

## Playphysio: Our Approach to Gamification of Respiratory Physiotherapy for Children with Cystic Fibrosis.

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According to the World Health Organisation:

*“Increasing the effectiveness of adherence interventions may have a far greater impact on the health of the population than any improvement in specific medical treatments”*

( [http://www.who.int/chp/knowledge/publications/adherence\\_report/en/](http://www.who.int/chp/knowledge/publications/adherence_report/en/) )

### Our Approach

Playphysio is a social venture which is committed to harness the power of play for the benefit of patients managing chronic illness. Currently we are focussed upon changing the negative attitudes of children with Cystic Fibrosis (CF) toward their daily respiratory physiotherapy treatment. We are actively researching possible solutions for adult patients at the moment and look forward to sharing these in the coming months.

We know that better compliance with this treatment will improve health outcomes and quality of life for patients and their families. Positive attitudes toward treatment can also bring additional benefits for patients which we explain and explore below. In order to realise these benefits, Playphysio is developing products and software to transform repetitive respiratory physiotherapy treatment through fun and engaging interactive games.

Our approach to gamifying treatment is based upon several existing areas of existing research.

### Daily routine treatments generate a significant burden of care

The burden of care for parents / carers that help to manage care Cystic Fibrosis for their children is significant [1]. Physiotherapy is by far the most time-consuming treatment activity for all patients with CF taking between 15 to 60 minutes every day. Parents or carers need to provide a lot of encouragement to children to start, and complete each physio session. Daily life for a family managing Cystic Fibrosis was illustrated very clearly by BBC2 television program ‘Big Life Fix’ first broadcast in the UK in Dec 2016. (Will Jackson appeared in the program as a volunteer and demonstrated functioning prototypes of physiotherapy monitoring and mobile games to the TV production team.)

Anecdotal evidence from parents of children with CF indicates that compliance with regular physiotherapy is extremely demanding for everyone involved. Encouraging your child to complete good quality, twice daily treatment requires almost superhuman levels of energy, enthusiasm, tenacity and stamina.

Therapy devices commonly used for respiratory physiotherapy are relatively simple mechanical products. They don't provide user feedback to confirm correct technique, or indicate when each blow is completed. Patients and families may only have 10 minutes of consultation time to check technique with a physiotherapist at monthly outpatient appointments. As a result, general confidence levels of children and parents / carer regarding their physiotherapy treatment are generally low.

These factors combine to create a situation of uncertainty, frustration, stress, conflict at home.

### Negative attitudes toward treatment cause harm

Children with CF report that they are 'nagged' routinely to complete their daily treatments [2, 3], they also report that physiotherapy is boring, no fun, or in some cases they 'don't see the point' of doing physiotherapy [3]. Adolescents become frustrated that they are caught up in control struggles with parents or other authority figures [3]. Striving to be 'normal-teenagers' by omitting time-consuming treatment sessions because they interfere with after school social events [3], adherence to respiratory treatments has been shown to decrease during adolescence [4].

Once established, a routine of nagging and non-supportive behaviors related to treatment has been found to be a predictor of psychological maladjustment for adolescents [5]. Family relationships including levels of cohesion, conflict and expressiveness have a significant impact on the young people's psychological functioning and adjustment [6].

The more positive the family relationship, the better adherence to airway clearance treatments and aerosolised medication [5]. Hence, family relationships have been suggested as appropriate targets for interventions at improving adherence [7]. Supervised physiotherapy has been shown in two cases to increase the quality of life for patients, required fewer courses of intravenous antibiotics and fewer hospital admissions [8,9].

In short, better adherence to regular chest physiotherapy should result in significant cost savings for care providers.

### Games generate positive attitudes toward treatment

Gamification is the application of game principles and game design elements in non-game contexts. Gamification services for generic health and fitness are now widespread with forecast that 25 million wearable fitness monitors will be sold in 2017. [10, 11].

Gamification where participants 'earn' badges and 'rewards' has been shown to have a positive effect upon direct engagement and behaviour' of participants in online programs [12]. Serious games have been defined as "games that are designed to entertain players as they educate, train, or change behaviour." [13, 14].

When individuals choose to play a game, they generate a concentrated state of optimistic engagement [15]. Playing games stimulates the physiological rewards, motivation, emotion and memory centres [15,16]. Play and interaction with serious games have been shown to help motivate changes in behaviour for health management and chronic paediatric disease management in children [17]. In addition, they reduced emergency admissions, improved health awareness, increased self-confidence, self-efficacy and self-monitoring [17,18].

### Multiplayer games could enable long term compliance

Finally, for CF (adult and paediatric) patients playing games with a multiplayer component could unlock further benefits to encourage adherence with chest physiotherapy over the long term.

This is particularly exciting due to the fact that all CF patients are currently isolated from one another to minimise the risk of cross infection. Playphysio has described a potential mechanism for patients to support one another, interact, perhaps to even compete through computer games which could stimulate a significant positive outcome for patients.

Playphysio is using the concepts of gamification to:

- Generate positive attitudes toward treatment.
- Incentivise children to complete treatment regularly.
- Reward patients for treatment through gamification.
- Track and monitor treatment to show progress and build self-awareness.
- Educate and inform children and parents about treatment.
- Empower children to have an element of control over their treatment.
- Build a community of 'players' so individuals are 'connected' not isolated.
- Help build good habits to manage chronic illness.
- Improve health outcomes and quality of life for children.
- Reduce the burden of care for families and carers.
- Reduce treatment time for children.
- Introduce a lot more fun into the lives of children dealing with chronic illness.
- Reduce costs for healthcare providers.
- Collect patient data to inform future medical research.

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