

MASTER

Cardiac Rehab Use Case and Persona Example

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cardiac rehabilitation conversation

Persona

Al Johnson	
Background:	<ul style="list-style-type: none"> Al (an Aussie) has had 3 heart surgeries – a 5 way bypass in the USA, 4 stents & a 3 way bypass in Australia.
Goals and Interests:	<ul style="list-style-type: none"> Be fit and healthy, age well Make informed decisions to avoid further heart issues
Concerns:	<ul style="list-style-type: none"> The abyss after rehab Current advice not suited to Al's needs Discontinuity as doctors come and go High cost of allied health for diet and exercise
Demography:	<ul style="list-style-type: none"> 60 years old Non-smoker, keen exerciser, eats well Good family situation
Interaction History:	<ul style="list-style-type: none"> Been through rehab 3 times Frustrated that canned rehab and advice based on obese, smoking inactive elderly people
Friction Factors:	<p>Easily confused ← → Comprehends advice</p> <p>Concerned ← → Accepting</p> <p>Reserved ← → Talkative</p> <p>Stressed ← → Relaxed</p> <p>Inquisitive ← → Uninterested</p>

Current Conversation – Institutional Journey



Al's Dr is on leave so he sees another Dr in the practice, unfamiliar with Al's history. This Dr has to make several long phone calls to a cardiac surgeon to determine what treatment to prescribe for Al's DVT because the traditional blood thinners might affect his recovery from surgery. The Dr says Al should wear a compression stocking and says he thinks there is a pharmacist up north who can fit them but has no details. Al has to find them himself.

Al completes rehab but hasn't been able to do all of the exercises because of his DVTs – he is still wearing a compression stocking. He doesn't know what exercises he can safely do to rebuild his endurance and strength, especially since he now has 8 bypass grafts, 4 stents, several DVTs and other chronic conditions. Al finishes rehab and falls into the abyss; he hasn't been given a plan nor advice on what to do next.

Al books to see his physiotherapist of 10 years about exercise but she is on leave and he is sent to a new therapist in the practice who is unfamiliar with Al's history. Note that much of Al's early history was lost when the practice computerised. Al is frustrated at having to explain his long and complicated medical history and the therapist is uncertain how best to proceed. After several sessions this therapist also takes leave and Al abandons seeking help there.

After many sessions with various Drs and allied health professionals Al still does not have a plan to continue his heart recovery after rehab!

Situation

Al had his last heart surgery, a 3 way bypass, in August 2017. The removal of his saphenous vein for the bypass gave him DVTs that left him in severe pain and disabled for several months. Most of the cardiac team were disinterested in this 'side effect'. His first 5 way bypass used endoscopic vein harvesting that his medical team believes has caused the need for the 4 stents and latest bypass. Al is frustrated because since his first surgery he has followed cardiac rehab advice he was given at the time but has still needed more surgery. Al completed his latest rehab in November 2017 and has since spent over \$2000 not covered by his health fund or Medicare on allied health professions – pharmacists, exercise physiotherapists, dieticians etc. to try and develop a healthy regime to protect his heart. During that time his 'experts' including his Dr have all taken extensive holidays.

Digital Human Conversation – Patient then Life Journey



When he is assessed at the hospital as requiring another bypass Al is assigned Coach, a digital human, as his **cardiac coach**.

Although not necessary, Al authorises Coach to access his full medical history and Apple eHealth data. Coach answers Al's initial questions and concerns about what has happened and the procedure ahead. She also checks his dietary preferences and advises the hospital of meal plans for his stay based on preferences and medical requirements.

After the surgery Coach is available whilst Al is in hospital to answer any other questions and to start preparing him for discharge. Al finds this much better than the one size fits all hardcopy discharge booklet normally issued to patients. Coach assists Al to make the follow-up appointments with the surgeon and cardiologist and talks Al though his changed medicines. Coach suggests they have a chat each morning about the day ahead whilst he is recovering. These chats enable Coach to monitor Al for early signs of depression following the surgery.

Coach books Al into cardiac rehab and helps him run through the awareness sessions before he attends the program so that he is prepared. Al asks Coach questions about what he sees. Coach also shows Al videos of the exercises he is likely to do at rehab and asks if he is familiar with these or has any concerns. Coach prepares a pre-rehab report for Al that is forwarded to the rehab team so that the education and exercise can be tailored to his needs.

At the completion of rehab Coach puts together a plan based on feedback from the rehab team and Al. She provides Al with **content** – exercise plans, meal plans etc. Coach advises Al to add the Apple wireless ECG band to his Apple Watch and to buy a wireless BP monitor so that she can monitor his exercise and check his blood pressure each day. Coach helps Al find recipes, video cooking demonstrations, exercise demonstrations, guided meditations and other **content** to help him live a healthy life. Coach monitors Al's Apple eHealth data to check on his sleeping, heart rate when resting and exercising, diet etc. to provide alerts or advice.

Explanation

Cardiac rehabilitation is a six week program of 6 one hour lectures that provide limited awareness of heart anatomy, heart disease, and diet, exercise, medications, and psychology. There is also around 6 sessions of 1.5 to 2 hours by exercise physiologists to provide basic exercise tolerance, restore basic movement and recover from the surgical sternal injuries. These exercise sessions do not provide functional fitness. Rehab graduates do not leave with initial exercise programs, diet plans or any of the tools they will need to continue their recovery. Many rehab patients are fearful and see finishing rehab as dropping into an abyss. Also, despite the preparation for, recovery from and secondary prevention of heart disease being universal constants most hospitals and health funds develop their own rehab procedures and education that are largely identical. This is a massive waste of money. Finally, adherence rates to what patients are taught in rehab is very low (largely because it is only awareness), leading to high repeat cardiac events and revascularisations amongst heart patients, an avoid financial drain on healthcare.

Industry	Conversation	Version	Date
Medicine – Heart Surgery	Rehabilitation	1.0	29/01/2018

the story behind the conversation

About the Persona	What Happened in Hospital	During Cardiac Rehabilitation	Other Considerations
<ul style="list-style-type: none"> AI is a 60 year old male. In March 2006 he had a 5 way bypass in Seattle in the USA. He then had 4 stents via angiogram in November 2006. He recently (August 2017) had a 3 way bypass. AI has never smoked but has a genetic predisposition to heart disease exacerbated by a high stress career. AI's first bypass used endoscopic vein harvesting, a technique that meta data studies (2009) have found to have a high risk of restenosis. AI's cardiologist believes this is why, despite his exercise and diet regime, he has required the stents and additional bypass. AI has engineering and master's degrees and has done considerable research into his condition and treatments. He has also performed volunteer work with cardiac rehab and the Heart Foundation, both have given him a well above average patient's understanding of heart disease. On all occasions before his surgeries AI has only had mild arm pain and shortness of breath, no chest pain. He has vigorously exercised until only a few weeks before his surgeries without angina making it difficult to take early action. 	<ul style="list-style-type: none"> AI was vegan after his first bypass but after working with a dietician changed to lacto-ovo vegetarian. The hospital (an expensive private one) constantly served AI the wrong food, or missed delivering meals altogether. The nurses both before and after surgery sometimes gave him the wrong medications; AI is educated enough to pick this up but worries about other patients. AI was given the wrong medications by the hospital pharmacy on discharge. AI was discharged with undiagnosed DVTs despite severe swelling and pain in his leg. After discharge AI went the rounds of various doctors, specialists and the hospital to try and work out what was wrong with his leg and what treatment was required. He was delayed starting rehab because of the problems with his leg. 	<ul style="list-style-type: none"> AI is well known to the nursing staff because of his volunteer work but the exercise part of rehab is performed by the exercise physiology (EP) department at the hospital. The EPs had no knowledge of AI's prior exercise programs and tolerance, nor that he is a Level 2 Personal Trainer registered with Fitness Australia and therefore very knowledgeable about exercise, including for those with his heart condition. The exercise program they gave AI and made him perform in the hospital gym was well below what he was safely capable of, and therefore did not prepare him for return to community based exercise. In fact he lost muscle mass and fitness during the program. AI sat through the awareness lectures and was dismayed that, except for the talk on anatomy and heart health by the nurses, they were either difficult to hear and follow, or failed to address anything beyond basic concepts. Few handouts were given so none of the patients had anything they could follow at home. Many of the patients were concerned about what would happen at the end of the program, whilst some had to keep leaving early to return to work or pick up children from school. 	<ul style="list-style-type: none"> The content AI was given in the Canberra Australia rehab awareness sessions in 2017 was identical to the content presented to him in rehab in Seattle USA in 2006. At least in Australia, each hospital prepares their own materials. Even in Canberra, the main public hospital and private hospital performing heart surgery, across the road from each other on the same campus, have their own rehab programs. This is a monumental waste of health resources. Interestingly, AI attended a Heart Foundation conference in Australia in 2011 where various researchers said they were trying to obtain funds to test the efficacy of telephone based support for heart patients post-surgery. AI pointed out to them that these were already used in the USA in 2006 by his health fund, Primera, and given the USA health funds' focus on outcomes and cost why did we have to waste research dollars in Australia; we should have just implemented it. Telephone support is still not routinely available in Australia although the Heart Foundation now has a number you can call to ask advice. This different to what I has in the USA where a nurse called each week to check up on me, offer advice etc.



Half-marathon entrant knows all about heart and soul

AI (Allan) Johnson is a retired RAAF Aeronautical Engineering Officer. Since leaving the RAAF in the late 1990s he has worked across Asia, the USA and the Middle East as an ERP specialist covering enterprise asset management, supply chain, project management, portfolio management and human resources. His clients have included major hospitals and health authorities, defence forces, power and water utilities, gold and coal mines, oil companies and chemical companies. His master's research project was in critical success factors for expert systems and he has provided advice on big data analysis for predictive modelling of complex systems.

Since his first heart bypass in the USA in 2006 AI has had a parallel 'career', learning everything he could about heart disease and its treatments, attending conferences, fundraising, mentoring other heart patients and volunteering with cardiac rehabilitation. During this period, and despite his 5 way bypass and 4 stents, he has also qualified as a personal trainer, cycle class instructor, body building coach and rehabilitation exercise specialist. He has also run several half-marathons and marathons in that time.



examples of digital human cardiac coach use cases



use case - cardiac rehabilitation



Stage 3
<ul style="list-style-type: none"> Ability to infer intent during conversations and respond appropriately Digital human interactions begin at admission to build rapport and continuity Could use value adds such as identifying and purchasing 'heart relevant' goods and services related to lifestyle.
Stage 2
<ul style="list-style-type: none"> Conversations extended including presentation of educational materials (but still supported by video etc. where appropriate) FAQ and Q&A added for a much broader range of topics Suitable for home use by patient and family with tight guardrails
Stage 1
<ul style="list-style-type: none"> High re-use of existing video, image and text (if literacy appropriate) content with introductions and comprehension check FAQs Q&A on high frequency and 'critical to outcomes' topics Used in controlled setting (e.g. outpatient facility)

Content Effort		
Thriving	Living	Surviving
<ul style="list-style-type: none"> Providing support for activities that require modification for most heart patients such as skiing at high altitude, scuba diving etc. Moving on from being a heart patient to being an athlete 	<ul style="list-style-type: none"> Extending advice on diet, exercise, travel etc. to support returning to normal life in the community Advanced topics such as requiring other surgeries (e.g. knee replacement, hip etc.) 	<ul style="list-style-type: none"> Legacy rehab topics required to recover and implement secondary prevention Essential topics not covered by all rehab programs such as dealing with comorbidities and returning to work Legal topics such as resuming driving especially if patient drives commercially

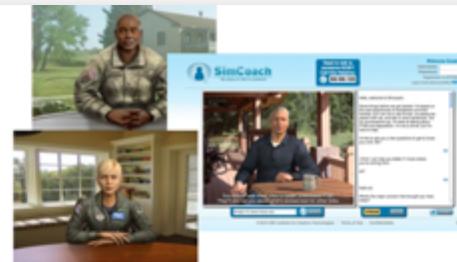
Health Topics	Health Topic Extensions	
About my condition	Understanding comorbidities	Dealing with comorbidities
Medications	Remember & track meds	Travelling with meds
Quitting tobacco	Specific support programs	Your family smoke
Diet	Dining out/take out	Healthy groceries & cooking
Exercise	Walking programs etc.	Community exercise
Psychology	Sleep	Family
Regular Immunisations (e.g. flu)	Others (e.g. pneumococcal)	xxxxx
xxxxx	xxxxx	xxxxx
Events	'Bucket List' Topics	
Returning to work	Exercising at altitude	
Resuming driving	Endurance events & HIIT	
Travel (esp. flying)	Water sports	
Prep for other surgeries	Weightlifting precautions	
Dealing with setbacks	Celebrating success	
xxxxx	xxxxx	
xxxxx	xxxxx	
xxxxx	xxxxx	

use case - discharge from hospital

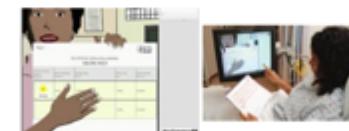


Admission – Discharge - Rehab	
<ul style="list-style-type: none"> Digital human goes home with patient after discharge and supports transition to home life and rehab (manages gap to rehab if any) FAQs and Q&A on expected transition period questions – meds, eating, exercise, wound care etc. – explains at discharge and then supports these at home or post-acute care 	
Admission to Discharge	
<ul style="list-style-type: none"> Digital human introduced to patient at admission and stays with them throughout confinement Rapport built over time enables richer discharge conversations at discharge Add presentation of standard video content e.g. what to expect first day at home (rapport better enables this interaction) 	
Only Used for Discharge	
<ul style="list-style-type: none"> Performs stand-alone tasks such as customer satisfaction Identifies additional actions for human discharge staff Motivates patient for rehab Other tasks as appropriate to reduce staff workload 	

The Digital Human 'Cardiac Coach' uses human realistic avatars, co-design, empathic natural conversation and artificial intelligence to overcome literacy and numeracy barriers, and significantly increase rapport, trust, disclosure and commitment. Co-design has been proven by the Nadia project. The peer reviewed SimCoach PTSD counsellor has proven the ability to build rapport, trust and disclosure.


The RED (Re-Engineering Discharge) project provides a repeatable capability with processes, data and technology to improve the PAC transition (Louise) but still doesn't fully address health illiteracy and innumeracy

Many effective point e-health initiatives including web sites, applications, wearables, digital health ecosystems and virtual environments have been released but don't address the entire problem

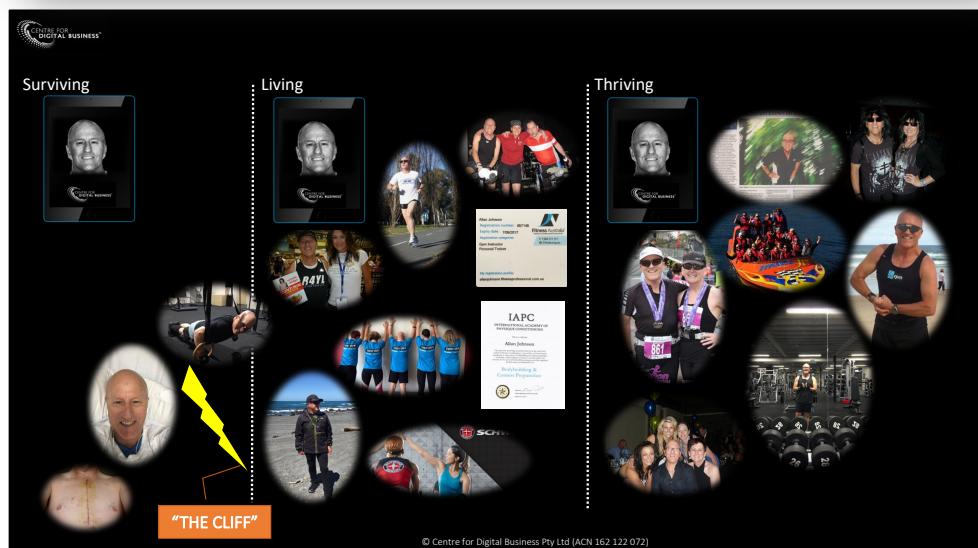
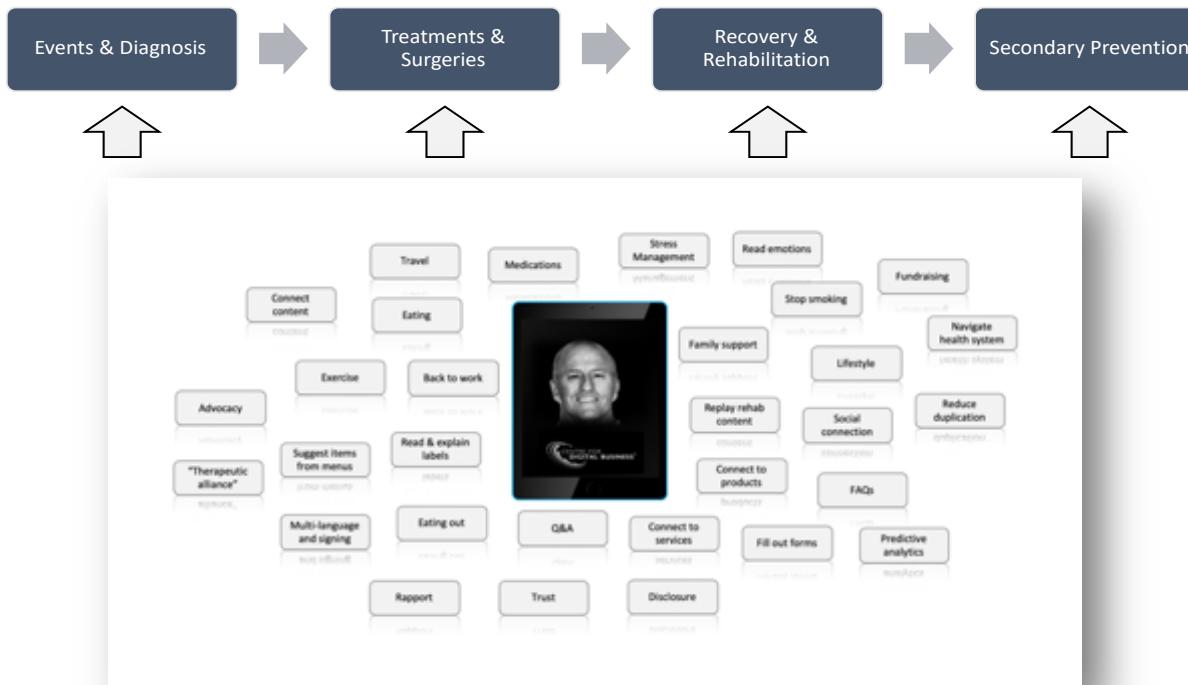


Effective solutions for transition to post acute care have been described and developed




what is the digital human cardiac coach?

*“...overcoming health illiteracy and other barriers
to build personal capacity and confidence to live a heart-healthy life...”*



- Cardiac Coach is a co-designed AI powered digital human containing a corpus/corpora and other functionality to achieve natural conversational interaction regarding heart health information and education for heart patients and their families.
- Cardiac Coach is intended to assist patients to understand primary prevention, cardiac events, hospitalisations and surgeries, recovery and secondary prevention and to support them in the implementation of these.
- Cardiac Coach is not automation of the current booklets given to heart patients which often fails to achieve adherence to the lifestyle changes and medication regimes required to prevent and recover from heart disease, events and surgeries.
- These booklets and structured website material are ineffective because of the high levels of health illiteracy amongst the heart patient community, especially amongst ethnic minorities and those with socio-economic and psycho-social disadvantage.
- Cardiac Coach is instead continuously available, accessible, understandable, updated and relevant to patient needs. Because it uses natural language conversations it overcomes the barriers of health illiteracy.
- It can be delivered direct to patients on desktops, kiosks or mobile devices or be used as an assistant by practitioners who are working with heart patients. These might include doctors, nurses, exercise physiologists, dietitians, pharmacists and psychologists.
- Cardiac Coach does not perform diagnosis nor recommend treatment.