

ieso<sup>®</sup>  
digital health

Changing the future of mental health





Our vision is to change the future of mental healthcare.



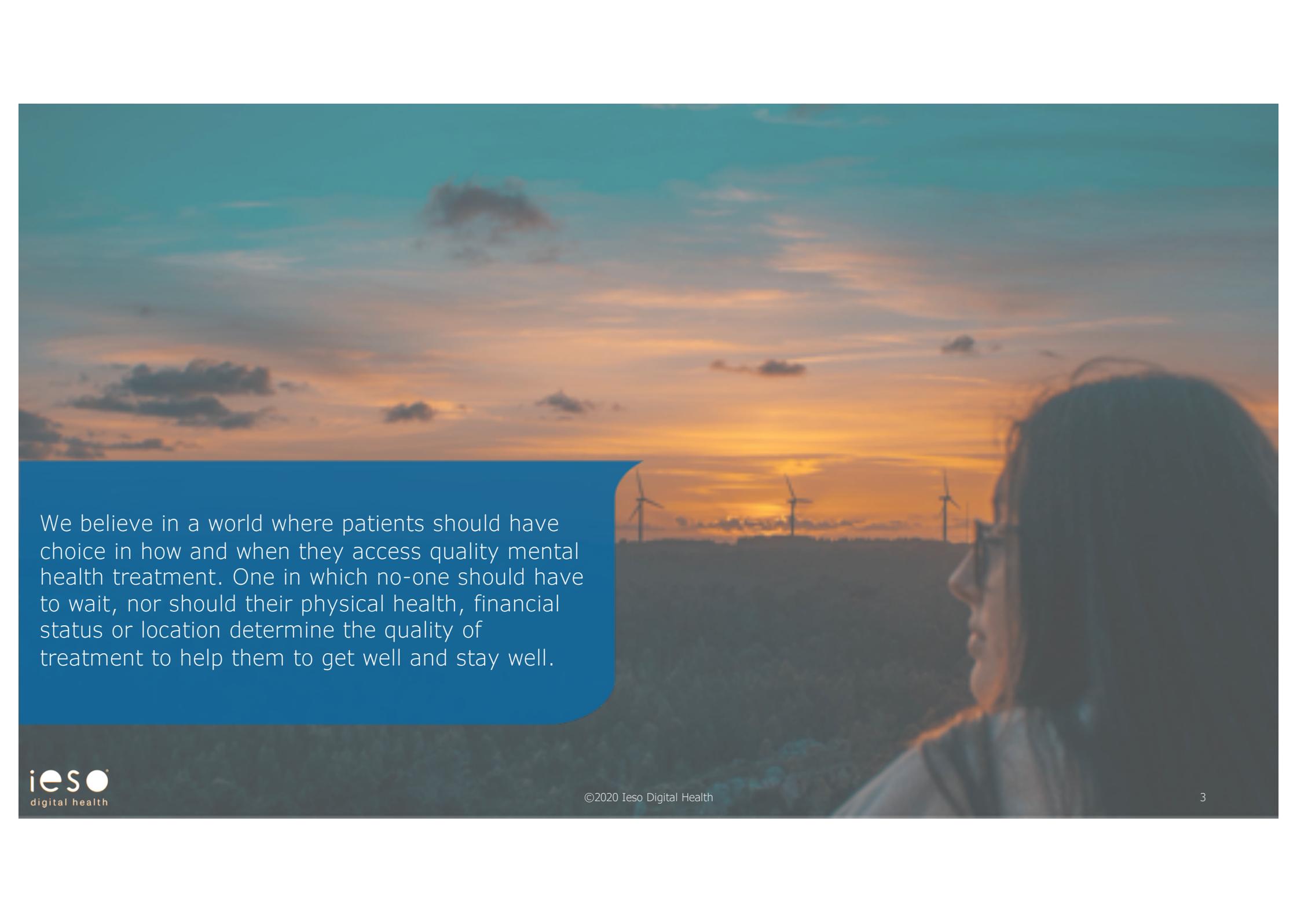
Our mission is to deliver evidence-based mental healthcare that works to everyone.



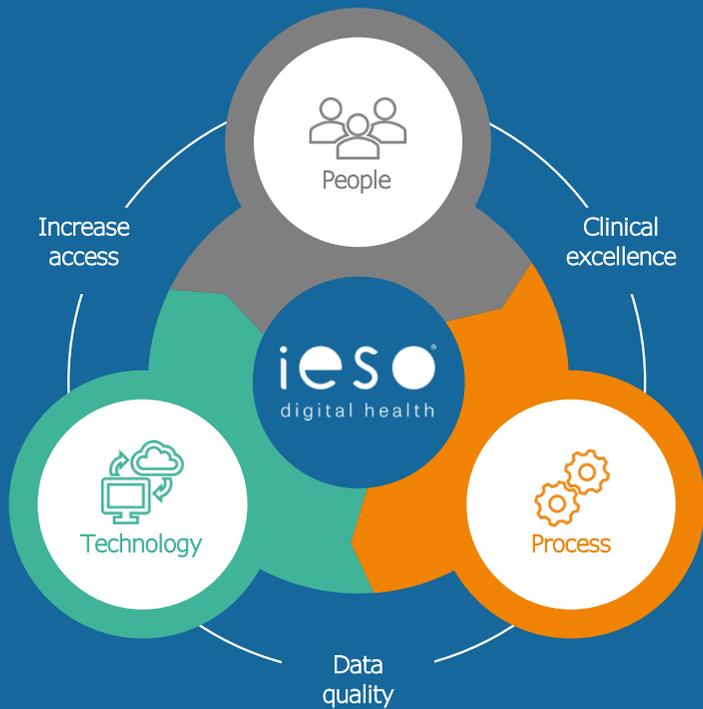
We want to be the world leading mental health treatment company improving millions of lives.



We will do this by leveraging the most comprehensive data set in the world to create a scalable, personalised digital therapeutics solution.

A woman with dark hair and glasses is shown in profile, looking out over a landscape at sunset. The sky is a mix of orange, yellow, and teal, with scattered clouds. In the distance, several wind turbines are visible against the horizon. The overall mood is serene and contemplative.

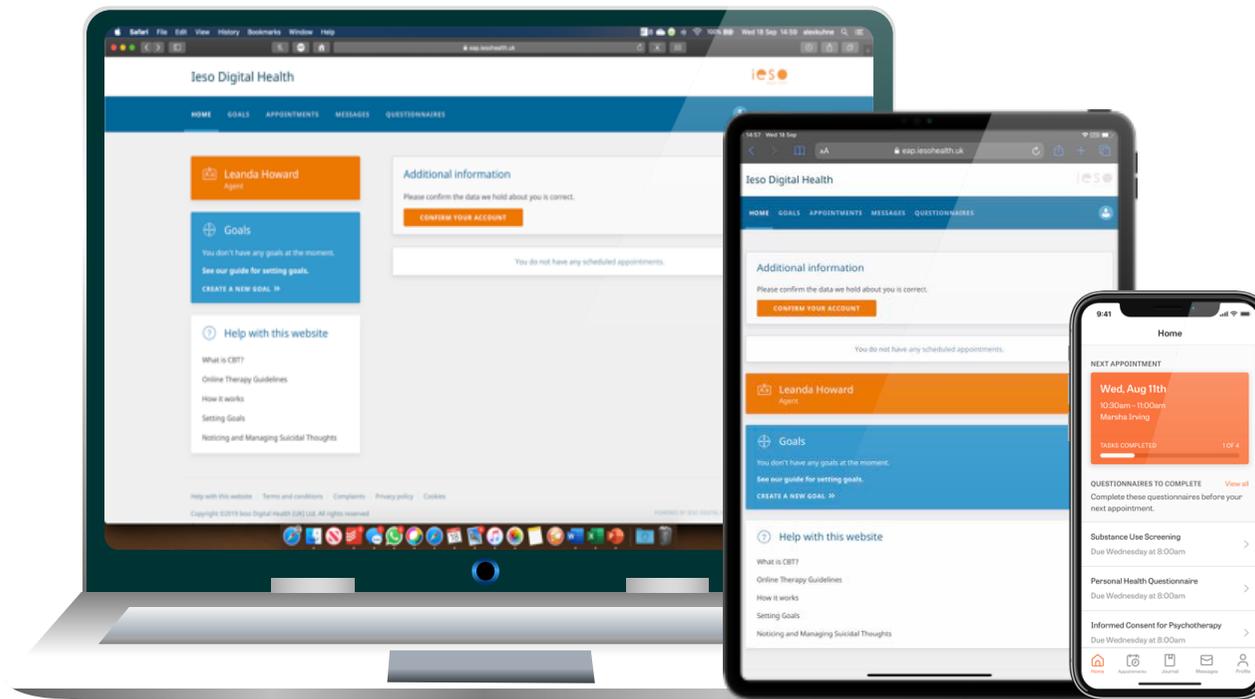
We believe in a world where patients should have choice in how and when they access quality mental health treatment. One in which no-one should have to wait, nor should their physical health, financial status or location determine the quality of treatment to help them to get well and stay well.



By combining people, processes and technology we are working to better understand mental illness, and deliver better access to highest-quality, evidence-based therapies anytime, anywhere.

# Introducing ThinkWell™

Delivering one-to-one CBT securely through our bespoke, device-agnostic therapy platform, we help new populations and hard-to-reach groups receive the help they need, when they need it.



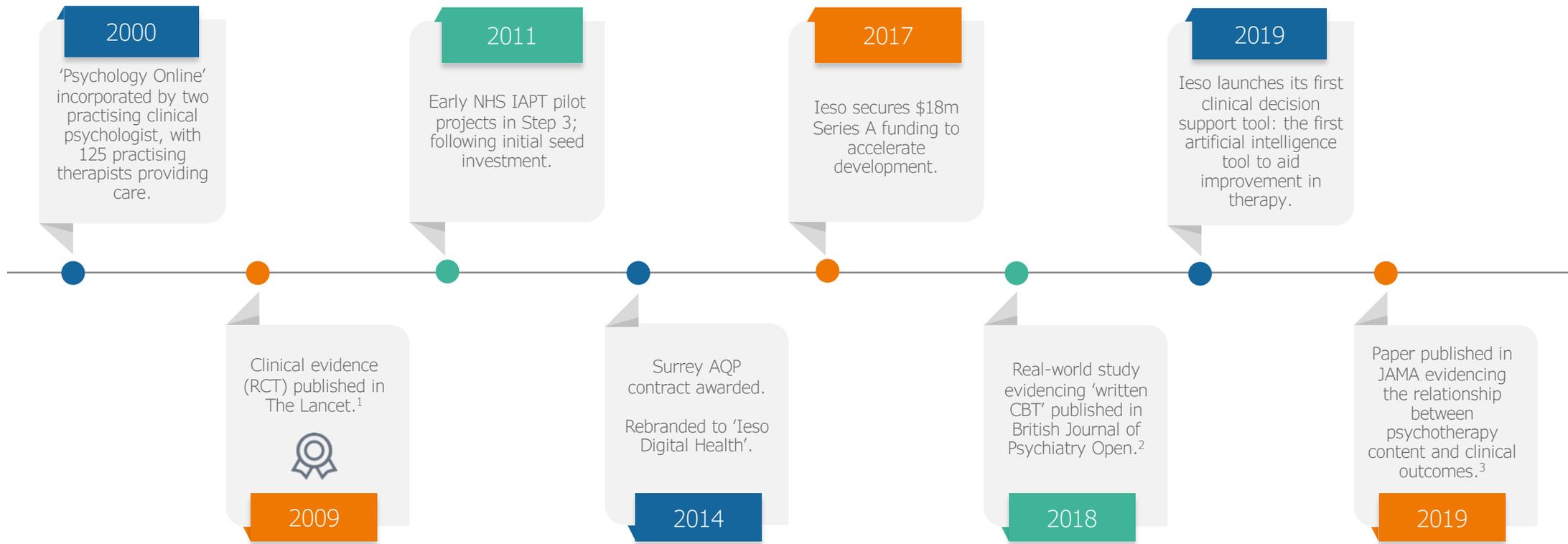
©2020 Ieso Digital Health

## What is CBT?

Cognitive Behavioural Therapy is a talking therapy used to treat a range of common mental health problems. CBT works to help people manage unhelpful thoughts, feelings and behaviours. Patients learn how to feel better and live the life they that want to live.



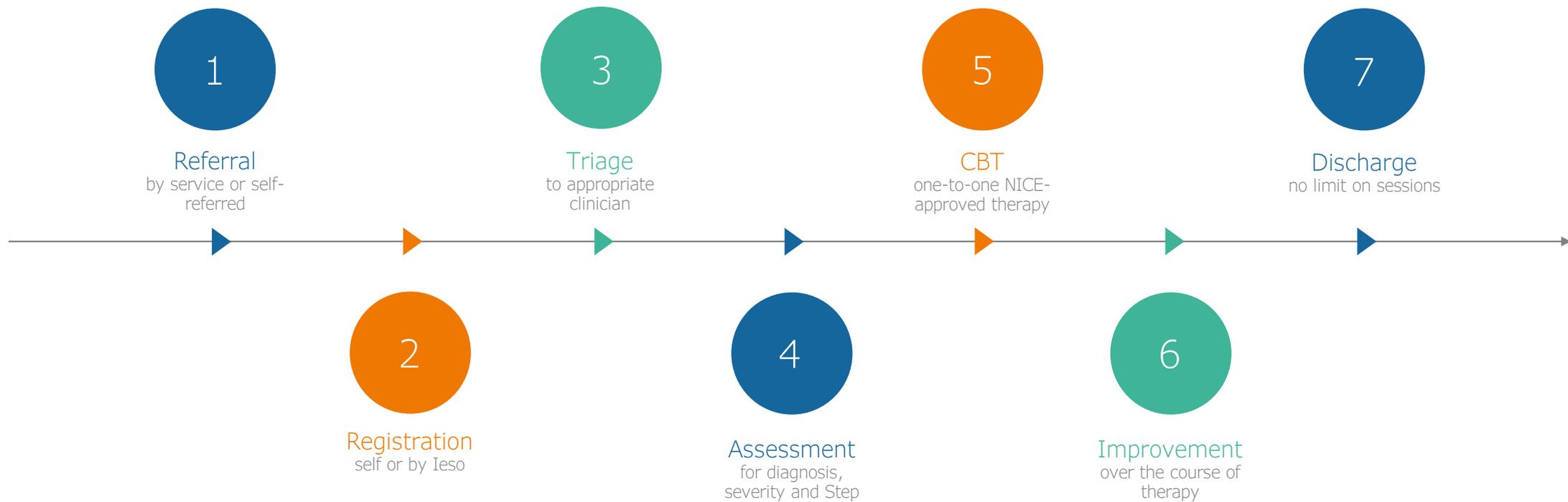
# Built on a foundation of clinical excellence



<sup>1</sup> Kessler, D. et al. (2009) Therapist-delivered internet psychotherapy for depression in primary care: a randomised controlled trial, The Lancet, 374: 628-34  
<sup>2</sup> Catarino, A., et al. (2018) Demographic and clinical predictors of response to internet-enabled cognitive-behavioural therapy for depression and anxiety, BJPsych Open, 4(5): 411-418  
<sup>3</sup> E. M. P. Ewbank et al (2019) Quantifying the relationship between psychotherapy content and clinical outcomes using deep learning, JAMA Psychiatry.

# The patient journey

One-to-one therapy with a dedicated clinician.



# Trust in our experience

We work alongside traditional therapies. Offering a digital solution is about increasing access and patient choice.



Available in  
**70** CCG  
areas



**Outcomes** as  
good as face-  
to-face



**52,294+**  
patients  
treated



**261,164+**  
hours of  
therapy  
completed



**65%** of  
treatment out  
of normal  
office hours



**640+**  
clinicians



**78%** of  
patients rate  
us 'good' or  
'excellent'



2018 Top 10 Best  
Investment in  
HealthTech



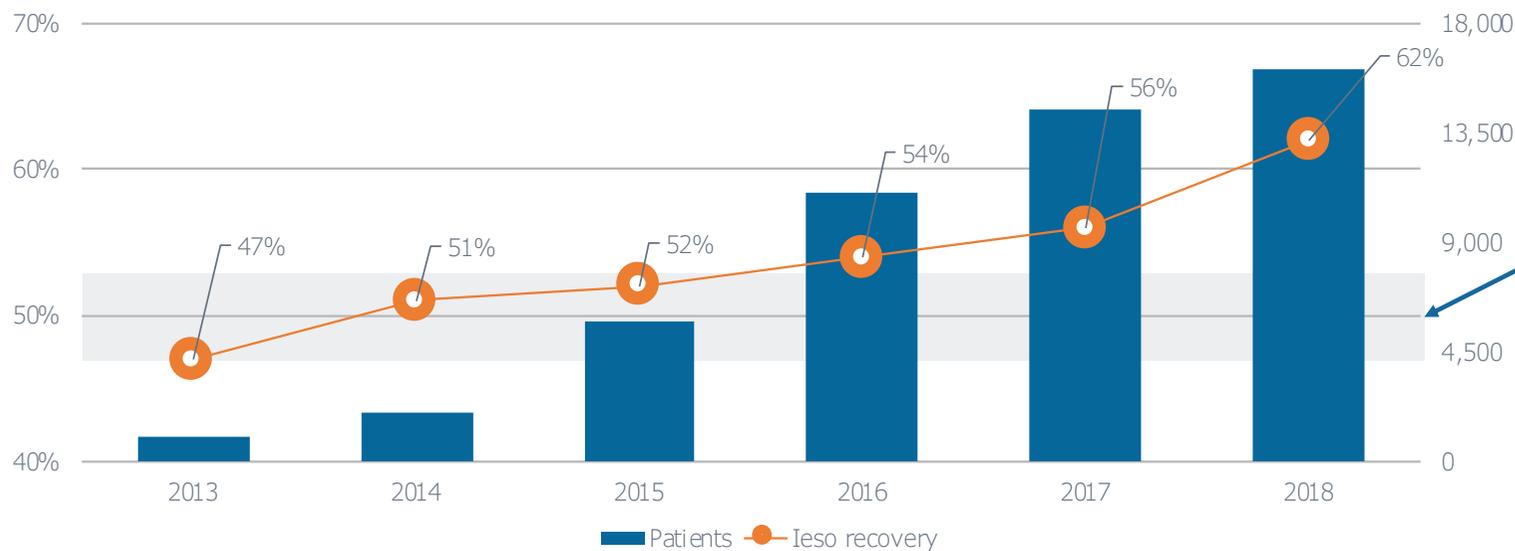
50

Technology Fast 50  
2017 UK WINNER  
Deloitte



# We strive for our patients to recover

We closely monitor outcomes to ensure patients receive the best care possible.



UK average face to face recovery rates



# Our clinical team

A team of highly skilled senior clinicians lead our affiliates; they're there to ensure that every affiliate is delivering the best care to our patients.



**Chief Clinical Officer**

Overall responsibility for governance and quality of therapy delivered.



**Clinical Director**

Strategic development of clinical service.



**Clinical Lead**

Quality of our affiliate clinician network and management of supervisors.



**Clinical Operations Manager**

Improving clinical processes, implementing new services.



**Clinical Service Delivery Manager**

Build effective clinical partnerships plus quality of clinical performance.



**Clinical Trainers**

Educational content to enhance quality of e-learning; training of partner clinicians.

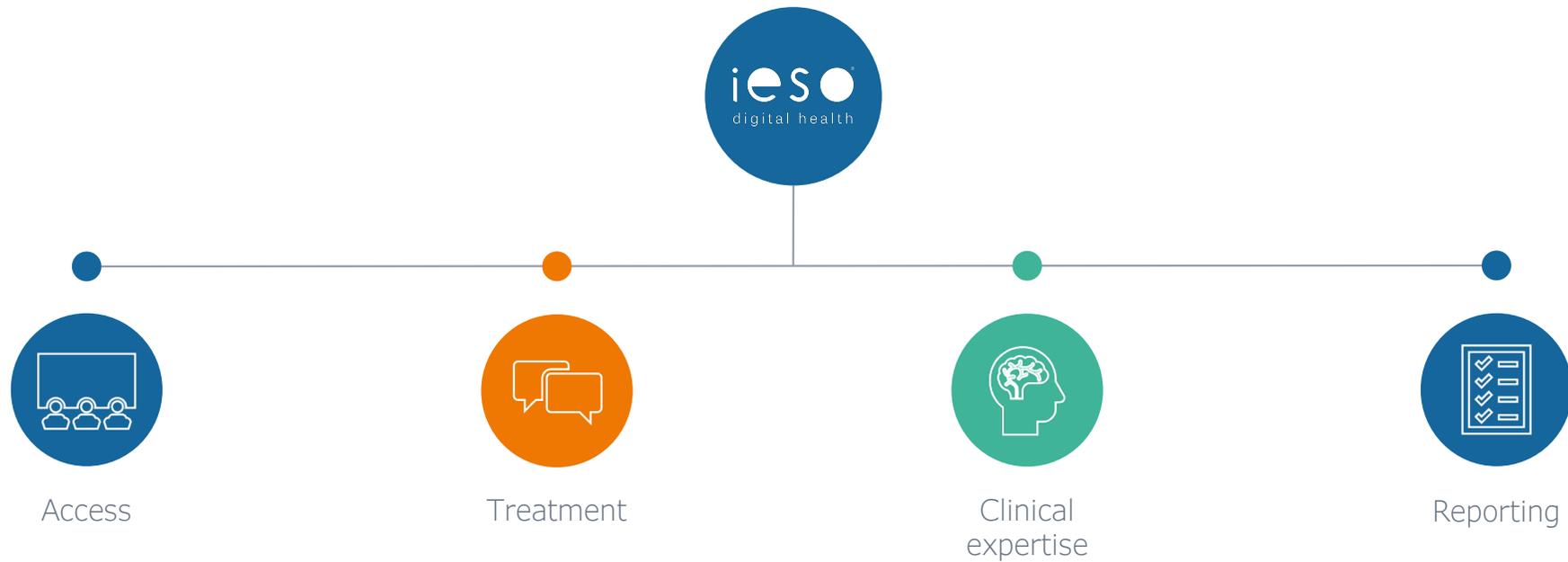


**Clinical Supervisors**

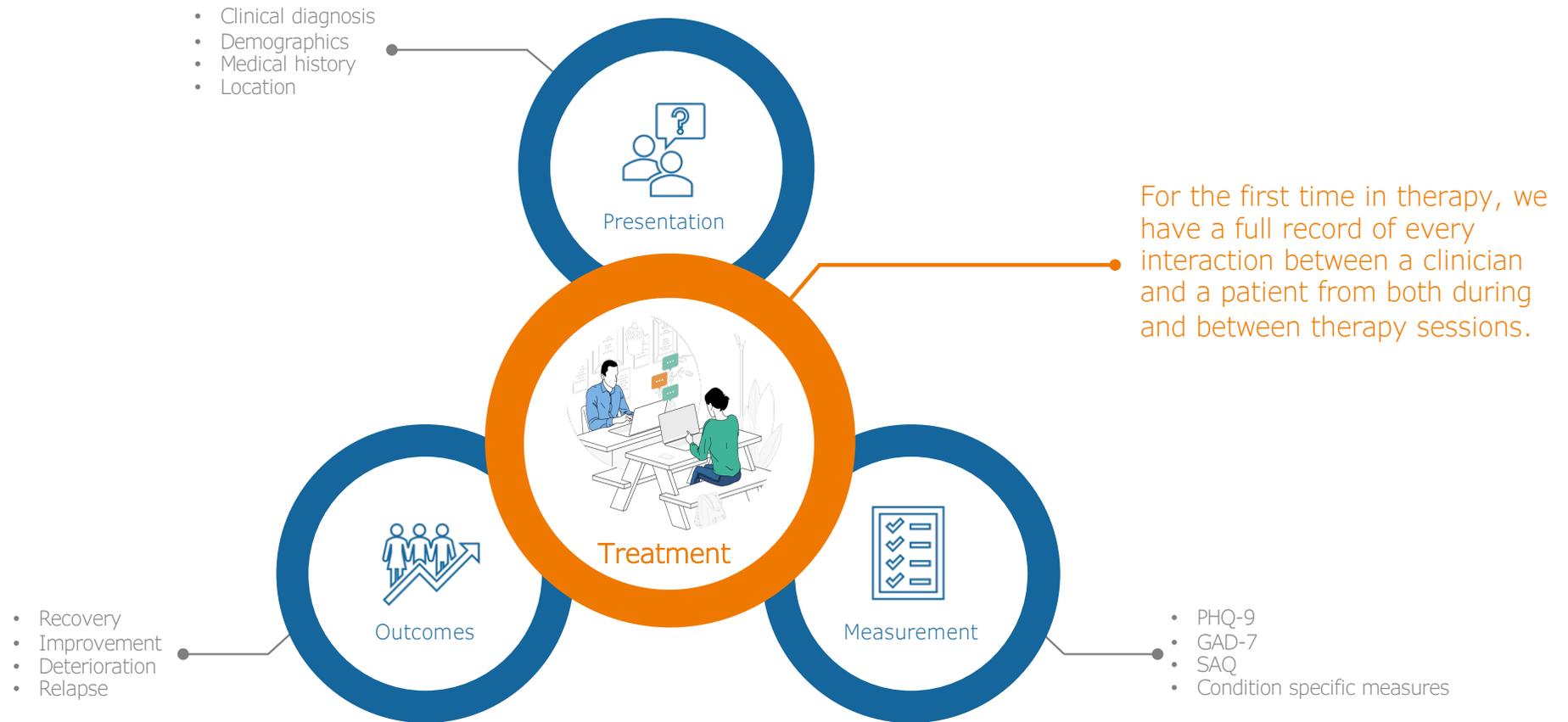
Clinical support and development of Ieso therapists.

## A fully managed service partner

Our service provision has been carefully developed to ensure a seamless and collaborative partnership.

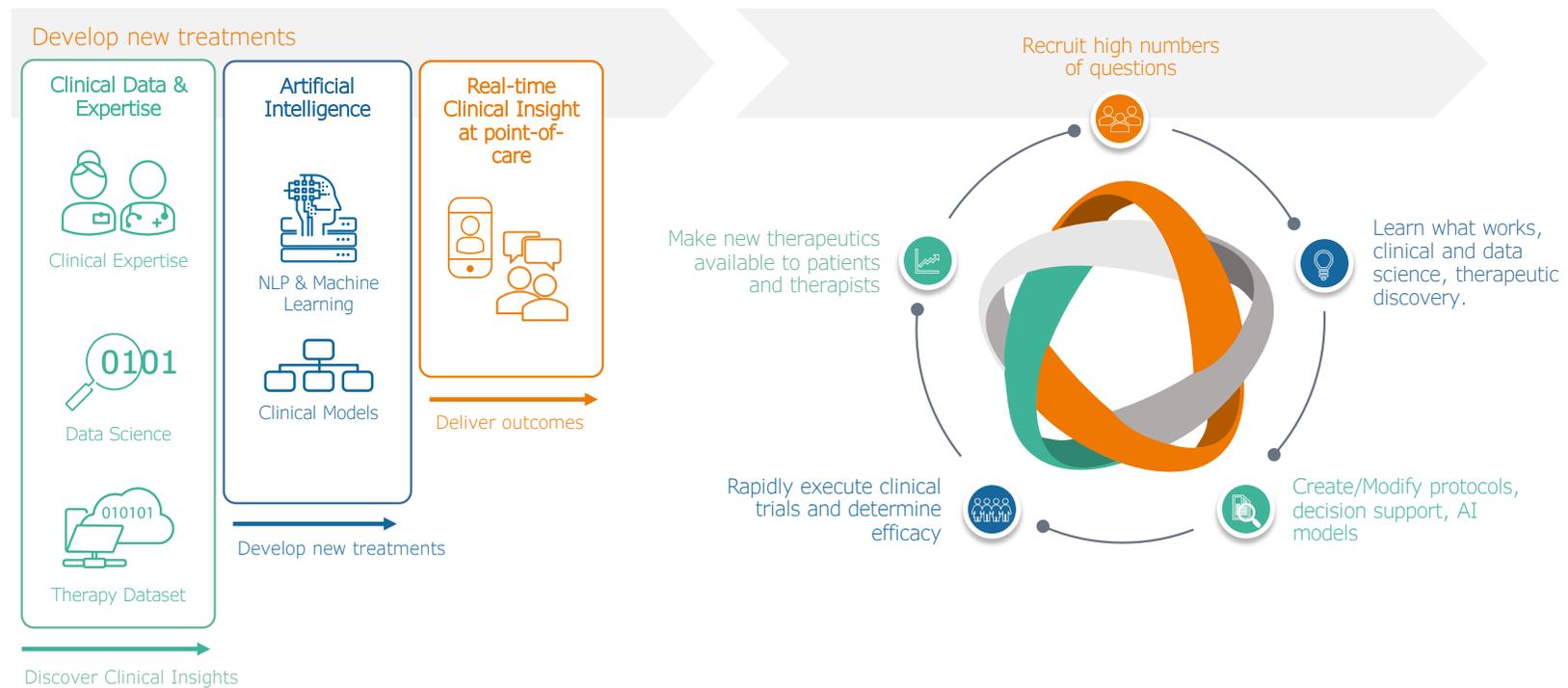


# We are building a unique data set



# We turn our clinical insights into outcomes

We strive to understand what good therapy looks like, discovering previously hidden clinical insights, to develop new methods that drive-up patient outcomes.



# Evidence-based practise and on-going research

iPsych Open 2018  
4, 411-418. doi: 10.1108/ijpp-2018-12-017

## Demographic and clinical predictors of response to internet-enabled cognitive-behavioural therapy for depression and anxiety

Ana Catarino, Sarah Bateup, Valentin Tablan, Katherine Innes, Stephen Freer, Andy Richards, Richard Storr, Steven D. Hickok, Samuel Robin Chamberlain, Ann Hayes and Andrew D. Blackwell

**Background**  
Common mental health problems affect a quarter of the population. Online cognitive-behavioural therapy (CBT) is increasingly used, but the factors modulating response to this treatment modality remain unclear.

**Aims**  
This study aims to explore the demographic and clinical predictors of response to one-to-one CBT delivered via the internet.

**Method**  
Real-world clinical outcomes data were collected from 2211 NHS England patients completing a course of CBT delivered by a trained clinician via the internet. Logistic regression analyses were performed using patient and service variables to identify significant predictors of response to treatment.

**Results**  
Multiple patient variables were significantly associated with positive response to treatment including older age, absence of long-term physical comorbidities, fewer symptoms at start of treatment. Service variables associated with positive response to treatment included shorter waiting times for initial assessment and longer treatment durations in terms of the number of sessions.

**Conclusions**  
Knowledge of which patient and service variables are associated with good clinical outcomes can be used to develop personalised treatment programmes, as part of a quality improvement cycle aiming to drive up standards in mental healthcare. This study exemplifies translational research output in practice and deployed at scale in the National Health Service, demonstrating the value of technology-enabled treatment delivery not only in facilitating access to care, but in enabling accelerated data capture for clinical research purposes.

**Declaration of interest**  
A.C., S.B., V.T., K.I., S.F., A.R., A.H. and A.D.B. are employees or board members of the sponsor, S.R.C. consults for Cambridge Cognition and Shire. Keywords: Anxiety disorders; cognitive behavioural therapies; depressive disorders; individual psychotherapy

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Common mental health disorders including depression and anxiety are characterised by intense emotional distress and have an impact on social and occupational functioning. One to four adults are estimated to have a mental health problem in any given year<sup>1,2</sup> but a significant proportion remains undiagnosed or untreated.<sup>3</sup> The Improving Access to Psychological Therapies (IAPT) programme is a large-scale initiative aimed at increasing access to accountable, evidence-based psychological therapy for common mental health disorders within the English National Health Service (NHS), while controlling costs.<sup>4</sup> In 2015/2016 one-third of patients referred to IAPT received cognitive-behavioural therapy (CBT).<sup>5</sup> With proven clinical effectiveness, structured CBT models are also amenable to delivery via 'self-help' programmes including online materials,<sup>6,7</sup> with various online CBT models shown as efficacious in controlled trial settings.<sup>8-11</sup> Online CBT offers a flexibility that is not possible under face-to-face programmes, allowing patients to undergo treatment outside of office hours, optimising convenience and avoiding perceived stigma associated with undertaking in-person therapy.<sup>12</sup> Other potential benefits include shorter waiting times, enhanced disclosure and improved access for patients who are reluctant to contact services given the nature of their condition (for example agoraphobia), or cannot travel because of disability or geographical location.<sup>13,14</sup> Despite multiple potential advantages, varying degrees of therapist

intervention in online CBT can affect clinical outcomes and patient engagement in real-world settings.<sup>15,16,17</sup> With therapist-guided online CBT associated with better clinical outcomes and lower dropout rates than self-guided programmes, internet-enabled CBT (IECBT) is an effective type of online therapy,<sup>18</sup> successfully used within IAPT, whereby patients are offered weekly one-to-one sessions with an accredited CBT therapist. As a result of its one-to-one nature, IECBT is classed as a high-intensity therapy and can be used to treat more severe patients, relative to other self-guided and guided self-help online CBT modalities that are classed as low-intensity interventions and therefore only suitable for patients with milder presentations.<sup>19</sup> Previous research investigating predictors of clinical outcomes for low-intensity guided self-help interventions shows that higher levels of adherence to treatment and treatment credibility are associated with higher rates of improvement and lower post-treatment scores.<sup>16,20</sup> This highlights the importance of investigating predictors of clinical outcomes in response to high-intensity online interventions like IECBT, where the relationship, or synergism, nature of the interaction between therapist and patient may promote treatment credibility and patient adherence to treatment protocol. The present study aims to explore patient and service variables of predictors of clinical outcomes, in patients receiving IECBT for the treatment of a common mental health disorder.

411

We published a paper in BJP Open in 2018 which looked at patients' engagement and response to treatment in correlation to patient variables.

Research

## JAMA Psychiatry | Original Investigation

### Quantifying the Association Between Psychotherapy Content and Clinical Outcomes Using Deep Learning

Michael P. Eubank, PhD; Susan Connors, PhD; Valentin Tablan, PhD; Sarah Bateup, MA; Ana Catarino, PhD; Alan J. Martin, EdD; Andrew D. Blackwell, PhD

**IMPORTANCE** Compared with the treatment of physical conditions, the quality of care of mental health disorders remains poor and the rate of improvement in treatment is slow, a primary reason being the lack of objective and systematic methods for measuring the delivery of psychotherapy.

**OBJECTIVE** To use a deep learning model applied to a large-scale clinical data set of cognitive behavioral therapy (CBT) session transcripts to generate a quantifiable measure of treatment delivered and to determine the association between the quantity of each aspect of therapy delivered and clinical outcomes.

**DESIGN, SETTING, AND PARTICIPANTS** All data were obtained from patients receiving internet-enabled CBT for the treatment of a mental health disorder between June 2012 and March 2018 in England. Cognitive behavioral therapy was delivered in a secure online therapy room via instant synchronous messaging. The initial sample comprised a total of 17 572 patients (10 934 therapy session transcripts). Patients self-referred or were referred by a primary health care worker directly to the service.

**EXPOSURES** All patients received National Institute for Health and Care Excellence–approved disorder-specific CBT treatment protocols delivered by a qualified CBT therapist.

**MAIN RESULTS AND MEASURES** Clinical outcomes were measured in terms of reliable improvement in patient symptoms and treatment engagement. Reliable improvement was calculated based on 2 severity measures: Patient Health Questionnaire (PHQ-9) and Generalized Anxiety Disorder 7-item scale (GAD-7), corresponding to depression and anxiety symptoms respectively, completed by the patient at initial assessment and before every therapy session.

**RESULTS** Treatment sessions from a total of 14 899 patients (10 882 women) aged between 18 and 94 years (median age, 34.8 years) were included in the final analysis. We trained a deep learning model to automatically categorize therapist utterances into 1 or more of 24 feature categories. The trained model was applied to our data set to obtain quantifiable measures of each feature of treatment delivered. A logistic regression revealed that increased quantities of a number of session features, including change methods (cognitive and behavioral techniques used in CBT), were associated with greater odds of reliable improvement in patient symptoms (odds ratio, 1.15; 95% CI, 1.06-1.25) and patient engagement (odds ratio, 1.20; 95% CI, 1.13-1.27). The quantity of nontherapy-related content was associated with reduced odds of symptom improvement (odds ratio, 0.89; 95% CI, 0.85-0.92) and patient engagement (odds ratio, 0.88; 95% CI, 0.84-0.92).

**CONCLUSIONS AND RELEVANCE** This work demonstrates an association between clinical outcomes in psychotherapy and the content of therapist utterances. These findings support the principle that CBT change methods help produce improvements in patients' presenting symptoms. The application of deep learning to large clinical data sets can provide valuable insights into psychotherapy, informing the development of new treatments and helping standardize clinical practice.

JAMA Psychiatry. doi:10.1001/jamapsychiatry.2019.2664  
Published online August 22, 2019.

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Downloaded From: <https://jamanetwork.com/> on 08/22/2019

We published a paper in JAMA Psychiatry in 2019, which described how we analyse the contents of therapy sessions and correlate the different therapy items with patient outcomes.

Articles

## Therapist-delivered internet psychotherapy for depression in primary care: a randomised controlled trial

David Emswiler, Glyn Lewis, Sumaira Akus, Nicola Miles, Michael King, Scott Welch, Debbie J Sharp, Ricardo Araya, Sandra Hollinghurst, Tim Peters

**Summary**  
Background Despite strong evidence for its effectiveness, cognitive-behavioural therapy (CBT) remains difficult to access. Computerised programs have been developed to improve accessibility, but whether these interventions are responsive to individual needs is unknown. We investigated the effectiveness of CBT delivered online in real time by a therapist for patients with depression in primary care.

**Methods** In this multicentre, randomised controlled trial, 297 individuals with a score of 8 or more on the Beck depression inventory (BDI) and a confirmed diagnosis of depression were recruited from 55 general practices in Bristol, London, and Warwickshire, UK. Participants were randomly assigned, by a computer-generated code, to online CBT in addition to usual care (intervention; n=149) or to usual care from their general practitioner while on an 8-month waiting list for online CBT (control; n=148). Participants, researchers involved in recruitment, and therapists were masked in advance to allocation. The primary outcome was recovery from depression (BDI score <10) at 4 months. Analysis was by intention to treat. This trial is registered, number ISRCTN14544578.

**Findings** 113 participants in the intervention group and 97 in the control group completed 4-month follow-up. 43 (38%) patients recovered from depression (BDI score <10) in the intervention group versus 23 (24%) in the control group at 4 months (hazard ratio: 2.39; 95% CI 1.23-4.67; p=0.011), and 44 (42%) versus 26 (26%) at 8 months (1.77; 1.13-3.87; p=0.023).

**Interpretation** CBT seems to be effective when delivered online in real time by a therapist, with benefits maintained over 8 months. This method of delivery could broaden access to CBT.

**Funding** BUPA Foundation.

**Introduction**  
Psychological therapies should be more widely accessible for depression in primary care than they are at present. There is an increased awareness of the health-care burden of depression<sup>1</sup> and a growing unease about the amounts of antidepressant prescribing compared with the resources made available for psychological therapies.<sup>2</sup> Questions are being asked about the efficacy of antidepressant drugs,<sup>3</sup> and some are concerned about the risk-benefit balance of selective serotonin re-uptake inhibitor antidepressants in specific groups of patients.<sup>4</sup> The UK Government is committed to improving access to psychological therapies for people with depression. The plans include training a new workforce of 3600 therapists to deliver such therapies.<sup>5</sup> Cognitive-behavioural therapy (CBT) is a large part of these plans. Despite a strong evidence base,<sup>6</sup> CBT remains difficult to access, especially in primary care. CBT is adaptable to self-help materials, including interactive computerised programs.<sup>7,8</sup> Telephone-administered CBT is more effective than is usual care for patients with depression.<sup>9</sup> Information technology has the potential to increase access to psychological therapy and CBT does not have to be delivered face-to-face. Computerised CBT programs, although effective, are inflexible, can be difficult to tailor to individual patient needs, and are associated with low rates of adherence.<sup>10</sup>

However, individual CBT can be offered by a therapist online, with instant messaging in which client and therapist communicate in real time with up-to-date responses. Possible benefits from this approach include flexibility and optimisation use of patient and therapist time, reaching client groups for whom travel to treatment centres is difficult for reasons of geography or disability, and access to foreign language therapists. Some evidence suggests that writing about traumatic events can lead to improvements in health.<sup>11</sup> This approach is acceptable to patients with depression, and therapy without face-to-face contact could encourage greater disclosure.<sup>12</sup> We investigated the effectiveness of online CBT for patients with depression in primary care.

**Methods**  
**Study design and participants**  
We undertook a randomised controlled trial, with recruitment taking place between Oct 1, 2005, and Feb 28, 2008. The sample comprised patients aged 18-75 years from primary care with a new episode of depression, which was defined as being diagnosed within the 4 weeks preceding referral. We excluded patients treated for depression in the 3 months before the present episode. Depression was defined as a score of 14 or more with the Beck depression inventory (BDI)<sup>13</sup> and a diagnosis of depression with the International

618

www.thelancet.com Vol 374 August 22, 2009

Bupa funded an RCT that was published in the Lancet demonstrating the efficacy and cost effectiveness of written method in clinical depression.

# Security is at the heart of all we do

- **Data Encryption**

- Data at rest – AES256
- Data in motion - TLS 1.2



- **Data Loss Protection**

- Active monitoring and prevention on a content, activity, and network level

- **Key management**

- Microsoft Key vault
- Keys are rotated every 90 days

- **Identity Management**

- OpenID, oAuth, SAML
- Role based authentication



- **Logging & Auditing**

- Centralised aggregation of all logging across networks, devices, and production environments
- Elastic Search advanced log management and integration



- **Vulnerability Management & Monitoring**

- Darktrace vulnerability monitoring and alerting
- Darktrace vulnerability intervention
- Cloud Flare, vulnerability probing, Ddos, bots
- Contrast – Static and dynamic code analysis
- Quay.io - Container scanning and vulnerability analysis
- Azure Security Advisor
- Elastic Works Protector - Device vulnerability monitoring

- **Penetration & Vulnerability Testing**

- 3rd Party office locations and production environments (quarterly)
- Authenticated & Unauthenticated (bi-annually)

- **External Audits**

- Reassessment & Certification (annually)
- Clients audits (regularly)
- Internal Audits (bi-annually)



- **Network Security & Segmentation**

- 802.1X – authenticated access points
- Production network inspection to Layer 7 (deep packet inspection)
- Network segmentation at departmental level (isolation of PHI activities)
- Geographic segmentation
- Multiple / redundant Azure regions
- Azure virtual networks and security groups

# Regulatory & Compliance

- **Current Regulatory Compliance and Certifications**
  - ISO27001 Certification (114 controls & externally audited & certified)
  - GDPR Compliance
  - Cyber Essentials Plus Certification
- **Upcoming Regulatory Compliance and Certifications**
  - MHRA Medical Device Registration / CE Mark
- **Internal Controls**
  - Quality Management System - Robust policies and procedures across the organization
  - Annual internal audits
  - 3<sup>rd</sup> Party Security Audits (NCC)
  - 3<sup>rd</sup> Party Penetration Tests (NCC)
  - 3<sup>rd</sup> Party Vulnerability Management & Monitoring
  - Data Loss Protection program
  - Customer Audit process, procedures, and management systems
  - Security by design principles



# Clinical Risk Management

## Clinical Risk Management

### Clinicians adhere to Ieso risk policy:

- Assess risk comprehensively at first session and consider suitability for service.
- Manage and monitor risk at subsequent sessions via MDS, feedback and Risk Assessment tools.
- Clinicians have access to our Clinical Supervisory Team seven days a week to report any concern.
- Clinicians receive PHQ-9 Q9 alert.

Clinicians have access to local information such as crisis teams and helpline numbers. Crisis numbers are detailed on the patient log-in page of the website

## Risk management with Local Service



### Immediate high risk inc. Safeguarding Adults

- Clinicians call and message the patient.
- Ieso contacts emergency services.
- Ieso notifies Link Worker by the following working day at the latest.
- Ieso uploads details on to the PMS.
- GP letter sent.
- Where relevant, referral on to secondary and/or safeguarding team.



### Non-immediate high risk

- Ieso uploads details on to the PMS, including rationale.
- GP letter sent and link workers notified.
- Where relevant, referral on to secondary and/or safeguarding team.



### Safeguarding children

- Immediate - Ieso contact local Safeguarding.
- Ieso notifies the Link Worker.
- Ieso uploads details on to the PMS, including rationale.
- GP letter sent.

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digital health

Thank you.

