



## Expanding Internationally

### The new global benchmark in pain assessment

PainChek is a Sydney-based pain assessment tool provider. Considering the lack of any prior global benchmark in pain assessment, PainChek is expected to set a new global standard with its innovative product. The artificial intelligence (AI)-based mobile app uses facial expression to map and quantify pain. Considering millions of patients suffer from dementia globally and cannot explain pain explicitly, this utility app has enormous growth potential.

### 1H FY20 delivers exponential YoY growth

For the half year ended December 2019, PainChek reported \$1.5m in total revenue, with \$0.8m coming from the R&D grant and \$0.5m coming from the first phase of the \$5m Australian Federal Government funded trial program. In terms of contract uptake for 1H FY20, PainChek has delivered exponential YoY growth, with Residential Aged Care (RAC) clients up +416% YoY from 19 to 98, contracted RAC facilities up +1,362% YoY from 26 to 380 and contracted beds up +1,690% YoY from 1,789 to 32,023.

### PainChek is rapidly expanding its global footprint

Since our December 2018 initiation report PainChek has made great strides towards commercialization of the PainChek app. Multiple deals have been announced with RAC providers in Australia and significant progress towards international expansion have been made. As at the date of this research report, PainChek has now entered the UK, New Zealand and Singapore markets, where direct sales agreements have been executed in these offshore markets. Meanwhile, PainChek is also working on developing its Children's App that is targeted towards the 400m pre-verbal children's market. These opportunities, along with the developing relationship with Philips Electronics and the expected US FDA clearance in CY21, provide investors with appealing prospects for this early stage Health Tech venture.

### Valuation range A\$0.31-\$0.62 per share

With this note we update our valuation range to 31 cents per share base case and 62 cents per share optimistic case (previously the range was \$0.08-\$0.16) using a DCF approach on the back of revised assumptions on commercial expansion. Our valuation relates to what PainChek has achieved over the last two years in bringing its app into the Australian RAC market. Should management be able to expand market outreach aggressively, launch the Children's App commercially, and gain regulatory clearances for US and global launches, there will be considerable upside to our current valuation.

Share Price: A\$0.165

ASX: PCK

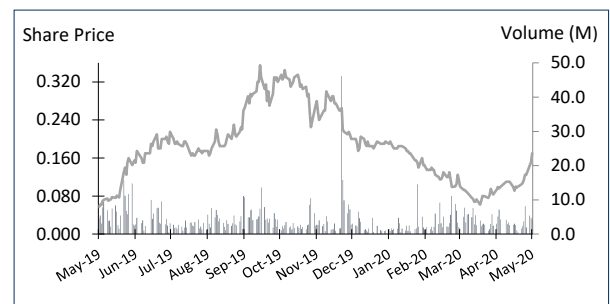
Sector: Healthcare

8 May 2020

Market Cap. (A\$m)	170.9
# shares outstanding (m)	1,035.5
# share fully diluted (m)	1,066.1
Market Cap Ful. Dil. (A\$m)	175.9
Free Float	100%
12-months high/low (A\$)	0.355 / 0.034
Avg. 12M daily volume ('000)	3,737
Website	<a href="http://painchek.com">painchek.com</a>

Source: Company, S&P Capital IQ and Pitt Street Research

### Share price (A\$) and avg. daily volume (r.h.s.)



Source: S&P Capital IQ, Pitt Street Research

<b>Valuation metrics</b>	
DCF fair valuation range (A\$)	\$0.31-\$0.62
WACC	10%
Assumed terminal growth rate	3.0%

Source: Pitt Street Research

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### 1H FY20 delivers significant contract uptake

During the first half of FY20, PainChek reported a healthy YoY growth of 71% in total revenue. Inclusive in the \$1.5m total revenue are government grant of \$0.5m and R&D grant of \$0.8m. Excluding R&D grant, the residual revenue of \$0.7m effectively represents commercial revenue generated from customers who have signed up for using the PainChek Adult App.

In terms of the underlying metrics for 1H FY20, contracted Residential Aged Care (RAC) clients increased +416% YoY from 19 to 98, with contracted RAC facilities up +1,362% YoY from 26 to 380 and contracted beds up +1,690% YoY from 1,789 to 32,023 (Figure 1). Among the 98 RAC clients, 58 new clients were contracted under the \$5m Federal Government trial program that was recently commenced in October 2019. Clearly, it is worth noting that the initial impact of the Federal Government trial program on the domestic RAC market has been potent.

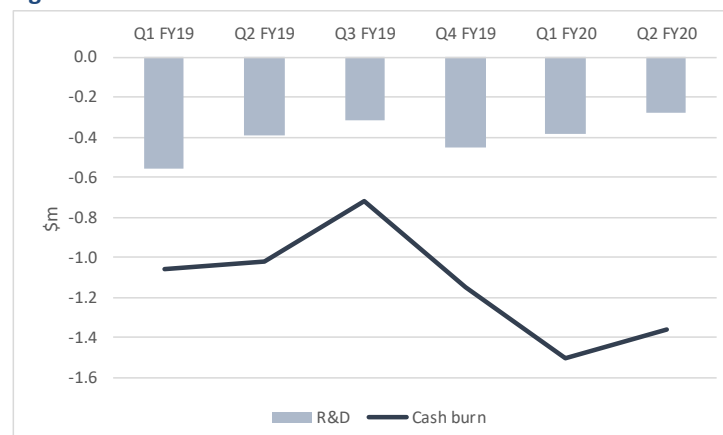
Figure 1: Number of contracted RAC clients, facilities and beds



Source: Company

Financially, Q2 FY20 cash burn rate has reduced by a considerable -9% QoQ to approximately \$1.4m on the basis of lower quarterly operating cash expense. This has partially contributed to a higher cash reserve, placing PainChek on a strengthened financial footing with approximately \$5.9m in cash (vs. \$4.6m cash ending Q1 FY20). Figure 2 below shows a positive trend emerging post Q1 FY20, using quarterly R&D expenses as a proxy for long term growth.

Figure 2: Cash burn rates



Source: Pitt Street Research, Company Reports



## Momentum accelerating in the RAC market

### Significant progress made in home market

In 2019, PainChek has signed multiple deals to broaden patient access to its app. In January 2019, it teamed up with Allity Aged Care – an Australian aged care provider – and Ward Medication Management (Ward MM), an Australian clinical pharmacy company that offers medication management services, to offer PainChek technology for aged care patients. The partnership will leverage PainChek’s technology in association with Ward MM’s Thrive service – a service that matches residents’ medications to their DNA to create personalised medication management plans. The implementation of PainChek has commenced in three Allity RAC homes located in NSW and Victoria.

In April 2019, PainChek signed a licence agreement with the Churches of Christ in Queensland (CofCQ), an Australian RAC provider, to make its app accessible to CofCQ’s nursing and care staff for assessing the clinical pain levels of residents. The licence agreement was signed as a follow-up to a successful PainChek trial conducted at CofCQ among residents suffering from dementia<sup>1</sup>.

Further, in April 2019, the Morrison Government announced that it will invest \$5m to facilitate implementation of the PainChek Adult App in Australian RAC centres. The investment makes provision for universal access of the PainChek Adult App to approximately 1,000 RAC providers in Australia and their 100,000 residents living with dementia or cognitive impairment for one year. This Government grant agreement was executed in December 2019 between PainChek and the Commonwealth represented by Department of Health. Of the \$5m, \$4.4m are allocated for the provision of 100,000 PainChek licenses for dementia patients across Australian RAC centres, with the remaining sum to be allocated for preparation of an evaluation report and on execution of the agreement to support the development of training materials.

In October 2019, PainChek partnered with Ward MM to deliver the national roll-out of PainChek’s Adult App to the wider Australian RAC market. This partnership allows PainChek to leverage on Ward MM’s skilled resources to deliver training to aged care providers in the use of PainChek’s technology, thereby helping PainChek to fast track the Federal Government trial program.

### Momentum building in home market

In Australia, PainChek’s contracted bed numbers totalled 31,564 as at 31 December 2019, representing a 15% penetration level of the Australian RAC market. Of the total contracted beds, 18,604 beds were contracted under the Australian Government funded trial during Q2 FY20. Given that PainChek is set out to deliver on the 100,000 dementia beds as part of its rollout of the \$5m Government funded trial, it can be deduced that there remains 81,396 beds that are yet to be contracted by the company, the execution of which will significantly expand PainChek’s market share in the Australian RAC sector. Further, PainChek is now integrated with six major aged care management system providers in Australia. Additionally, we view the ongoing launch of PainChek’s Adult App in the domestic RAC market as laying the foundation for the company’s future success in offshore markets such as UK, Singapore and New Zealand. And of course, a very sizable US market awaits. If PainChek can replicate its Australian success in all of its offshore markets, the company will enjoy material upsides to its revenues and earnings over the medium term.

*\$5m Federal Government trial program serves as a launching pad for PainChek’s technology to be experimented by the wider Australian RAC operators*

*Government trial program allows PainChek to build traction in its home market*

<sup>1</sup> CofCQ owns and operates 28 Queensland RAC homes comprising ~1,900 aged care beds.



## National trial roll-out boosts customer retention

Under the Federal Government trial program, both new and existing RAC clients are subject to contractual terms that extend for a two to three year period combining the government funded dementia bed program for the first year and the company's standard approved bed terms for the remaining years. Because the contractual terms extend for at least a year after the trial ends, the Federal Government trial program effectively aids PainChek to lock in short term revenues which will be derived based on the company's normal commercial pricing.

*Highly probable for most RAC operators to continue their contracts once the Federal funded trial has completed and the utility of the PainChek device proven*

Recent case studies have confirmed significant clinical benefits of PainChek's Adult App including the improvement in pain management and patients' behaviours as well as cost savings through reduction in administration. On this note, we believe by the end of the one-year trial program, it is highly probable for most RAC clients to continue their contracts with PainChek as they would have found the product appealing and an invaluable tool for assessing pain and evaluating pain management strategies in residents with dementia. The likely continuation of contracts by most Australian RAC operators will provide PainChek with cashflows that reflect its normal commercial pricing.

## Expanding Internationally

### \$4.15m secured from shareholders to fuel expansion plans

In June 2019, the company secured \$4.15m in a share placement. The funds would help the company achieve the expansion of its Adult App in multiple international markets – including select European and other overseas markets under the CE mark clearance – as well as new customer segments, such as direct-to-consumer and in-hospital use. Moreover, it would help the company secure regulatory clearance for PainChek's Adult App (in US) and Children's App (in US, Europe and Australia). In July 2019, the second tranche of \$1m of the placement totalling \$4.15m settled with issue of approximately 6.9m ordinary shares and approximately 3.4 options exercisable at \$0.25 per share with an expiry date of 30 June 2022.

*PainChek expands presence in the UK market; first 1,000 annual bed license order received from PCS UK in Q2 FY20*

### PainChek enters the UK market

In May 2019, PainChek entered its first overseas market, the UK, by signing a binding distribution agreement with Person Centred Software (PCS), a UK-based aged care software provider whose mobile solution is used by approximately 1,200 care homes across the UK. Through the agreement, PainChek intends to distribute its dementia app to PCS's UK clientele through PCS's sales, marketing and service capabilities. The integration of PainChek's app into PCS's industry leading product range has been completed. In December 2019, after a couple of trials, PCS have placed initial orders of 1,000 PainChek annual bed licences for their UK aged care and nursing home clients. Given there are more than 55,000 resident beds under PCS licenses, we view the confirmation of PCS's initial orders as a positive sign for PainChek. As the company continues to prove its operating model, we believe more orders will come through from PCS over the near term.

*Direct sale agreement landed in Q2 FY20 with UK dementia aged care centre*

In September 2019, the company recruited Mr Pete Shergill, a highly experienced and qualified business development person, in an effort to boost its UK business. Shortly after this appointment, Mr Shergill assisted the company in landing its first direct sale to a 30-bed dementia specific aged care customer in the UK. Moreover, on the marketing front, PainChek has made further progress by teaming up with an outstanding Care Quality Commission



rated aged care facility to promote the PainChek technology to potential new UK customers. This arrangement should in our view enhance PainChek's growth as it will drive direct sales to the large number of dementia focused aged care home in the UK.

Elsewhere in Europe, the company is also working with the German Pain Society to assess market entry in Germany.

## **PainChek's first break in the New Zealand market**

*In Q2 FY20, PainChek signed its first direct sales agreement with a leading New Zealand aged care operator*

Following a successful trial in New Zealand, PainChek made its first break into the market by executing its first direct licence agreement with Enliven (Presbyterian Support Southland) ("Enliven"), a leading New Zealand-based aged care provider that owns and operates 5 aged care homes comprising 300 aged care beds. This agreement will allow PainChek's Adult App to be accessed among Enliven's nurses and carers in assessing patients' pain. We believe the signing of this initial direct licence agreement with Enliven has set the foundation for PainChek to land further direct sales agreements with many other New Zealand aged care operators over the short term.

## **PainChek breaks into the Asian market**

*PainChek inked its first deal in Singapore*

In August 2019, PainChek entered its first Asian market, Singapore, following regulatory approval there. The company inked a 2-year licence agreement with Allium Healthcare (Allium), a Singapore-based 129 bed premium nursing home developer and operator, for the utilisation of its Adult App across all Allium's facilities. Through this first direct sales agreement PainChek can not only demonstrate its product capability in the Singapore market, but also prepare the way for future opportunities in the broader Asian market. In 2018, it is estimated that about 82,000 people living in Singapore may be suffering from dementia, with the number expected to exceed 100,000 in a few years<sup>2</sup>. In Asia, there are approximately 23 million people with dementia in Asia, with the number expected to grow considerably by 2030<sup>3</sup>. These stats represent material upsides to PainChek should the company able to penetrate the Asian market, which in our opinion, is likely to occur once the company proved its business model in the Singapore market via its current agreement with Allium.

*Japanese patent secured by PainChek*

Elsewhere in Asia, PainChek has made progress in Japan where it has been granted a patent for its pain assessment device. This patent will exclude parties other than PainChek from making, using, selling and importing its invention in Japan for 20 years from the filing date as at 17 February 2017. It therefore marks a big step in PainChek's commercialisation drive. Given 26% of Japan's 126 million population is estimated to be over 65 years of age<sup>4</sup> and that the number of over-65s is set to grow significantly in the future, this aging demographic presents an immense opportunity for PainChek to capitalise on, especially given the focus on quality aged care services in Japan.

## **PainChek now has its first US patent and is moving towards its goal to obtain the US FDA clearance**

*US patent protection for the PainChek app is now in place*

PainChek's basic intellectual property is covered by the PCT Patent Application entitled Pain assessment method and system, WO/2016/025989, priority date 18 August 2014<sup>5</sup>. At the time of our December 2018 initiation report on

<sup>2</sup> [www.alz.org.sg/dementia/singapore/](http://www.alz.org.sg/dementia/singapore/)

<sup>3</sup> [www.alz.co.uk/sites/default/files/conf2018/3\\_DY\\_Suharya\\_Asia\\_Pacific\\_response\\_to\\_global\\_action\\_plan\\_on\\_dementia.pdf](http://www.alz.co.uk/sites/default/files/conf2018/3_DY_Suharya_Asia_Pacific_response_to_global_action_plan_on_dementia.pdf)

<sup>4</sup> [https://en.wikipedia.org/wiki/Demographics\\_of\\_Japan](https://en.wikipedia.org/wiki/Demographics_of_Japan)

<sup>5</sup> Invented by Jeff Hughes, Kreshnik Hoti and Mustafa Atee.





PainChek this patent application had yet to translate into granted patents in major jurisdictions although it had gone to National Phase. The July 2019 Notice of Allowance from the US Patent and Trademark Office for the first US patent grant<sup>6</sup> is therefore a significant step forward. As a general rule the US market constitutes around 40-50% of the global healthcare market<sup>7</sup> so US Patent Protection or other intellectual property protection is vital for any company like PainChek with a world-first invention looking to commercialise globally.

***FDA De Novo submission for PainChek Adult App expected to be completed during CY20, with FDA clearance expected during CY21***

In terms of progress on FDA approval, the company has engaged with two North American service providers to conduct both the Human Factors and Clinical Study work required for the De Novo submission. Management anticipates completing the De Novo submission for FDA clearance for the PainChek's Adult App during CY20, with FDA clearance expected during CY21.

***Globally there are approximately 400m children between the age of 0-3 years old – an immense market opportunity for PainChek to capitalise on***

## The Children's App is slated to release in late CY20

Even larger than the elderly dementia market is the pre-verbal children market where PainChek's pain assessment device can also be utilised. Across the world now there are approximately 400m children between the age of 0-3 years old. As part of its business strategy to capture this immense market opportunity, PainChek is working on a pediatric version of its pain assessment technology, known as the PainChek' Children's App. It is scheduled to be delivered in 3 age group versions, with the youngest Infant App – suited for infants between 0-1 years old – being the first developed and now undergoing clinical research.

In June 2019, a research agreement was signed with Melbourne's Murdoch Children's Research Institute (MCRI), the largest child health research institute in Australia. The clinical trial version of the PainChek Infant App has been finalised for use in the study. Management expects the Children's App to be commercially available in late CY20.

## Delirium – a potential new market for PainChek

On 9 January 2020, a research paper was published by the *Journal of European Geriatric Medicine*<sup>8</sup>, noting the potential application of PainChek's pain assessment technology in patients with delirium, a medical condition affecting people's mental ability and resulting in confused thinking and reduced awareness. As such, patients with delirium often find difficulty in self-reporting pain, thereby shifting the burden of pain assessment onto practitioners. Professor Sampson from Marie Curie Palliative Care Research Department, University College London (UCLH), the author of the research paper, believes PainChek's device may be a solution to assessing pain in patients with delirium. Currently, the company is working with Professor Sampson and the UCLH team on a research project to assess PainChek as a new delirium patient management tool. Should the research project yield favourable outcomes, we would expect a new sizable delirium market awaits for PainChek.

<sup>6</sup> Which relates to Application No. 20170156661, filed in February 2017.

<sup>7</sup> See, for example, Statista, Global pharmaceutical sales from 2016 to 2018, by region (in billion U.S. dollars).

<sup>8</sup> Sampson EL, West E, Fischer T. Pain and delirium: mechanisms, assessment, and management. *European Geriatric Medicine*, 9 January 2020.



*Institutional investors buying signifies something positive about PainChek*

## Institutional buying

In November 2019, shares totaling 45.1m have been sold by 4 PainChek's directors to fund tax liability resulting from option exercising. Importantly, those shares were sold to a group of domestic and international institutional investors. Normally investors would be cautious when hearing directors disposing large sum of their shares. In this case however, we believe the institutional take-up signifies something positive about the company as those type of investors would typically conduct extensive due diligence on an investment opportunity before committing their capital.

## The Philips relationship bodes well

The Dutch electronics giant Philips has been a major player globally in healthcare for many years. The company is probably best known for its diagnostic imaging equipment but it is a leader in equipment categories as diverse as defibrillators, CPAP machines and blood pressure monitors. This has led in recent years to a strong interest in health informatics and the Internet of Medical Things as the Next Big Things in medical equipment.

A recent initiative for Philips in this regard is Healthworks, a global collaboration program for startups focused on artificial intelligence in healthcare. Startups chosen to be part of Healthworks get to undertake a 12 week programme where Philips gives them access to its health technology expertise and the ecosystem it has built around this expertise. That this is a serious programme is suggested by its global scale – Healthworks takes place across four Philips 'innovation centres' - in Eindhoven, Bangalore, Shanghai, and Cambridge, Ma. In 2019 the Program kicked off in September and in December there was a Breakthrough Da where companies pitched to the Philips ecosystem.

Encouragingly for PainChek shareholders, their company was part of the 2019 programme, having been selected from over 2,500 applicants. PainChek hasn't made a great deal of it in a public sense<sup>9</sup> but we believe that its participation bodes well for the company – not just in terms of its relationship with a major company involved in healthcare AI, but also because it put PainChek and its technology in front of many key opinion leaders in its space.

## Valuing PainChek

We previously valued PainChek at at 8 cents per share base case and 16 cents per share optimistic case using a DCF approach. With this note we update our model for the recent capital raising as well as a changed discount rate, resulting in a valuing range of 31 cents per share base case and 62 cents per share optimistic case (Figure 3).

**Discount rate:** We used a 10% discount rate to reflect the relatively low risk of PainChek compared to other Life Science ventures<sup>10</sup>. Previously, with the higher Australian 10 year bond rate, the discount rate was closer to 11%<sup>11</sup>.

<sup>9</sup> Healthworks is discussed in the quarterly update for September 2019, which was issued on 31 October 2019.

<sup>10</sup> As of 1 January 2020 10% represents the lowest discount rate we will use for 'start-up' and early-stage ventures.

<sup>11</sup> For a relevant discount rate, we use varying WACCs depending on the risk for Life Science companies. We start with an RFR of the Australian ten year bond rate and an ungeared beta of 1.1 but use a variable MRP of 7.5%-11.5% (7.5% for 'medium risk' companies, 9.5% for 'high risk' companies and 11.5% for 'speculative' companies). We regard Life Science companies with existing businesses, or who have enough capital to reach the market with their products, as 'Medium' risk. Companies that have small revenue streams from marketed products but that are still potentially in need of capital are 'High' risk. Everything else is 'Speculative'.





**Time horizon:** We constructed base and optimistic case DCFs with a 15 year time horizon.

**Figure 3: Our valuation of PainChek**

	<b>Base</b>	<b>Optim.</b>
Value of PainChek ePAT	319.9	651.2
Value of tax losses	8.0	8.0
Corporate overhead	-8.4	-8.4
Cash now (A\$m)	5.9	5.9
Cash to be raised (A\$m)	0.0	0.0
Option exercises (A\$m)	6.6	6.6
Total value (A\$m)	332.0	663.3
Total diluted shares (million)	1,066.1	1,066.1
Value per share	\$0.311	\$0.622
Valuation midpoint	\$0.467	
Share price now (A\$ per share)	\$0.165	
Upside to midpoint	182.7%	

Source: Company

*PainChek continues to look attractive even as a niche product provider*

**Initial patient numbers:** We previously assumed that over the period 2019-2023 PainChek remains a niche product in its core markets, growing the average number of treated patients to ~280,000 by FY24. The Morrison Government's April 2019 announcement of a A\$5m investment to facilitate implementation of the PainChek app in Australian RACs suggested that the diffusion of PainChek could run faster than we initially expected. The March 2020 quarterly result, showing 50% growth in beds, clients and facilities, has provided confirmation of this. Consequently we've now assumed 500,000 patients globally by FY24.

**Operating costs.** We assume that PainChek's current cost base after corporate expenses is A\$2m pa. and will grow by 30% p.a. over the next five years as the company grows its sales stream to roll out the PainChek app globally.

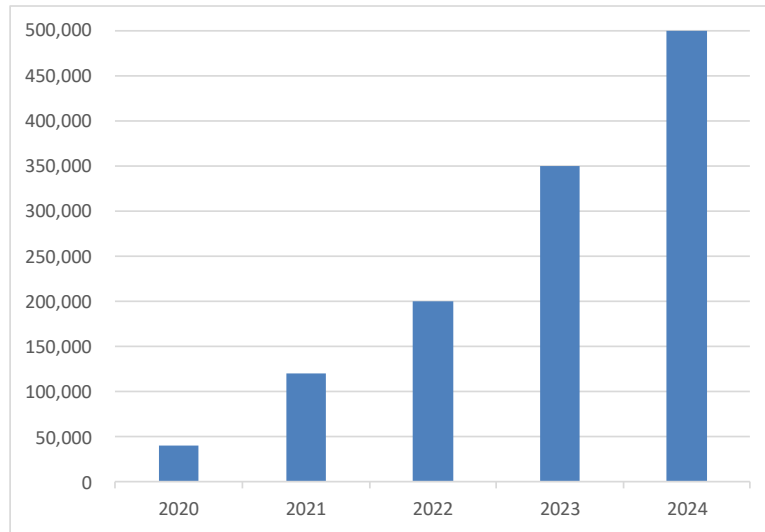
**Corporate costs.** We assume A\$1.2m in corporate costs p.a.

**Gross margins.** We assume that PainChek can generate gross margins in the order of 85% given the ease with which app-based diagnostics can scale. We see upside to this number based on the fact that sometimes PainChek has to pay away some gross margin to system integration partners.

**Software licensing.** We include no value for any royalties on the PainChek app, since PainChek has paid for its SDK in full. We assume no royalties payable to other third party software providers going forward.



Figure 4: Potential user numbers for the PainChek app



Source: Pitt Street Research

For the ten years beyond FY24 we used the following assumptions

Figure 5: Growth assumptions from FY24

	BASE	OPTIMISTIC
Sales at year 5	30.0	30.0
Growth rate year 6	25.0%	35.0%
Growth rate year 14	15.0%	20.0%
Initial gross margin	85.0%	90.0%
Margin improvement factor	0.2%	0.4%
Capex (% of sales)	4.0%	2.0%
Ongoing tax rate	30.0%	30.0%
Amount set aside to working capital (% of revenues)	4.0%	2.0%
Terminal growth rate	2.0%	3.0%
Terminal margins	40.0%	50.0%

Source: Pitt Street Research

*PainChek's margins are potentially very high*

**Long-run usage potential.** Our assumptions on long run sales growth suggests that the user base of the PainChek app is between 2.5 million and 4.2 million patients, which is still a fraction of the potential user base globally.

**Terminal margins.** The potentially high margin nature of the PainChek app suggests that EBITDA margins for the company as a whole could be north of 50% or 60%. We assume that other diagnostic modalities emerge between now and the 2030s which could slightly erode PainChek's competitive advantage and thereby dampen margins.

**We see upside risk to our current valuation.** Obviously PainChek is at the early stage of its growth. We believe that solid growth in assessment numbers in FY19 and into FY20 will help determine the validity of the valuation range we have developed.

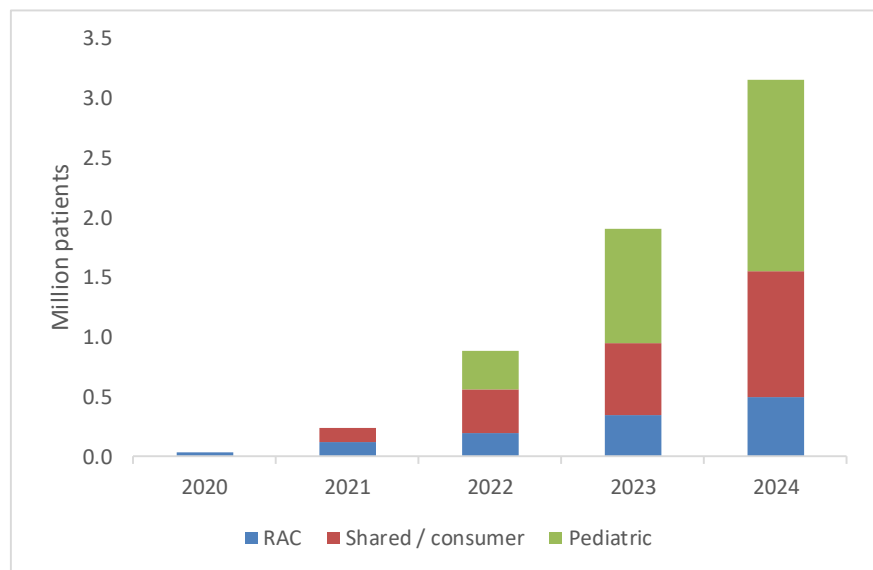


**There are, potentially, multiple growth curves.** The above valuation depends in large measure on PainChek's early success in growing usage in Residential Aged Care. There are, however, two other growth curves that can potentially layer onto this one (see Figure 6 below).

- **Growth Curve 1: Shared care and consumer for dementia = 3x.** These applications of PainChek can serve a market potentially 3 times the size of the RAC market depending on the geography being targeted.
- **Growth Curve 2 – Pediatric users = 8x.** This is a seriously large opportunity. If there are 50 million people with dementia globally, there are 400 million children under 3.

Obviously PainChek has to complete development of the relevant software and start to market the applications, but the 3x and 8x market opportunity suggests a much more aggressive growth profile than the one we have used.

**Figure 6: One potential chart of PainChek patient numbers should all applications gain a good market response**



Source: Pitt Street Research

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