Health Management for Addiction Recovery

Team #7 - Landscape

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Society is Facing a Growing Problem

Substance abuse in the US affects 21.7 million people

That’s 1 in 8,

And is growing 6.7% each year
Drug Rehab. Market is Large... and Growing!

- $12.3B US Market Size in 2021 (60% inpatient + 40% outpatient)
- $28.7B Worldwide Market Size in 2021
- US/EU/APAC growth rate: 6.7%/7.1%/8.2%

Incumbent Support Programs

<table>
<thead>
<tr>
<th>Program Type</th>
<th>Cost Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self Help Apps &amp; Support Groups</td>
<td>$0 to minimal cost</td>
</tr>
<tr>
<td>90 Day Outpatient programs</td>
<td>$5-10k</td>
</tr>
<tr>
<td>30 Day Inpatient Programs</td>
<td>$6-20k</td>
</tr>
</tbody>
</table>

40-60% of individuals relapse within 30 days of completing an inpatient drug and alcohol treatment center.

85% relapse within the first year

Why?

- Mental Health
- Withdrawal
- Boredom & Isolation
- Emotions & Stress
- People, Places, Things

https://drugabuse.com/addiction/relapse/
https://www.familyaddictionsspecialist.com/blog/10-most-common-reasons-for-addiction-relapse
Developing Solutions

Software
- PEAR Therapeutics
- NIGHTWARE
- Welldoc
- biofourmis

Hardware
- Affectiva
- Apple
- Empatica
- Actigraph
- sentio
- fitbit
- Microsoft

Healthcare
- SHARP
- Penn Medicine
- Kaiser Permanente
FDA Approving Software-as-Medical-Device in 2017


Pear Therapeutics Case Study

Prevented drug relapse by >20%

Manual Data Entry
- Triggers
- Cravings
- Relapse

Lessons & Coaching

Patient App

Clinician UI
Hardware for Rehabilitation

Successful Clinical Case Studies:

**Empatica E4:** Wrist mount multi-sensor

**Autosense:** Chest Mount Multi-sensor

<table>
<thead>
<tr>
<th>Classification Case</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress vs. No-Stress</td>
<td>81.30%</td>
</tr>
<tr>
<td>Craving vs. No-Craving</td>
<td>82.10%</td>
</tr>
<tr>
<td>Craving vs. Stress</td>
<td>80.70%</td>
</tr>
<tr>
<td>Craving vs. Stress vs. No-Stress</td>
<td>66.90%</td>
</tr>
</tbody>
</table>

[Classification Case](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7197459/)

Accuracy:
- Stress vs. No-Stress: 81.30%
- Craving vs. No-Craving: 82.10%
- Craving vs. Stress: 80.70%
- Craving vs. Stress vs. No-Stress: 66.90%

[Heroin Craving](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4447529/#R10)
# Tracking is the New Norm

<table>
<thead>
<tr>
<th>Market</th>
<th>Market Size - 2020 in USD Bn</th>
<th>Annual Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wearable Fitness Technology Market</td>
<td>9.63</td>
<td>13.7%</td>
</tr>
<tr>
<td>Wearable Healthcare Devices Market</td>
<td>18.34</td>
<td>20.5%</td>
</tr>
<tr>
<td>Wearable Computing Market</td>
<td>34.61</td>
<td>20.7%</td>
</tr>
<tr>
<td>Electronic Sensor Market</td>
<td>21.23</td>
<td>12.26%</td>
</tr>
<tr>
<td>Wearable Artificial Intelligence(AI) Market</td>
<td>19.41</td>
<td>29.75%</td>
</tr>
</tbody>
</table>
Detecting Relapse

**WHY?**
- Mental Health
- Withdrawal
- Boredom & Isolation
- Emotions & Stress
- People, Places, Things

**HOW?**
- Electrodermal, Heart Rate, GPS, Accelerometer, Microphone
- Electrodermal, Heart Rate, Blood Pressure, Temperature
- Heart Rate, Blood Pressure, Temperature, GPS, Accelerometer
- Electrodermal, Heart Rate, Blood Pressure, Temperature, Accelerometer
- GPS, Microphone

**WHO?**
- Microsoft: $2.5tril
- Apple: $2.6tril
- fitbit: $1.9tril
- Empatica: $7.8mil
- sentio: $6.4mil
- : Affectiva: $62.6mil
- Actigraph: $1.6bil

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7913347/

https://doi.org/10.3389/fdgth.2021.662811
**Healthcare: Big Data/ML**

**Improved patient outcome through intervention**

**Sharp Healthcare**
PoC System

**Patient** → **Medical Data** → **Extraction** → **Predictive ML analytics** → **Rapid Response Healthcare Intervention** → **Hospital (Sharp Healthcare)**

**Results:**
Pre-Fatality Detection
Accuracy: 80%
Detection: <1hour

**Cloudera, ProKarma**

**Intel**

**Penn Medicine**
Penn Signals
(based on Trusted Analytics Platform)

**Sepsis Detection**
Accuracy: 50% → 80%
Detection: 2hrs → 30hrs

**Heart Failure Detection**
Accuracy: 70-80% → 100%

Privacy Concerns

Headwind: No comprehensive privacy law in US

- No singular law that covers the privacy of all types of data in US
  - 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

- Only 3 states have comprehensive privacy laws
  - CCPA - California Consumer Privacy Act
  - VCDPA - Virginia Consumer Data Protection Act
  - ColoPA - Colorado Privacy Act

- EU’s comprehensive privacy law
  - GDPR - General Data Protection Regulation
Summary

**Healthcare & Insurance:**

Product: In-patient & out-patient care  
Goals: Outcomes ↑, Costs ↓

**Software:**

Product: Patient Logging & Behavior Management

FDA is authorizing Apps as SaMD

App Makers are marketing Telehealth & Analytics to healthcare providers & insurance

**Hardware:**

Product: Medical wearable sensors  
Growth: Overall wearable market & quality is rapidly improving

FDA approving wearable sensors for medical applications

Device Makers developing & marketing sensor data analytics services to healthcare providers
Opportunities:

- Healthcare providers (e.g. Kaiser) to acquire or partner with companies analyzing data to provide better SaMD to detect pre and post-relapse to reduce costs and reduce deaths.
- Big tech such as Apple/Microsoft/Google/Intel to acquire wearable manufacturers/add EDA, temperature technology to better predict causes of substance abuse addiction.