating demands something*

of the patients”. Uninterested quotes were statements made by the professionals about the patients or caregivers not being interested in using the SilverFit Flow or did not experienced the device as engaging. For example, “*I had to motivate them, because at the start they did not really showed motivation to participate*”. The last negative quotes were about the difficulty. These quotes were about negative attitudes of the patients or caregivers because they did not understand what the purpose was or what they had to do. For example, “*The patient was more hyperventilating instead of doing good exercising, probably the reason why he did not experienced it as positive*”.

The suggestion quotes could be divided into two subgroups, suitable patients and tips. Suitable patients were statements mentioned by the professionals that thought these specific patients were most suitable. Children who got research about their sleep, children who just came from an operation and children with trauma were mentioned. Tips were advices to improve patients and caregivers attitude. It was mentioned to let the computer stay with the patient and instruct them that they can use it. A tip was that some patients, but not all, prefer to see scores. And that the patients and caregivers’ attitude would decrease if there were more games, instead of a few, that did not react adequately.

Code 3 - Inner setting

Quotations regarding the inner setting were about the suitability of the SilverFit Flow in the organisational setting. In total, there were 65 quotations for the facilitator, suggestion, and barrier outer setting codes.

The facilitators could be divided into five subgroups, enthusiasm, more mobilization, profit, suitable, and expanding. Enthusiasm refers to the enthusiastic reactions of employees of the PICU towards the SilverFit Flow. For example, “*My colleagues quite liked it*”. More mobilization refers to the mentioning that the employees want more mobilization at the PICU. For example, “*Compared to parents, we want to use the device more, because we mobilize patients more*”. Profit refers to statements about the organisation profiting by having the SilverFit Flow. For example, “*We would have an additional way to train patients breathing, one that is more motivating I expect*”. Suitable refers to statements made by professionals that indicate that the SilverFit Flow suits the setting of the PICU. For example, “*One of the research direction is the acutely sick patient, that is a research line that suits this study and the adding of the SilverFit Flow*”. Expanding refers to the quotes in which professionals prefer having the SilverFit Flow as an addition to what they already have. For example, “*I would like at least to have it as a standard option*”.

The barriers could be divided into two subgroups, non-practical and effort. The first one, non-practical, refers to the professionals mentioning the SilverFit Flow to be difficult to implement at a PICU. For example, *“I was quite disappointed how well it was to implement in an intensive care unit”*. Effort quotes refer to needing some resources to correctly implement the SilverFit Flow. Sometimes because the patient and/or caregiver has to be persuaded or sometimes the time it costs is a bit long. An example quote is, *“Because the system did not react good, I felt some extra work to motivate the patient to not let him be discouraged by the system”*.

No suggestion quotes were made.

Code 4 – Process

Quotations regarding the process were about the way the SilverFit Flow was implemented at the PICU and how it should be continued according to the professionals. In total, there were 129 quotations for the facilitator, suggestion, and barrier process codes.

The facilitators could be divided in three subgroups, information, intensivist, and enthusiasm. Information quotes were quotes that stated that the professional was provided with information before using the SilverFit Flow, and that they were positive about receiving this information. The intensivist quotes were statements the professionals made that they were included in this study by a specific intensivist, and that they preferred this kind of inclusion. The enthusiasm quotes were mentioning positive effects of the way the SilverFit Flow was implemented. For example, *“I don’t know if this was the intention, but then parents started using the device”* or *“This research gave a ‘schwung’ to early mobilization at our PICU”*.

The barriers could be divided into four subgroups, free character, no implementation, , low priority, and bad implementation route. Free character quotes were about the negative effect of have a too much free character on including patients, caregivers, and professionals in the study. According to professionals, there has to be a bit more obligation to it. No implementation quotes were statements that indicated that at certain moments the SilverFit Flow was not used. For example, *“We did not use it, due to this tiny amount of eligible patients”*. Low priority refers to statements about professionals at the PICU who do not prioritize early mobilization or the use of the SilverFit Flow. Sometimes because they already have a high workload. For example, *“The nurses prefer to easily use a breathing coach to practice breathing, those people are more up to grasp”*. At last, bad implementation route were complains about how the implementation process developed at the PICU. For example, *“Now, I saw the intensivist carrying this device, but I think physiotherapists would be much better to do this”*.

The suggestion quotes could be divided in four subgroups, accessible, proceed, improvement, and structure. At first, accessible quotes were about the professionals mentioning that it was important that the device should be easy to use and grasp. Therefore, it would potentially be more implemented. For example, *“It is an advantage when it is accessible”*. Proceed quotes were suggestions for further implementation of the SilverFit Flow or the continuation of this study. Examples were *“If you just put the devices on four departments, then I am afraid that in one year they will still lay there”* or *“I think a next step is looking if there are other devices to compare to this device”*. Improvement quotes were about improvements that could be made to increase the implementation of the SilverFit Flow. For example, *“I think we could also implement the device to reduce anxiety or something”*. The structure quotes were about the need to create more implementation structure for a better implementation process. And, how this structure could look like. For example, *“Every week we have an early mobilization round, these rounds could be a perfect fit to discuss the patients and which patients should use the SilverFit Flow”*.

Code 5 – Individuals

Quotations regarding the individuals were about the potential responsible professionals for the implementation of the SilverFit Flow. In total, there were 79 quotations for the facilitator, suggestion, and barrier individuals’ codes.

Facilitators were about individuals having a positive attitude towards the responsibility of implementing the SilverFit Flow. Sometimes they spoke for themselves and sometimes they spoke for others. For example, *“To be honest, they already do such things. They think of all sorts of things to make it nicer and better”*. In addition, two times was mentioned that the current champions were sufficient for the implementation of the SilverFit Flow.

Barriers for the individuals’ code were about a lack of champions to implement the SilverFit Flow. For example, *“If I look at our department, there is a serious need for people that own the intervention”*. In addition, the professionals mentioned a lot of times that the lack of cooperation during the implementation of the SilverFit Flow could be a serious barrier. For example, *“We are not able to see the children three times a day on or own”*.

The suggestion code was mainly about which professionals should be responsible for the implementation of the SilverFit Flow. Physiotherapists were mostly suggested as a solo responsible professionals for the implementation. For example, *“The physiotherapists are most suitable, I guess”*. On the contrary, other professionals were mentioned as a solo responsible professional. In these quotes was sometimes suggested that this responsible professional should

have help from other professionals, but then the ‘other professionals’ were not specified. A lot of times was mentioned that it should be a combination of responsible professionals. Four times the professionals made a quote about the need for champions to sufficiently implement the SilverFit Flow. For example, “*It is advisable that there are people who monitor the implementation*”. The criteria mentioned for a champion was having the ability to indicate the physical state of a patient and be able to encourage the patient. Lastly, two times the parents were named as a potential implementer of the SilverFit Flow. Not as the first implementers of the intervention, but in a later stadium. Two times the professionals mentioned that the parents were not able to implement the SilverFit Flow, due to their lack of skills compared to professionals.

Discussion

This mixed-methods pilot study was the first to examine the safety, feasibility, and acceptability of the SilverFit Flow to assist early mobilization at the PICU. Overall, the results of this study suggest that the SilverFit Flow in combination with a professional could assist early mobilization at the PICU. The SilverFit Flow is safe in terms of adverse events rates and acceptable in terms of patients’ and caregivers satisfaction. Feasibility improvements are highly recommended to increase the use of the SilverFit Flow at the PICU.

No serious adverse events with a direct relation to the SilverFit Flow occurred. Other studies identified exergames to be safe as well (Abdulsatar et al., 2013; Chacon et al., 2015; Gomes et al., 2020; Hemphill et al., 2021; Lai et al., 2021), as adverse events due to an intervention do not occur (Gomes et al., 2020), or occur on a minimal level (Lai et al., 2021). In this study, only pain or discomfort was twice noted in the pre-set adverse events table by a professional. Caregivers and professionals both indicated that a certain level of pain was sometimes expected, or even good. For example, a patient experienced anxiety with breathing through because that hurts. Nevertheless, breathing through was good for his recovery. Therefore, the SilverFit Flow was used to distract the patient from his anxiety. This helped and the patient breathed through, which resulted in pain or discomfort beneficial for his recovery. In the end, this study indicated the SilverFit Flow to be safe in terms of adverse events rates due to no adverse events occurring with a direct relation to the SilverFit Flow. Although, research is needed with more participants to better ensure the safety of the SilverFit Flow

The findings regarding the feasibility of this study could assist a larger feasibility study. Feasibility issues arose from the interviews with professionals, but also from the observation

forms. In other research, feasibility issues were also found (Abdulsatar et al., 2013; Chacon et al., 2015). Although, more recent studies argue that with careful attention feasibility issues can be tackled (Hemphill et al., 2021; Lai et al., 2021). Therefore, a more structured implementation of the SilverFit Flow is recommended. In a more structured implementation of the SilverFit Flow, it is expected to tackle the negative experiences of the professionals in the current pilot implementation of the SilverFit Flow. Additionally, it might even improve the patients' and caregivers satisfaction as their negative attitude existed of process related problems.

The acceptability in terms of patients' and caregivers satisfaction was high. In the satisfaction forms the scores of the patients' attitude was rated high by the professionals, the caregivers and the patients. The highest rating came from the patients. The in-depth understanding of these scores was collected via semi-structured dual interviews with patients and caregivers. Patients and caregivers mentioned the SilverFit Flow to be fun, a care improvement, a great monitor to make performance visible, and an important exercise. In addition, the patients and caregivers mentioned that the patient did not experienced pain or discomfort and that the SilverFit Flow had several good features, like the system being easy in use. Although, these last two factors had their counterparts, because the patients' and caregivers also mentioned bad features of the SilverFit Flow and they mentioned that patients did not want or could continue using the SilverFit Flow at a certain point.

In sum, the implementation of the SilverFit Flow must be improved in order to adequately use the system. The system has a great potential regarding acceptability in terms of patients', caregivers', but also professionals' satisfaction. A more structured implementation would even increase this satisfaction. This study was the first to research the SilverFit Flow at a PICU setting. The SilverFit Flow is initially designed for elderly care, but the findings of this study suggest that with certain adaptations the SilverFit Flow could also assist early mobilization at a PICU. The findings of the safety and feasibility of the SilverFit Flow is in line with the findings regarding safety and feasibility about exergames at a hospital setting. Therefore, different exergames still seem to be safe in terms of adverse events rate. In addition, the SilverFit Flow does not distinguish itself from other research regarding feasibility of exergames. Feasibility issues show potential to be tackled by a more structured implementation. Therefore, a follow-up study with a more structured implementation is recommended. This study should built on the feasibility results of the current study. The study showed results that strongly show the acceptability of the SilverFit Flow. These high scores is an important argument for follow-up research. Because, patients, caregivers, and professionals seem to be satisfied by having the SilverFit Flow around at the PICU for training breathing.

Strengths & Limitations

The study had several strengths. At first, the interview scheme and the satisfaction questionnaire were based on the satisfaction questionnaires of four other studies used to assess acceptability of an exergame (Badke et al., 2019; Gomes et al., 2020; Parke et al., 2020; Wren et al., 2021). In addition, semi-structured interviews were used because they create a more in-depth understanding of insight and information gained than standard interviews (Newcomer et al., 2015). Semi-structured interviews employ a blend of closed- and open-ended questions, accompanied by follow-up questions (Newcomer et al., 2015).

An additional strength was the precautions that were taken to increase the credibility of this study. At first, the occurrence of an adverse event was judge by a present professional (physician/nurse/physiotherapist) as attributable to the study procedure. Therefore, the judgement was more reliable. Secondly, professionals could more precisely decide which games and settings were used for optimal experiences of the patient due to the provided manuals, video and real-life instructions of the SilverFit Flow.

On the other hand, the study had several limitations. At first, the sample sizes of patients (N=4) and caregivers (N=4) are not representable to generalize the main findings and conclusion to all patients and their caregivers at a PICU. In addition, the sample size of professionals (N=4) are not representable to generalize the main findings and conclusion to other PICUs. They might be generalizable for the PICU of the UMCU but as joining the study project had a free character, it might be that the professionals who joined had special interest in the topic and were therefore more enthusiastic. Various reasons formed the base of the low included patients' rate. As was discussed in the results section. Namely, the COVID-19 pandemic, less patients, and short PICU stays. In order to change the inclusion rate it might be better to assign a researcher who is present at the PICU. This researcher could be solely responsible for the study and making sure that all patients who visit the PICU were assessed for participation. This would also tackle the barrier of low prioritizing by medical staff (Wiezcorek et al., 2015).

Secondly, the results from the data might be less valid due to the fact that only a single researcher analysed the data (Babbie, 2016). The single researcher used the website of the CFIR and feedback from two supervisors to define the constructs of the CFIR. Nevertheless, the data analysis was still done by a single researcher, instead of more researchers, which negatively influences the validity of the data results.

Conclusion

This pilot mixed-methods study provides preliminary evidence on the safety, feasibility, and acceptability of the SilverFit Flow as an exergame to implement early mobilization at the PICU. According to this study, the SilverFit Flow is safe due to no serious adverse events occurring directly related to the SilverFit Flow. The feasibility of the SilverFit Flow in terms of professionals' experiences varied from positive to negative experiences. The findings regarding the feasibility could assist a further feasibility study to implement the SilverFit Flow to assist early mobilization at the PICU. The SilverFit Flow scored high on acceptability in terms of patients' and caregivers' satisfaction. Based on this study, there seems to be sufficient grounds to initiate follow-up research to improve the implementation process of the SilverFit Flow to assist early mobilization at a PICU. It is recommended to assign a research project leader and create a research team including a representative for the intensivists, physiotherapists, nurses, and pedagogical employees in order to develop and communicate a clear implementation process for all professionals, patients and caregivers at the PICU.

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Appendix I - SilverFit Flow visualisations and materials

Materials:



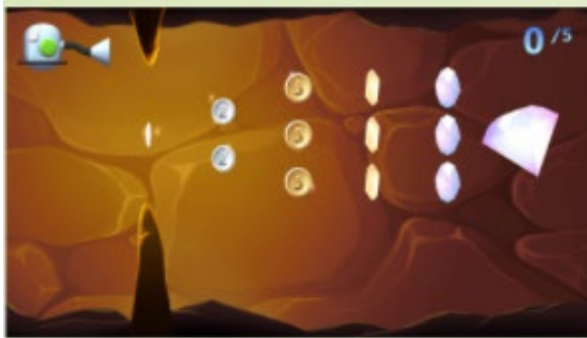
Visualisations:

Name: Paardenbloem – Desired exercise: ‘Huf’-technique



Dit spel bestaat uit twee fases: fase 1, waarin er rustig in en uit wordt geademd en fase 2, waarin er gehuft moet worden. De gebruiker begint in fase 1 en ademt rustig in en uit door de sensor, waardoor de paardenbloem heen en weer beweegt: naar links bij inademen en naar rechts bij uitademen. Om naar fase 2 te gaan, moet er op de knop rechts onderaan gedrukt worden, waar 'Start huf fase' op staat. In fase 2 worden de zaadjes van de paardenbloem door middel van het huffen in de sensor weggeblazen. Allereerst ademt de cliënt door de sensor zo diep mogelijk in, waarna er met een huf uitgeademd dient te worden. De zaden vliegen dan weg. Het is mogelijk om bij de instellingen van de oefening extra stappen toe te voegen in fase 2, zoals bijvoorbeeld het inhouden van de adem vlak voor het huffen. Voor meer informatie over deze extra mogelijkheden, kunt u terecht bij het kopje 'Instellingen'. Met tekst wordt er tijdens de oefening aangegeven wat er op dat moment van de cliënt verwacht wordt. Mocht u fase 2 vroegtijdig willen verlaten, bijvoorbeeld als de cliënt slijm opgehoest heeft, is er rechts onderaan in fase 2 een knop zichtbaar waar 'Gehoest' op staat. Deze kan ingedrukt worden om direct terug te gaan naar fase 1. Rechts bovenaan staat het aantal herhalingen dat is ingesteld. Nadat alle icoontjes eruitzien als een uitgeblazen paardenbloem, groeien er evenveel paardenbloemen in het veld. Vervolgens navigeert de oefening automatisch weer terug naar fase 1. Vanaf daar kan het spel afgesloten worden door op het rode kruis links bovenaan het scherm te drukken.

Name: Diamantmijn – Desired exercise: Breathe deeply



Op het scherm verschijnt een stofzuiger en een aantal muntjes en diamanten. Wanneer de cliënt door de ademhalingsensor inademt, zuigt het stofzuigertje de muntjes naar binnen. Wanneer de stofzuiger de grote diamant opzuigt is een score van 100% gehaald voor deze herhaling. Na elke repetitie wordt de gehaalde score als percentage van het doelvolumen getoond. Indien er met flow-drempelwaarden gespeeld wordt verschijnen er één of twee muntjes die aangeven of de flow van de cliënt binnen de juiste grenswaarden zit. Rechtsboven ziet u hoeveel herhalingen er voltooid zijn in de set.

Name: Speerwerpen – Desired exercise: Exhale forcefully



Op het scherm verschijnt een prehistorisch figuurtje met een speer in de hand. Wanneer door de ademhalingsensor wordt ingeademd wordt de speer naar achteren getrokken. Wanneer de cliënt vervolgens uitademt wordt de speer geworpen. Hoe hoger de flow in de eerste seconde, hoe verder de speer gegooid wordt. Het einddoel is een mammoet, dit wordt gehaald wanneer de cliënt de doelflow heeft behaald. Na elke repetitie wordt de gehaalde score in verhouding tot het hoogst gehaalde doel getoond. Rechtsboven ziet u hoeveel herhalingen er voltooid zijn in de set.

Name: Sterrenpad – Desired exercise: Breathing rhythm

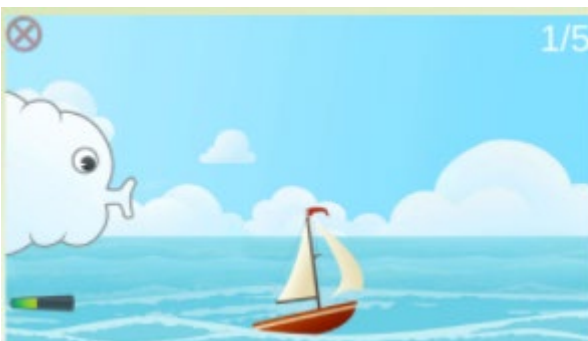


Op het scherm verschijnt een figuurtje aan een paraplu en een pad van sterren. Door in- en uit te ademen stuurt de cliënt het figuurtje omhoog en omlaag om zo het pad te volgen. Wanneer het figuurtje het pad netjes volgt wordt het pad gekleurd.

Rechtsboven ziet u het percentage waarop het pad netjes gevolgd is.

Het is ook mogelijk om alleen door het buisje uit te ademen, dit stelt u in bij de instellingen voorafgaand aan het spel. Dan zijn alleen de stukken van het pad zichtbaar waarop uitgeademd dient te worden. Het figuurtje zakt automatisch naar beneden wanneer er niet door het buisje uitgeademd wordt.

Name: Zeiltocht – Desired exercise: Controlled exhalation



Op het scherm verschijnen een zeilboot en een wolk. Wanneer de client uitademt, wordt de boot door de wolk voorwaarts geblazen. Door gecontroleerd uit te ademen, kan de client ervoor zorgen dat de boot het doel bereikt. Wanneer het doelvolumen uitgeademd is, bereikt de boot een eiland met een wit met zwart geblokte finishvlag erop.

De client kan op twee manieren falen en het doel niet bereiken:

- Als de client niet genoeg lucht uitademt om het doelvolumen te bereiken, bereikt de boot een saai rotsblok.
- Als de client te hard uitademt, breekt het zeil van de boot. Onder de wolk is als grafisch hulpmiddel een balkje zichtbaar, dat groen begint en roder wordt naarmate de client dichterbij de maximale flow grens zit. Als het balkje volledig gevuld is, breekt het zeil. De maximale flow grens kan ingesteld worden bij de instellingen van de oefening.

Na elke herhaling is er een korte rustpauze, waarvan de lengte ingesteld kan worden bij de instellingen voorafgaand aan het spel.

Appendix II – Informed consent

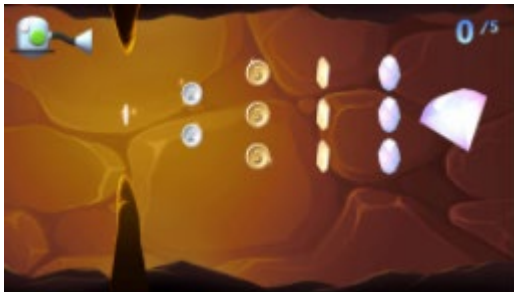
Informatieblad voor onderzoek

‘Vroeg mobilisatie op de Intensive Care Kinderen | Kunnen games bijdragen?’

Waar gaat het over?

We willen je vragen om mee te doen aan een onderzoek naar het gebruik van videogames in het ziekenhuis om te gaan bewegen (een beetje hetzelfde als een Wii of de Xbox Kinect). We weten dat bewegen (mobiliseren) goed is voor kinderen in het ziekenhuis, maar er zijn nog weinig apparaten die we daarvoor kunnen gebruiken. We willen verkennen of een actieve video game een geschikt apparaat is voor mobiliseren in het ziekenhuis voor kinderen.

Je mag zelf beslissen of je meedoet.



Wat gaat er gebeuren?

Wanneer je meedoet, kun je drie keer de videogames spelen. Bij deze videogames ga je bewegingen maken om een spelletje op de computer te spelen. Terwijl jij het spelletje aan het spelen bent, gaan wij belangrijk informatie opschrijven. Achteraf stellen we jou en jouw ouders een paar vragen over hoe jullie het spelen vonden.

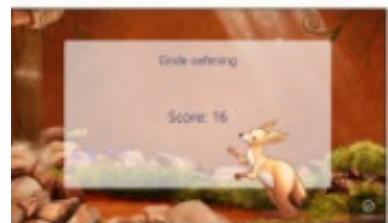
Wanneer en hoe lang?

We willen informatie verzamelen tijdens de eerste drie keer dat jij de spelletjes speelt. Elke keer dat jij gaat spelen, duurt dat ongeveer 30 minuten. Maar je mag altijd eerder stoppen. We stoppen eerder wanneer jij dat wilt. Twee vragen zullen we jullie direct na het spelen stellen. Later willen we jullie in een gesprek een paar meer vragen stellen.



Wat zijn de voordelen en nadelen?

- Het voordeel van dat je meedoet aan dit onderzoek is dat je ons helpt aan het prettiger maken van bewegen voor kinderen in het ziekenhuis.
- Een ander voordeel is dat je misschien wel één van de eerste kinderen kan zijn die deze games speelt
- Als je niet meedoet aan het onderzoek, heb je geen nadelen, het is namelijk niet erg als je niet mee wilt doen aan het onderzoek.



Belangrijk om te weten:

- Meedoen is **niet verplicht**
- Je mag altijd **stoppen zonder dat je hoeft te vertellen waarom**
- Je mag altijd **vragen stellen**.

Als je vragen hebt

Vragen kun je met jouw ouders bespreken. Maar je kunt ze ook aan de verpleegkundige stellen die jou helpt bij het spelen van de videogames.

Toestemmingsformulier verzorgers

Ik ben gevraagd om toestemming te geven voor deelname van mijn kind aan dit onderzoek:

Naam participant (kind) Geboortedatum/...../.....

Extra informatie voor u als verzorger:

Dit onderzoek wordt uitgevoerd door het Wilhelmina Kinderziekenhuis van het UMCU in samenwerking met de Universiteit van Twente. Uw persoonlijke gegevens worden anoniem in het onderzoeksrapport verwerkt en uitsluitend gebruikt voor doeleinden gerelateerd aan dit onderzoek. Uw gegevens worden veilig opgeslagen. Dit onderzoek is beoordeeld als niet-Wmo plichtig en daarmee goedgekeurd door de Medisch Ethische Toetsingscommissie Utrecht.

- Ik heb het informatieblad gelezen. Ook kon ik vragen stellen. Mijn vragen zijn goed genoeg beantwoord. Ik had genoeg tijd om te beslissen of ik meedoe. Ik had genoeg tijd om te beslissen of ik wil dat mijn kind meedoet.
- Ik weet dat meedoen vrijwillig is. Ook weet ik dat ik op ieder moment kan beslissen dat mijn kind en ik toch niet mee willen doen met het onderzoek. Ik hoef dan niet te zeggen waarom ik dat wil.
- Ik heb begrepen dat deelname aan het onderzoek gepaard gaat met een audio opname en schriftelijke aantekeningen.
- Ik heb begrepen dat de door mij verstrekte informatie gebruikt zal worden voor een onderzoek gericht op de veiligheid, haalbaarheid en aanvaardbaarheid van actieve videogames ter ondersteuning van vroeg mobiliseren
- Ik begrijp dat mijn persoonlijke informatie, zoals bijvoorbeeld mijn naam, niet buiten het onderzoeksteam gedeeld zal worden.
- Ik doe mee aan dit onderzoek.
- Ik ga ermee akkoord dat mijn kind meedoet aan dit onderzoek.

Naam verzorger:

Handtekening verzorger: Datum:/...../.....

Naam verzorger:

Handtekening verzorger: Datum:/...../.....

Appendix III – Observation form (Professionals)

Sessie- en patiëntgegevens

1)

Datum	
Starttijd (<i>Moment dat de Flow erbij gepakt wordt</i>)	
Eindtijd (<i>Moment dat de Flow is opgeruimd</i>)	
Patiëntnummer (<i>Het nummer wat speciaal is ontwikkeld voor het gebruik van de SilverFit systemen</i>)	
Leeftijd	

2) Kruis aan welke spellen er gespeeld zijn. *Meerdere antwoorden mogelijk*

- De Paardenbloem
- Diamantmijn
- Speerwerpen
- Sterrenpad
- Zeiltocht

3) Hoe leuk vond de patiënt de sessie volgens jou (0 = schitterend, 4 = helemaal niks)?



4) Denk je dat dit de patiënt helpt om goed te bewegen/mobiliseren?

- 1. Ja
- 2. een beetje/misschien
- 3. Nee

Veiligheid

Plaats streepjes wanneer een bijwerking optrad. Geef met het aantal streepjes aan hoe vaak deze bijwerking optrad.

Mogelijke bijwerkingen	Aantal keer opgetreden
Vallen	
Flauwvallen	
Misselijk worden	
De noodzaak om de medicatie- of zuurstoftoevoer te verhogen	
Aanhoudende tachycardie	
Tachypneu	
Toegenomen ademhalingsarbeid	
Aritmie	
Daling van zuurstofverzadiging tot < 85%	
Pijn of ongemak (waarvoor meer nodig is dan de gebruikelijke sedatie/analgesie van de patiënt)	
(Musculoskeetaal) Letsel	
Hypotensie	
Hypertensie	
Het per ongeluk verwijderen van een katheter	
Het per ongeluk verwijderen van een tube	
Het per ongeluk verwijderen van een drain	
Het per ongeluk verwijderen van een sonde	

Overige bijwerkingen, namelijk... (noteer ook het aantal keer dat deze bijwerking optrad)

.....
.....

Haalbaarheid

1)

Is het gelukt om de patiënt met de SilverFit Flow te laten spelen?

- A. Ja, zonder problemen
- B. Ja, met enkele problemen
- C. Ja, met veel problemen
- D. Nee, het is niet gelukt

2)

Hoelang duurde het om de SilverFit Flow te installeren (van het moment dat de Flow erbij gepakt wordt totdat het kind kan spelen)?

..... Minuten

3)

Hoelang duurde het om de SilverFit Flow te verwijderen bij de patiënt, schoon te maken en eventueel op te bergen?

..... Minuten

4)

Hoeveel professionals waren er **noodzakelijk** om de patiënt te laten spelen met de SilverFit Flow?

..... medewerkers

5)

Noteer de problemen die optraden en omcirkel de categorie waar het probleem volgens jou onder valt

#	Type probleem	Categorie
1		Technisch / Patiënt / Overige
2		Technisch / Patiënt / Overige
3		Technisch / Patiënt / Overige
4		Technisch / Patiënt / Overige
5		Technisch / Patiënt / Overige
6		Technisch / Patiënt / Overige
7		Technisch / Patiënt / Overige
8		Technisch / Patiënt / Overige

Appendix IV – Protocol for observation forms

Er zijn twee observatieformulieren. Eén voor bij gebruik van de SilverFit Flow en één voor bij gebruik van de SilverFit Rephagia. Wanneer er door een patiënt met beide systemen gespeeld wordt, vul dan beide formulieren in. De formulieren lijken veel op elkaar. Echter, gebruik het formulier voor het ene systeem niet zomaar, zonder duidelijk aan te geven, voor het andere systeem in verband met de betrouwbaarheid van de resultaten.

Beide formulieren bestaan uit drie onderdelen; sessie- en patiëntgegevens, veiligheid en haalbaarheid.

Het eerste onderdeel bestaat uit een aantal gegevens over de sessie en de patiënt. Eén notitie: Het patiëntnummer is een nummer wat speciaal is ontwikkeld voor dit onderzoek. Het is namelijk niet de bedoeling dat de standaard patiëntnummers in de SilverFit systemen worden verwerkt. Wanneer het niet lukt om dit nummer te vinden, is het mogelijk om het standaard patiëntnummer in te vullen. Geef dit duidelijk aan. Dan wordt het juiste nummer achteraf gezocht voor het onderzoek.

Het onderdeel veiligheid gaat om de bijwerkingen die optreden doordat de patiënt met de SilverFit systemen speelt. Op de observatieformulieren staan een aantal bijwerkingen om de veiligheid te meten. Deze lijst met bijwerkingen werd gebruikt in andere studies met exergames op de Pediatric Intensive Care Unit. Dit betekent **niet** dat deze bijwerkingen ook voorkwamen in de studies. De lijst is bedoeld als checklist of bijwerkingen wel of niet optreden. Bijwerkingen die optreden, maar niet op de lijst staan, kunnen onder '*overige bijwerkingen*' ingevuld worden.

Het onderdeel haalbaarheid gaat om een aantal praktische vraagstukken. Onder vraag 5 staat een schema om opgetreden problemen te beschrijven. Problemen zijn er in verschillende soorten en maten. Vul daarom gerust alles in wat jij onder een probleem verstaat. Probeer het probleem daarna te schaden onder een technisch probleem of een probleem met betrekking tot de patiënt. Wanneer het probleem volgens jou niet onder één van deze categorieën valt, omcirkel dan de categorie 'overige'.

Verzamel en bewaar de ingevulde formulieren en alvast ontzettend bedankt voor jullie medewerking!

Appendix V – Satisfaction form (Patients)

Sessie- en patiëntgegevens

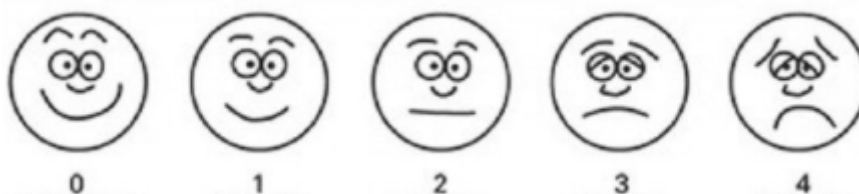
1)

Datum	
Patiëntnummer <i>(Het nummer wat speciaal is ontwikkeld voor het gebruik van de SilverFit systemen)</i>	
Leeftijd	

2) Kruis aan welke spellen je hebt gespeeld. *Meerdere antwoorden mogelijk*

- De Paardenbloem
- Diamantmijn
- Speerwerpen
- Sterrenpad
- Zeiltocht

3) Hoe leuk vond je de sessie?



4) Denk je dat dit helpt om goed te bewegen?

- 1. Ja
- 2. een beetje/misschien
- 3. Nee

5) Had je ergens last van door met dit spel te spelen?

- Nee.
- Ja, namelijk:

Appendix VI – Satisfaction form (Caregivers)

Sessie- en patiëntgegevens

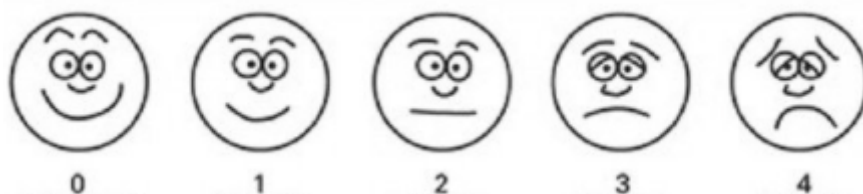
1)

Datum	
Starttijd (<i>Moment dat de Flow erbij gepakt wordt</i>)	
Eindtijd (<i>Moment dat de Flow is opgeruimd</i>)	
Patiëntnummer (<i>Het nummer wat speciaal is ontwikkeld voor het gebruik van de SilverFit systemen</i>)	
Leeftijd	

2) Kruis aan welke spellen er gespeeld zijn. *Meerdere antwoorden mogelijk*

- De Paardenbloem
- Diamantmijn
- Speerwerpen
- Sterrenpad
- Zeiltocht

3) Hoe leuk vond uw kind de sessie (0 = schitterend, 4 = vreselijk)?



4) Denk je dat dit uw kind helpt om goed te bewegen?

- 1. Ja
- 2. een beetje/misschien
- 3. Nee

5) Had uw kind ergens last van door met dit spel te spelen?

- Nee.
- Ja, namelijk:

Appendix VII – Interview scheme patients & caregivers

Slide 1)

Wat vind je leuk om te doen?

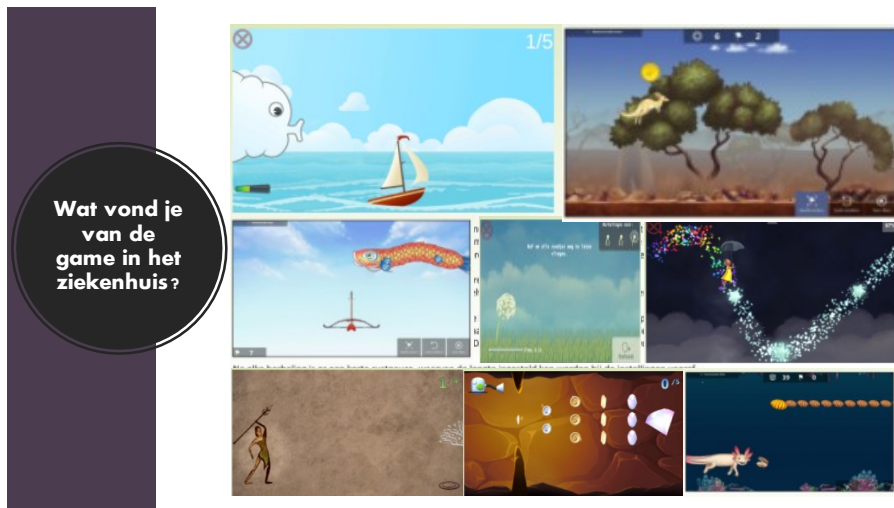


Slide 2)



**Game je
wel eens?**

Slide 3)



**Wat vond je
van de
game in het
ziekenhuis?**

Vragen

1. Game je weleens?
 - a. Welke games vind je leuk?
 - b. Waarom vind je die leuk?
2. Hoe vond je het spelen in het ziekenhuis?
 - a. Leuk/niet leuk?
 - i. Wat vond je leuk/niet leuk?
 - b. Wilde je langer doorspelen?
 - c. Wil je dit nog vaker spelen?
 - d. Enthousiast/niet enthousiast?
 - i. Waar werd je enthousiast van?
 - e. Zou je dit thuis ook willen hebben?
3. Was het duidelijk wat je moest doen?
 - a. Kun je uitleggen wat je moest doen?
4. Was je goed in het spelletje?
5. How vond je de game eruit zien?
 - a. Vond je de plaatjes mooi?
6. Heb je een tip en een top om het spel beter te maken?
7. Hoe voelde je je tijdens het spelen?
 - a. Voelde je ook pijn?
8. Denk je dat de games een goede manier is om kinderen te helpen met ademen/bewegen?
 - a. Waarom?
9. Hoe kunnen we deze games nog beter maken?
10. Hoe kunnen we deze games nog leuker maken?
11. Overige opmerkingen?

Appendix VIII – Interview scheme professionals

Intervention - Subvragen:

Kun je uitleggen hoe de SilverFit Flow werkt en hoe jij de sessies met de SilverFit Flow liet plaatsvinden?

Hoe vond je dit gaan?

Als je een collega moet vertellen over de voor- en nadelen van het gebruik van de SilverFit Flow bij het mobiliseren van patiënten, welke voor- en nadelen zou je dan allemaal noemen?

Hoe vond je de spellen op de SilverFit Flow eruitzien?

Waren de spellen geschikt voor alle patiënten op de afdeling?

Suggesties voor uitbreiding?

Had jij, ouder/verzorger en/of patiënt voldoende informatie over de SilverFit Flow om het systeem goed te gebruiken?

Intervention - Hoofdvraag: Wat vond je in het algemeen van de SilverFit Flow en de sessies waarin de patiënten speelden met de SilverFit Flow?

Outer setting - Subvragen:

Hoe reageerden patiënten op de SilverFit Flow?

Wat vond je van deze reactie?

Welke gevolgen herkende je bij patiënten wanneer zij gebruik maakten van de SilverFit Flow?

Kun je de voor- en nadelen omschrijven voor patiënten die gebruik maakten van de SilverFit Flow?

Hoe reageerden ouders/verzorgers op de SilverFit Flow?

Wat vond je van de reactie van ouders?

Kun je de voor- en nadelen omschrijven voor ouders/verzorgers van patiënten die gebruik maakten van de SilverFit Flow?

Herkende je gevolgen tussen ouder/verzorger en kind (binnen families) na het spelen met de SilverFit Flow?

Outer setting - Hoofdvraag: Wat vond je van de reacties van ouders/verzorgers en patiënten op het gebruik van de SilverFit Flow?

Inner setting - Subvragen:

Denk je dat professionals in het Wilhelmina Kinderziekenhuis profijt hebben van het gebruik van de SilverFit Flow?

 Zo ja, hoe zou je dit voordeel omschrijven? Levert het ook extra problemen op? En wegens deze extra problemen dan minder zwaar dan het voordeel?

 Zo nee, levert het professionals extra problemen op?

Hoe reageerden collega's op het gehele onderzoek rondom vroeg mobiliseren d.m.v. de SilverFit systemen?

Past dit onderzoek omtrent vroeg mobiliseren d.m.v. SilverFit systemen bij jullie organisatie/visie?

 Zo ja, hoe sluit dit op elkaar aan?

 Zo nee, waar schort het aan?

Raad je het aan om de SilverFit Flow standaard in het Wilhelmina Kinderziekenhuis te hebben ter ondersteuning van de dagelijkse zorg? Waarom wel/niet?

Inner setting - Hoofdvraag: Vind je de SilverFit Flow binnen het Wilhelmina Kinderziekenhuis passen en draagt het bij aan de zorg van het Wilhelmina Kinderziekenhuis?

Process - Subvragen:

Hoe ben je in aanraking gekomen met de SilverFit Flow?

Wat vond je daarvan?

Heb je instructies gehad voor het gebruiken van de SilverFit Flow met patiënten?

Zo ja, waren deze instructies toereikend?

Zo nee, had je achteraf gezien behoefte aan andere instructies rondom de SilverFit Flow?

Hoe kwam het dat het aantal inclusies veel moeizamer verliep dan aanvankelijk verwacht?

Wat moet er minimaal nog gebeuren om de SilverFit Flow, of soortgelijke exergame interventies, verder te implementeren binnen het Wilhelmina Kinderziekenhuis?

Als we de Silverfit Flow nu zouden willen uitrollen naar andere afdelingen of andere ziekenhuizen, welke stappen zouden we dan moeten zetten? Hoe zouden we dat moeten aanpakken?

Hoe kunnen we dit onderzoeksproject het beste een vervolg geven?

Process - Hoofdvraag: Hoe vond je de implementatie van de SilverFit Flow tot nu toe gaan? En hoe vind je dat een eventueel vervolg eruit moet zien?

Individuals - Subvragen:

Welke zorgprofessional binnen het Wilhelmina Kinderziekenhuis zou jij aanwijzen als verantwoordelijke voor de implementatie en uitvoering van de SilverFit Flow, of soortgelijke exergame interventies?

Heb je een idee hoe zij tegenover deze verantwoordelijkheid staan?

Op welke andere manieren kunnen deze professionals nog ondersteund worden om de implementatie en het gebruik van de Silverfit Flow goed te laten verlopen?

Waar moet een zorgprofessional die de SilverFit Flow gaat gebruiken met patiënten (verder) aan voldoen?

Individuals - Hoofdvraag: Wat vind je van de verdeling en uitvoering van de verantwoordelijke professionals voor de implementatie van de SilverFit Flow binnen het Wilhelmina Kinderziekenhuis?
