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Sword Health Investment Memo

8-10 minutes

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With most of the larger investments that I make, I try to document how I was thinking about the company at the time when I invested. You only learn about how an investment performed years after you made the decision and at that point your memory of why you invested originally is mediocre at best. I think this practice allows you to more accurately look back at your original thought process and analyze what you misjudged.

Below is my memo for one of the largest checks I've written to date, $5m of a $7.5m total Series A round. I've tried to do minimal sanitization of what I originally wrote. I tend to follow this exact format with all my memos, i.e. Summary, Upside, Tech, Key metrics, Key risks, Personal perspective, Team, Follow-up reading. At the end of the day venture is defined by the outliers and so most of your time should be spent on thinking about why a company can have massive upside.

Sword is also one of my favorite examples to give to other junior VCs about how to find your comparative advantage. Sword is tackling a massive market in the US with differentiated technology, but because they were based in Portugal they were completely overlooked. Most senior GPs are no longer willing to hop on an international flight to hunt for a company like this down. If this had been based in SF, there's no way I could have "won" the series A against a Keith Rabois.

If you're interested in Sword Health, especially in joining the team, please do shoot me an email at delian@foundersfund.com

Summary

Sword Health is a full stack digital physical therapy provider. They are the first group in the world to create remote autonomous digitally guided therapy that provides faster recovery and better long term outcomes for a variety of musculoskeletal injuries. They are in the early stages of commercializing their solution, with XXXXX being their first US-based customer.

An important aspect of their go to market strategy is to offer the solution to payers as an acute care and preventative solution, which the cost structure of current in-person PT centers cannot support. They then use this as a wedge to expand into displacing PT centers.

Interestingly, the company is primarily based in Porto, Portugal, however plans to move most of the executive and some of the R&D to the bay area as a part of this round.

I am proposing $5m from KV at $25m post with a 25% option pool, with a secondary option for us to put in another $5m at $40m post at our discretion.

Upside

Musculoskeletal disorders (MSD) are the second largest category of healthcare spend in the US, even above all of oncology combined. It is also a much larger contributor to decreased productivity than other healthcare categories.

In the US chronic pain from MSDs contribute to 60% of opioid deaths. Payers/providers are looking for alternatives to prescribing opioids and Sword is one of the only evidence-based solutions. The pull from the market is so strong that XXXXXX proactively reached out to their team and went straight into a paid contract for 50 patients.

That contract will expand to $7m ACV as long as Sword has around a 10% conversion of XXXXX offering it to patients and them completing the program. Sword currently has a 60% conversion in its roll-

out in Australia with a very similar process. Sword has proof from their Australian patients that self-reported pain dramatically decreases for the patients that complete their program.

This means the company can both completely take over the pre-existing post-acute in-person and at-home physical therapy market, but their massive cost decrease gives them a structural advantage to offer preventive care, which is currently a blue ocean market.

Technology

The patient-facing technology is quite clever. Rather than utilizing a camera-based solution which would require them to be placed in a few different angles in order to capture all movements done in physical therapy, Sword has patients put on a few different motion trackers. Each tracker contains an accelerometer for movement, gyrometer for rotation, and magnetometer for a fixed orientation and to correct gyroscopic drift. Sword then translates the data to create a biomechanical model. For each movement in their library they have a variety of different constraints they place on the model. For example when doing a single leg squat if your chest is angling too far forward, their interface will inform you. They are also able to track range of motion and gamify certain movements by allowing the patient to earn stars if they are able to push past their current range of motion.

They've iterated significantly since their first version on the patient-facing interface. It is almost purely audio cues and video cues with essentially no need to ever press a button on the tablet and the trackers themselves are devoid of buttons. They've had to make it incredibly intuitive since most of their patients are north of 60 yrs old. The digital therapist has over 5000 different feedback messages it can deliver.

On the therapist's side, they are able to see the patient's adherence, progress over time, and make adjustments to their program. Most importantly they collect the data on what adjustments the therapists make and the outcomes of each program so that over time they can automate the work of the therapists. They have already made some progress on this as shown by their ratio of active patients to therapists. Legacy providers typically have a 7:1 ratio, versus Sword is already at 45:1 and will soon be at 100:1.

Key metrics

$703k in booked revenue in 2018
1100 patients in total treated
100 currently active patients
$210k/mo burn rate
$4.1m total raised

Key risks/questions

1. **Defensibility:** There is some minor defensibility around their IP as well as their FDA approval which would slow down a fast follower. I think their biggest advantage will be the data set they build over time and utilizing that data set to automate more and more of what the therapist programs for their patients.
2. **Team/go to market:** All of their contracts to date have essentially been inbound interest from payers. They have only just started an outbound sales strategy in the past 2 months and have only made a single hire, who seems relatively old school to me.
3. **Competitors:** Redacted; No need to criticize others in public :)

DA perspective

The technology Sword has built is by far the best in class, and they have the scientific and clinical backgrounds to continue pushing on this front. I think their main gaps are in go to market. The CRO seems good as an individual salesperson, no idea if he's going to be able to build out a team. I'm really quite impressed by Virgilio after coming to Portugal. He's incredibly ambitious and willing to learn. The moment we had a moment alone he was immediately asking me what I thought of his team, where I thought he needed upgrades, what parts of his pitch he should adjust. He's definitely not a traditionally trained valley founder a la the XXXX team (trained by Roleof) or XXXX team (trained by Ribbit/Matt Cohler), but I think he'll be able to scale up with Sword all the way. Virgilio reminds me of XXXXX from XXXX in some ways in that he's a great scientist and a great engineer and is great at hiring, but similar to XXXXX is quite coachable and a bit naive on go to market, albeit better than XXXXX at it.

Team

CEO - Virgilio Bento - PhD in EE. Founded Findster (GPS pet tracker w/o monthly fees) doing $2.5m in 2018, $10m in 2019

CSO - Marcio Colunas - MS in CS. Cofounded Findster as well.

CoS - Catarina Prata - SJD from UCLA, Fullbright Scholar

CMO - Fernando Dias Correia - MD in Neurology, top of class in Porto's medical school

GM of Europe/Asia - Andre Eiras dos Santos - MS Biomedical engineering + EMBA

CPO - Ivo Gabriel - MS in Computer Engineering

Head of Algorithms - Luis Ungaro - MS in EE and Computer Engineering

VP of Engineering - Tiago Seabra - BS in Informatics, MS in Health Informatics, Senior Dev at Rocket Internet

Attachments

Fundraising Deck

TKR Paper

THR Study

TKR medium term outcomes paper

THR medium term outcomes paper