

# Health Management for Addiction Recovery

Landscape

Authors: Andrew Choi, Li-Shun Wang, Sangeetha Thelapurath,

Mujib Wahab, Matt Jones

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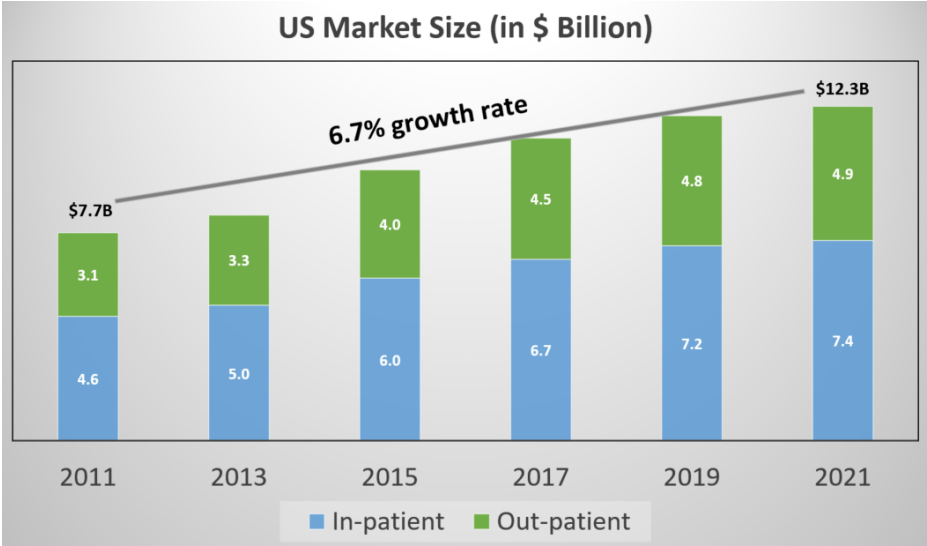
# Introduction

Society worldwide is facing a growing problem of substance abuse, and addiction. According to the National Survey on Drug Use and Health, in the US alone, 21.7 million people suffer from one form of substance abuse or another, including alcohol, synthetic compounds, prescription and over the counter medications as well as many others. That equates to 1 in 8 people, so most likely this is affecting someone that you know. The rate of growth of this problem is 6.7% annually within the US. Recent events, such as the covid pandemic, have only made the issue worse by exacerbating underlying causes of substance abuse such as mental health issues.

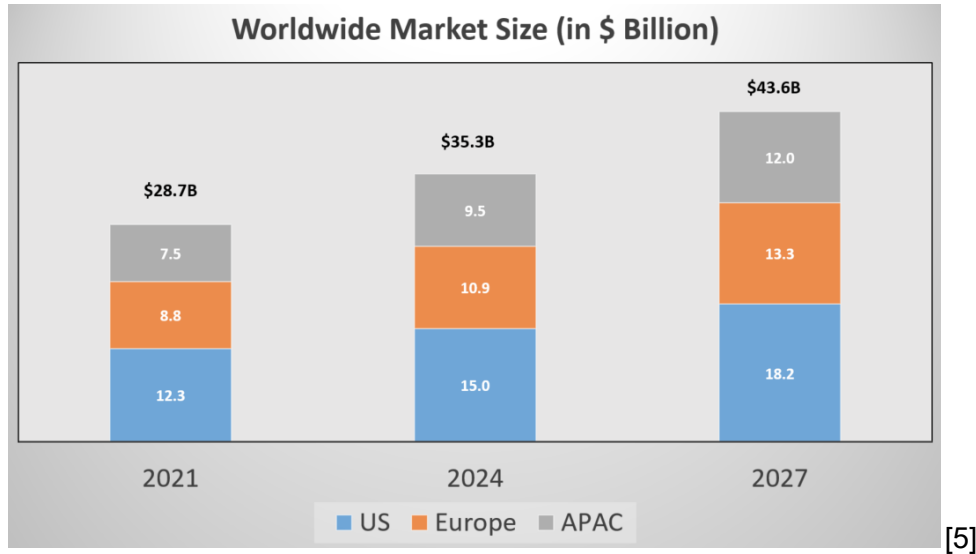
## Drug Rehabilitation Market Analysis

The worldwide drug rehabilitation market is projected to grow from \$28.7B in 2021 to \$43.6B in 2027 [5].

The US held the largest drug rehabilitation market share of 43%, and is projected to grow at a rate of 6.7% in terms of value, from \$13.2B in 2021 to reach \$18.2B by 2027. The market dominance in the US is due to several factors such as the rising number of population exposed to addiction, well-structured reimbursement policies, and legalization of marijuana in various states, which is supporting the growth of the market in the US. The EU held 31% of the market in 2021, with a projected annual growth rate 7.1%. The market share is attributed to the continuously expanding healthcare market and increasing investments in the healthcare sector. APAC is projected to witness the fastest growth rate of 8.2%. The growth rate is resultant of the expansion of the health care sector and rising incidence rate of alcohol & tobacco addiction which is supporting the market growth in this region.



[5]



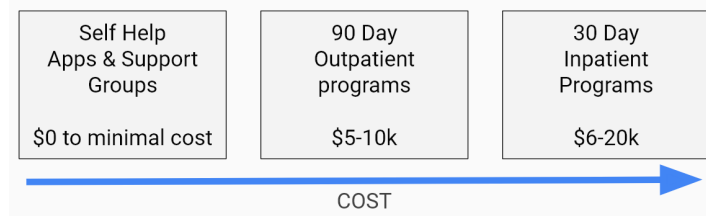
The size of this market shows there is room to make improvements to existing drug rehabilitation programs to reduce costs, improve effectiveness, as well as develop new solutions that can capture existing market share.

## Incumbent Rehabilitation Programs

Self help apps and Support groups (such as Alcoholics Anonymous) are the cheapest solutions in the current market to deal with substance abuse addiction, and generally cost nothing to the user. They require someone to reach out to get the support, and they must be engaged with the program with their own motivation. Whilst cheap, they are not often ideal for all people, for example they can cause social anxiety for some, and can often be linked to religious organizations that deter others from attending.

Outpatient programs are available as structured programs, usually in a healthcare setting, where a patient pays for a set program of rehabilitation and support. These programs generally run for about 90 days, and cost anywhere in the range of \$5k to \$10k[4] for the program. They offer a less intrusive experience than inpatient rehabilitation (as you can still go about day to day activities), but a lot more engaged support than cheaper options.

The most costly, intensive, but also the most supportive of the programs on offer is full inpatient programs that will run for upwards of 30 days. They cost anywhere from \$6k to \$20k per 30 days[4].



# Relapsing

One of the big issues facing structured programs is the ability to prevent a patient from relapsing once they have left the program and are on their own to continue abstinence. Data shows that between 40-60% of inpatients will relapse within 30 days of completing an inpatient program, and that 85% will relapse within the first year[12]. This means that even when treated, patients are potentially having to come back through the system multiple times before they may achieve a successful recovery.

In order to understand how to improve the outcome for patients, we need to understand the many reasons for relapse[11]. Some of the most common are detailed here:

## Mental Health

Often the reason people start using in the first place is due to underlying mental health issues. Treating the addiction does not treat the root cause, and when unaddressed, or undiscovered at the time of treatment, they can lead to relapse.

## Withdrawal

Patients are often trying to cope with the physical withdrawal of a substance within the early stages of recovery (first 6 to 18 months), which can cause nausea, hot and cold sweats, vomiting, insomnia, among other things. To find relief from these, patients often relapse if medical detox methods are not working or available.

## Boredom and Isolation

Replacing the habit that once used to be a part of their everyday life can be difficult, as well as the feeling of isolation that occurs when you are no longer around the people you once were familiar with.

## Emotions and Stress

Having to engage in high emotion or high stress situations can trigger a need to relapse to cope. These can be anything from going through a breakup, to the stresses that people encounter at work.

## People, Places and Things

Before rehabilitation, individuals with alcohol or drug addiction would find themselves frequenting certain places such as bars, or spending time with other like minded individuals. Coming into proximity of these places, or meeting these people who may still be suffering

addiction can cause individuals to relapse unless they have a support and accountability partner with them.

## Developing Solutions

There are a number of solutions developing in the market to start assisting patients to better outcomes with addiction, or even just better healthcare.

Many smaller companies have entered this space, as well as bigger players in healthcare and technology trying to find solutions to healthcare problems as a whole. Many of these solutions offer an opportunity to adapt, to reduce patient and program costs, and improve patient outcomes from drug rehabilitation.

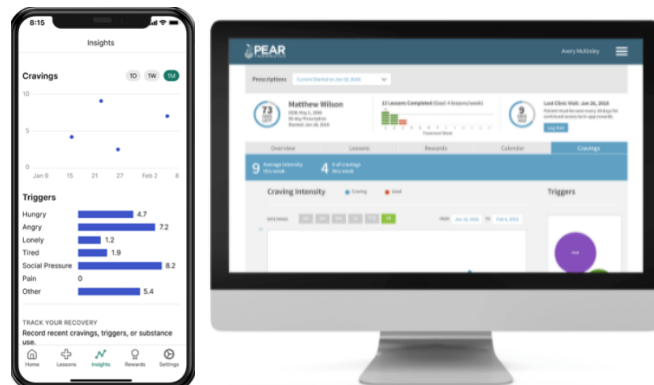
We will look at 3 key areas of solution, and how they have started to change the way that traditional rehabilitation works.

## Software for Rehabilitation



The FDA, in 2017, permitted marketing of the first mobile medical application to help treat substance use disorders[6], thus allowing Software as a Medical Device for substance abuse cases.

Pear Therapeutics was the first company to provide an app under this categorization, and requires an Rx for a patient to have access to the app. There is also an app for the clinician to follow the patient's progress. Patients use the app by manually entering in any triggers, cravings or relapses that they have had. It also provides access to lessons and coaching to help the patient along their rehabilitation process. Whilst the app was less than ideal, as it needed things to be entered manually, it did manage to prevent drug relapse by over 20%[9].



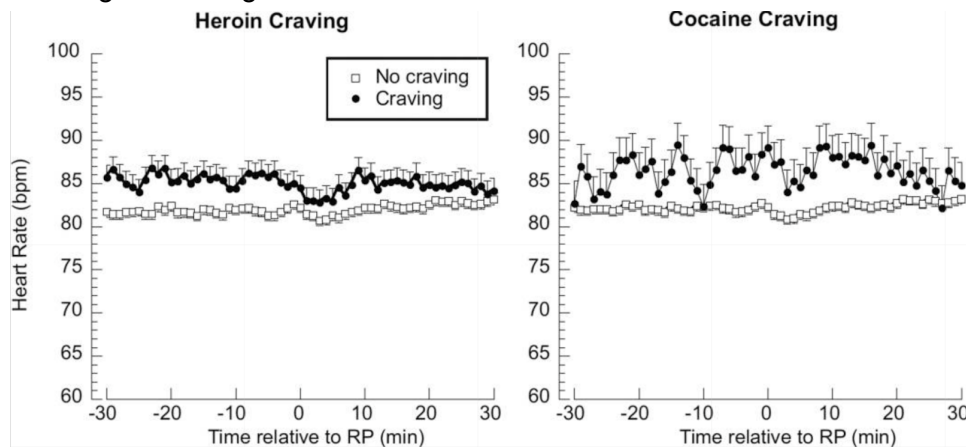
## Hardware for Rehabilitation



Several clinical studies have been performed to evaluate the use of wearable wellness technology that contain sensors to track various aspects of a patient's cravings and stress. It has been repeatedly demonstrated in these studies that there is a strong relationship between stress and cravings in substance use disorder, where stress states notably increase the risk of cravings.

One study[2] used a device created by Empatica called the E4 which found that it could detect the different states of stress versus no-stress, cravings versus no cravings and craving versus stress with more than an 80% accuracy in all cases. It was also possible to detect craving versus stress versus no-stress with over 60% accuracy.

Another study[7] used a device called Autosense (a chest mounted sensor) that would detect the variable heart rate of a patient, and could detect the difference between craving/no craving heroin, and craving/no craving cocaine.



## Wearable Market

The growth opportunities in wearable technology market are attractive. As of 2020 the market size for the Electronic Sensor Market is 21.23 Bn growing at an annual rate of 12.26%, Wearable Fitness Technology Market is 9.63 Bn growing at an annual rate of 13.7%, Wearable Healthcare Devices Market is 18.34 Bn growing at an annual rate of 20.5%, Wearable Computing Market is 34.61 Bn growing at an annual rate of 20.7% and Wearable Artificial Intelligence(AI) Market is 19.41 Bn growing at an annual rate of 29.75%.

This is a very healthy foundation on which to rely going forward for greater integration into substance abuse prevention, as well as addiction rehabilitation. Access to these devices is becoming commonplace, and increasing year over year. Competition and growth are driving new innovation in this space, as we see with the hardware case studies above.

Growth in wearable AI tech is also something that will aid in the healthcare industry as people become more careful about how their personal data is handled (privacy headwinds are discussed later). The more that can happen as close to the user as possible, the less data needs to be collected remotely.

## Detecting Relapse

Having previously elaborated on the causes of relapse, there is growing research into the ways these causes can be identified using sensors that individuals wear to monitor various activities[10][8]. Electronic sensors include Electrodermal sensors to detect sweat from the skin, variable heart rate monitors to detect changes in heart beat over a period of time, blood pressure sensors, temperature sensors. It is also possible to make use of the more common devices on modern wearables such as GPS, Accelerometers and microphones. These wearable sensors are becoming more commonplace and no longer exclusive to expensive medical devices.

There have been a lot of studies into different wearable sensors that can aid in detection of conditions such as pain and stress[3] and the companies developing in this space range from large tech companies to smaller players. There have to date been numerous acquisitions, even among the companies mentioned in the previous journal[3], ActiGraph was acquired by Archimed in 2020 for example.

|   |           |   |           |
|---|-----------|---|-----------|
|  Microsoft | \$2.5tril |  empatica     | \$7.8mil  |
|            | \$2.6tril |  sentio       | \$6.4mil  |
|  fitbit    | \$1.9tril |  :) Affectiva | \$62.6mil |
|   |           |  ActiGraph    | \$1.6bil  |

Table showing market cap of companies developing wearable medical devices[3]



## Big Data/ML in Healthcare



In HealthCare there are many companies working together using Big data ,Cloud technologies and Predictive models based on machine learning to improve patient engagement, population health, quality of care and business operations.

One example is Sharp HealthCare[1] working with Cloudera , ProKarma and Intel to develop a predictive model to identify the patients that require their rapid response team's help. They analyzed a wide range of data from the hospital's electronic medical records , fitness tracker records and clinicians handwritten notes to predict the likelihood of a rapid response event within an hour with 80% accuracy.

Another example is Penn Medicine[1] working with Intel to create a collaborative data science platform named Penn Signals to predict and prevent Sepsis and Heart failures.Using this predictive model they were able to identify 85% of the Sepsis cases , 30 hours before the onset of the shock and 100% of the heart failure cases by educating their patients to successfully self manage this condition.

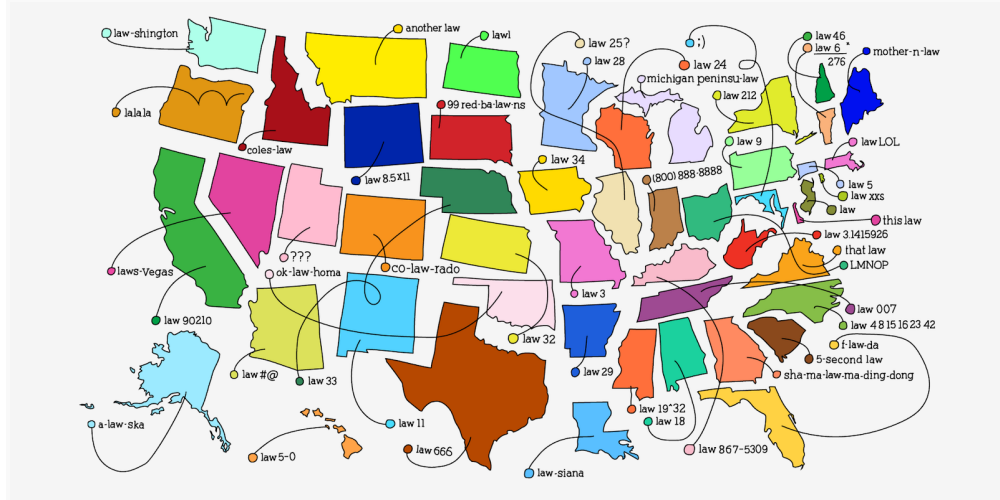
Whilst these case studies do not directly work on solving substance abuse, it is clear that the infrastructure and systems are starting to integrate into healthcare to improve patient outcomes, and it would not be a large reach to improve on these types of systems to also work on detection of pre and post-relapse indicators that can feed back into supporting these patients.

## Privacy Headwinds

Currently, privacy laws are a cluttered mess of different sectoral rules.

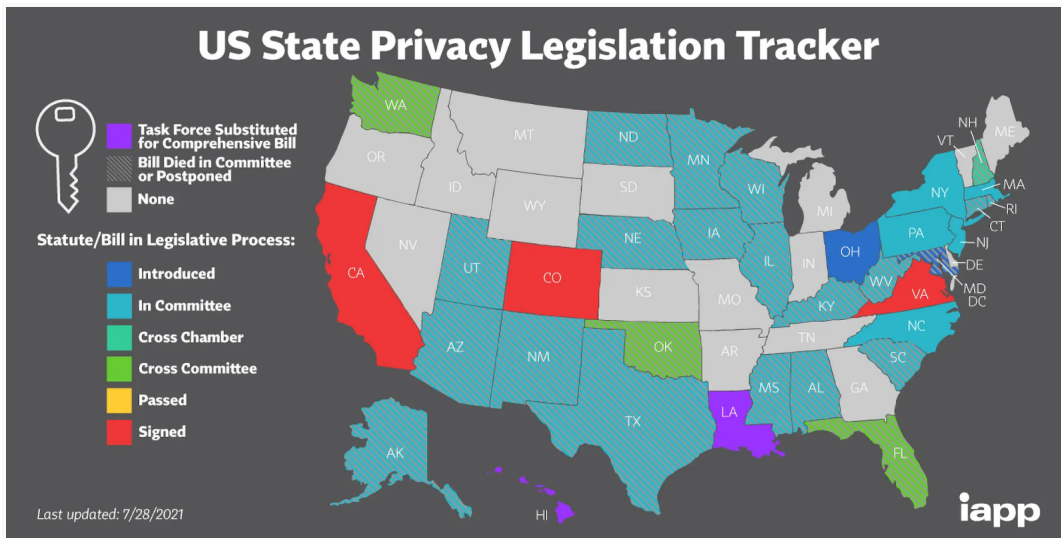
The United States doesn't have a singular law that covers the privacy of all types of data. Instead, it has a mix of laws that go by acronyms like HIPAA, FCRA, FERPA, GLBA, ECPA, COPPA, and VPPA.

- HIPAA - The Health Insurance Portability and Accountability Act
- ECPA - Electronic Communications Privacy Act
- FCRA - Fair Credit Reporting Act
- FERPA - Family Educational Rights and Privacy Act
- GINA - The Genetic Information Nondiscrimination Act
- CMIA - Confidentiality of Medical Information Act
- COPPA - Children's Online Privacy Protection Rule



The data collected by the vast majority of devices people use isn't regulated. Since there are no federal privacy laws regulating many companies, they're pretty much free to do what they want with the data, unless a state has its own data privacy laws.

Currently, three states in the US have three different comprehensive consumer privacy laws: California (CCPA and its amendment, CPRA), Virginia (VCDPA), and Colorado (ColoPA). Regardless of which state a company is located in, the rights the laws provide apply only to people who live in these states.



At least four other states, Massachusetts, New York, North Carolina, and Pennsylvania, have serious comprehensive consumer data privacy proposals in committee right now. Other states have varying laws in the early stages.

Unlike the US, the EU has a comprehensive privacy law, General Data Protection Regulation (GDPR), that requires companies to ask for some permissions to share data and gives individuals rights to access, delete, or control the use of that data.

Though privacy possesses a headwind in the US, we believe that the US states and Federal will follow the proven path from EU's GDPR and 3 states that have implemented the comprehensive privacy laws to address the privacy concern.

## Summary

It is clear that there are many opportunities in this space.

Firstly, healthcare providers have several opportunities to acquire or partner with companies analyzing data to provide a better full loop software and/or hardware solution for their patients. This can give better insight over the entire rehabilitation journey of patients, and allow for more insight in how to reduce relapse cases. It will also allow them to drive down the costs of drug rehabilitation by tailoring care on a more personal level to the patient, and intervening only when necessary, and to give a less clinical "telemarketed" solution.



The second opportunity in this space is for tech companies to get ahead of the problem. They can work on expanding their wearable technology to include different sensors to detect more of the triggers that lead to someone abusing substances. These include stress, mental health state etc.

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