

Advancing patient engagement: the role of AI and data

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CNIO
University Hospitals of
Derby and Burton FT

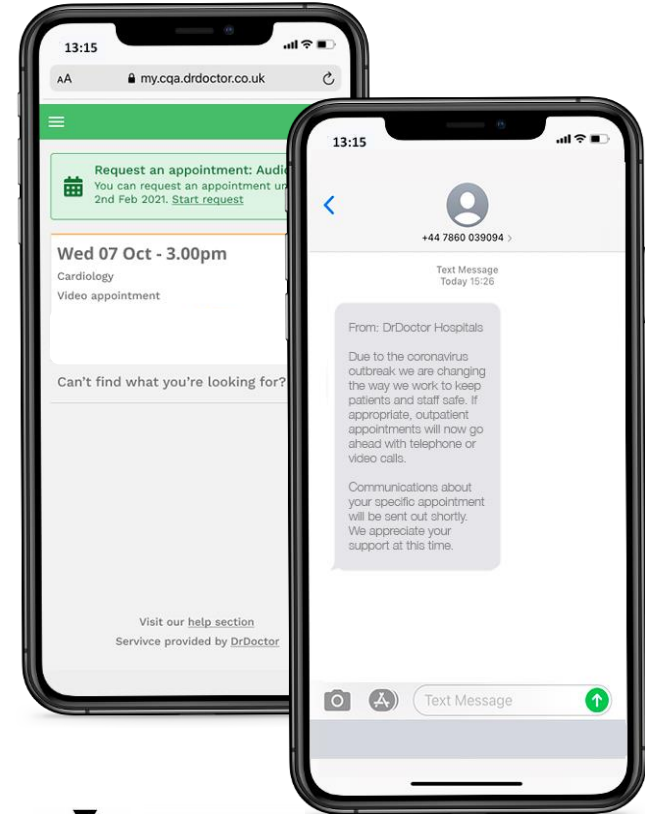
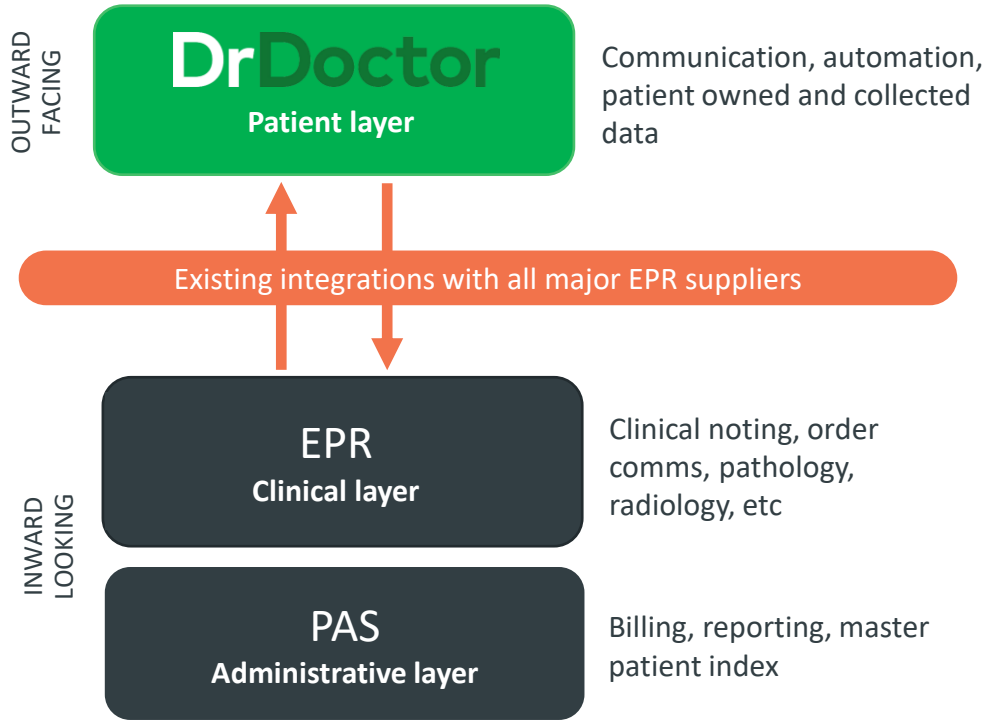
DrDoctor

Milking the model

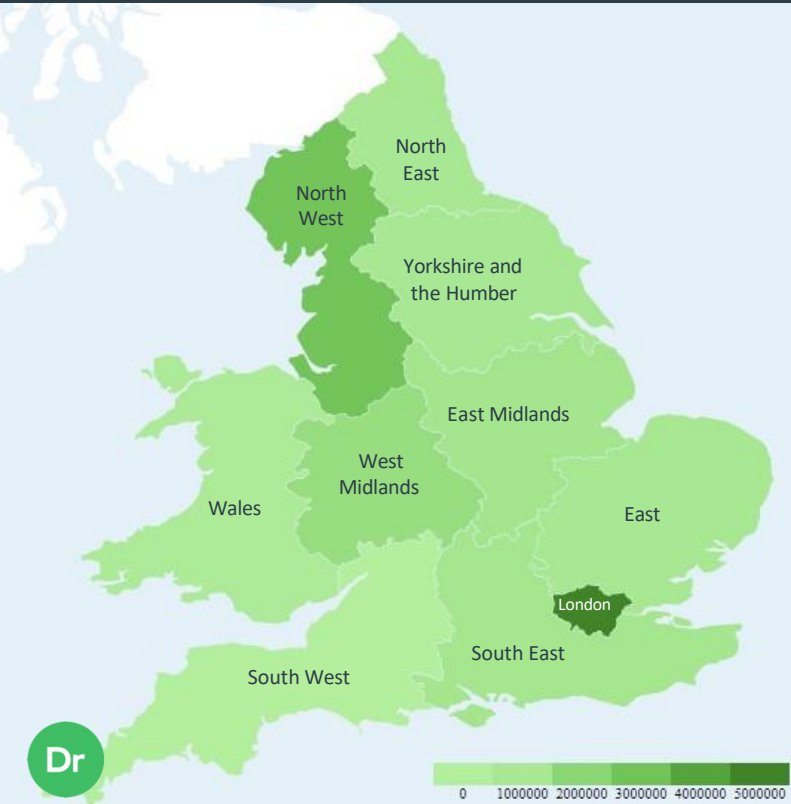
Building new products from existing models



The Complete Patient Layer



DrDoctor is already used by 21M patients across 60 leading providers



Multi award winning digital solution



Healthtech Company of the Year



Healthcare Transformation Experts of the Year - UK



Efficiency Savings of the Year with Nottingham University Hospital



Digital Transformation Project of the Year



Finalist - Digitising Patient Services

Already used by 40% of NHS Trusts in the UK



Cumulative Appointments and Patients

DrDoctor Internal Use Only

103M

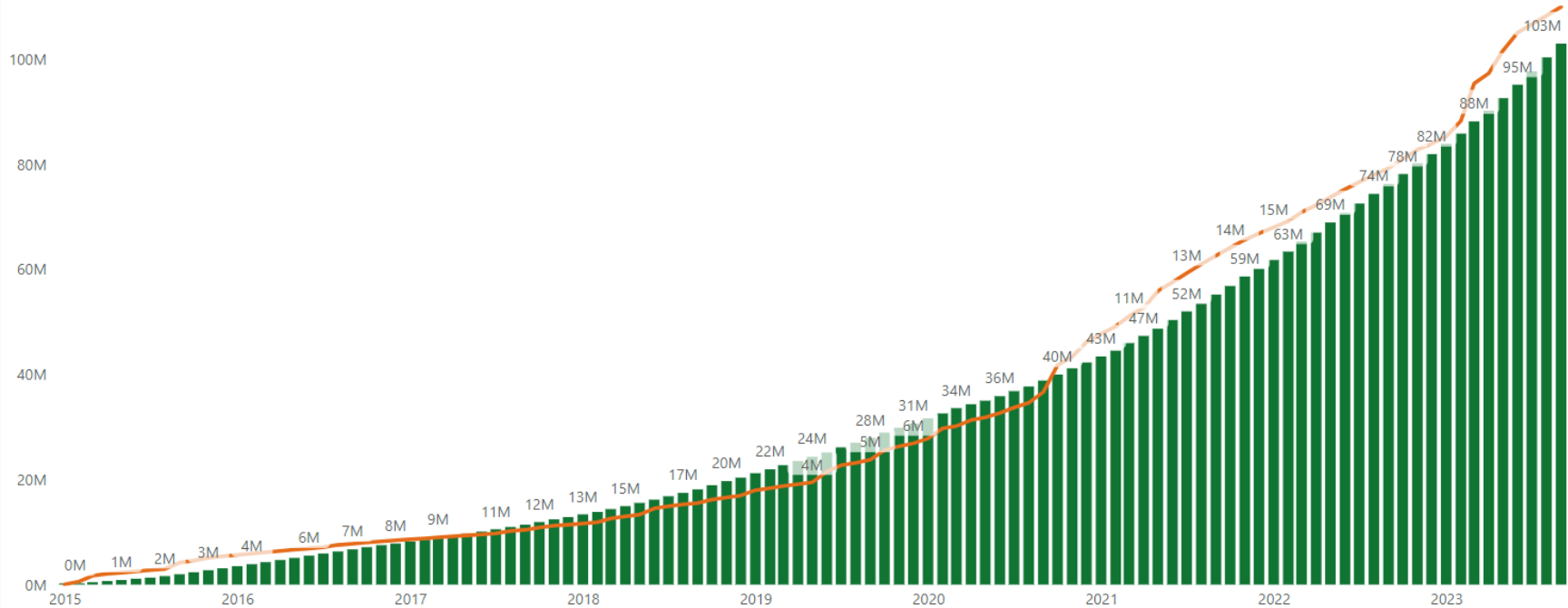
Total Appointments

24M

Total Unique Patients

Cumulative Appointments and Patients

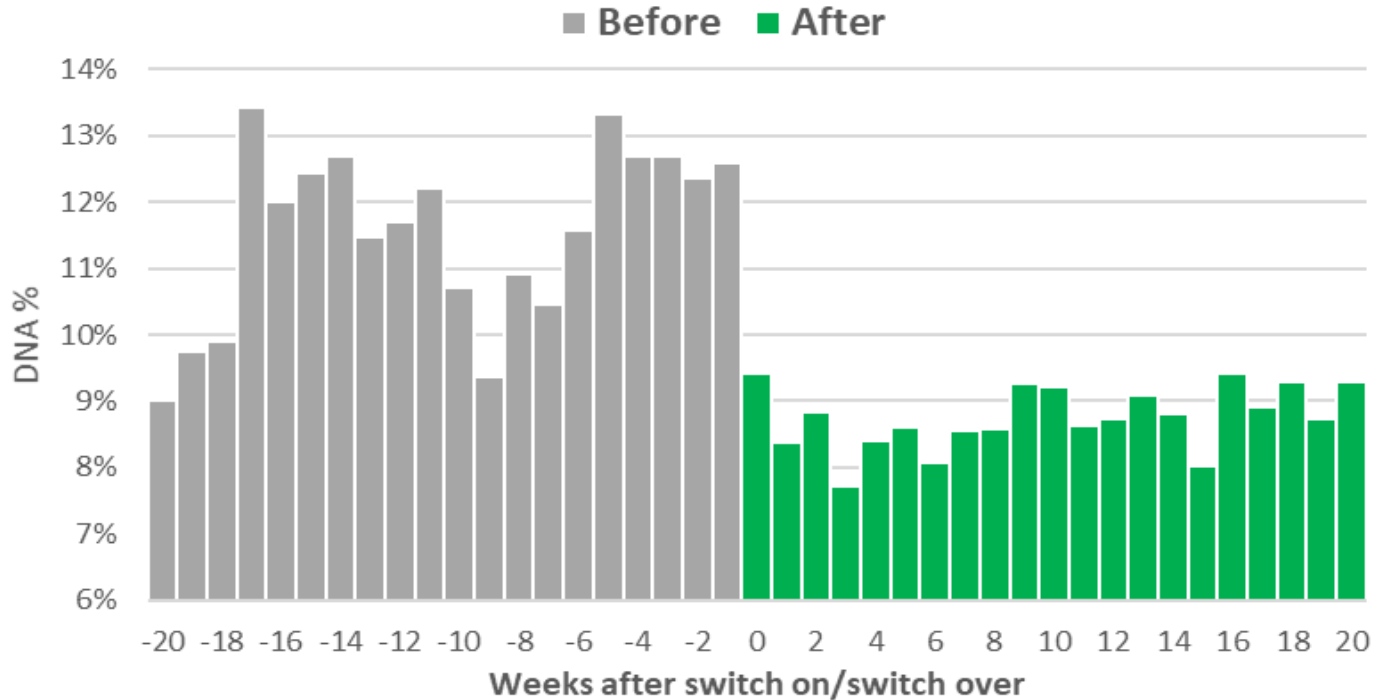
● Appointments ● Patients



Utilising AI Across our product stack



Sending reminders reduces Did Not Attends



How does the model work?

The model is made up of 42 features

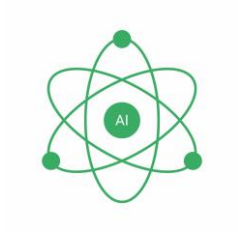
Example Features

- Days since last booked
- Specialty
- Day of the week

- Reminders enabled
- Contact details up to date

- # of previous appts
- # of previous DNAs
- # of previous cancellations

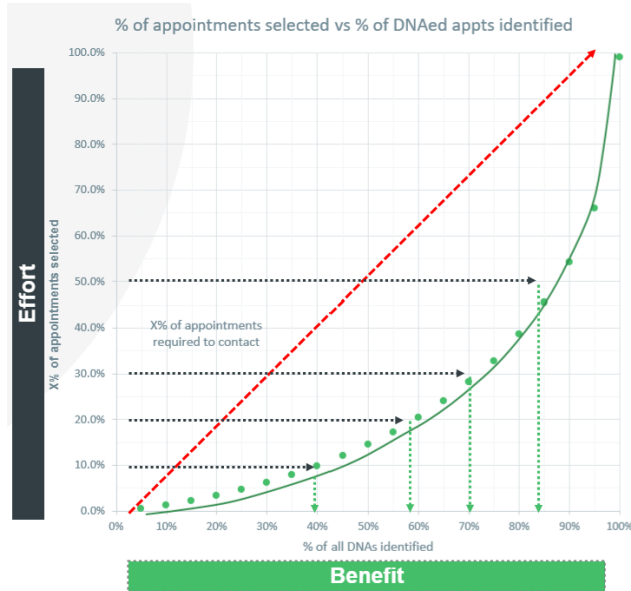
- Appt format (eg. Video, phone, etc)



The prediction is run against the **patient** within their booked **appointment**

Can we Find DNAs?

DNAs Found across each Score Decile (300,00 appointments / Decile)



The top decile of scores caught 40% of missed appointments.

The top 2 deciles caught nearly 60% of them.

So, rather than randomly contacting 60% of patients, we just need to focus on the top 20% highlighted by our model.

**Data aggregated across all trusts like with DNA Prediction.*

The interventions



Intervention 1: Manual Calls

- A page powered by the DNA model in the Staff Portal used to prioritise calls for Confirmation Callers / Booking Teams
- Trusts set a threshold of patients that they want to contact, eg. Patients who are 60% likely to not attend their appointment
- Calls are made manually as normal, and the Confirmation Caller updates the contact status in the Staff Portal to log whether the patient has advised they will attend, has cancelled their appointment or has amended their appointment.

We have a model that can effectively identify appointments that are likely to DNA. This model powers 2 interventions:



Intervention 2: Smart SMS Reminders

- A 'filter' that sits on top of existing 'extra' reminders.
- The DNA model highlights patients most likely to not attend their appointment, the Trust selects the threshold as in Intervention 1, and an automated SMS is sent out to high likelihood patients.
- This intervention is best either for Trusts who do not currently have both reminders switched on, have neither reminders switched on or who are looking to bring down what they are spending on reminders without increasing their rates of DNA dramatically.

Intervention 1: Manual Calls List

DrDoctor

- Patients ✓
- Setup ✓
- Reports ✓
- System ✓

DNA predictions



Logout

Search appointments



11 March - 17 March 2022

Booking team (1)

Status

Prediction: 0% 100%

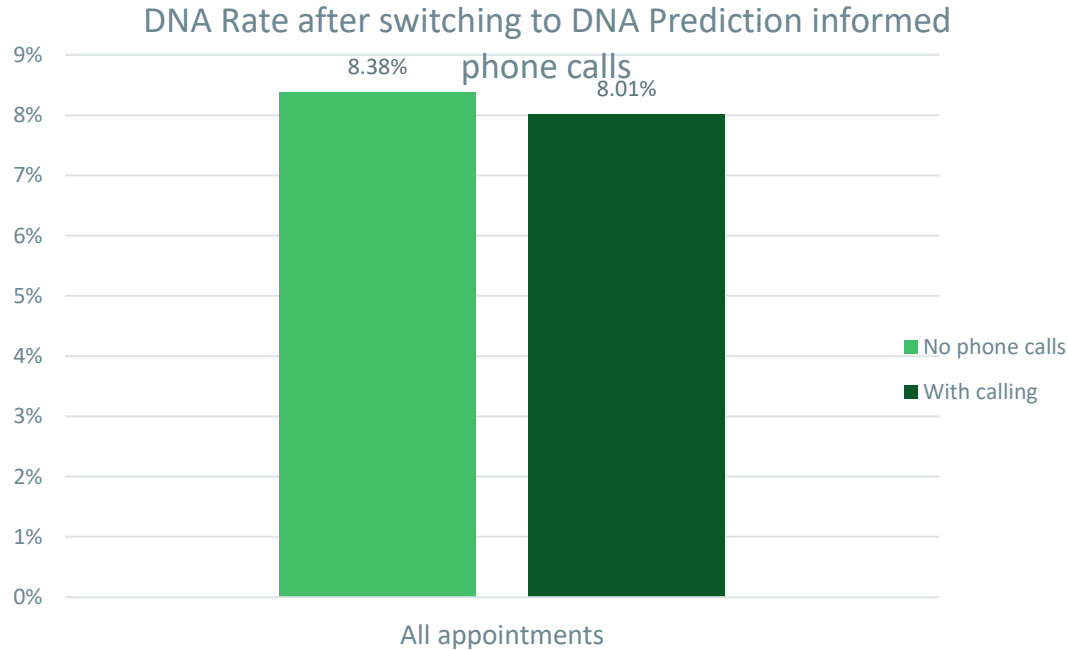
Add status

<input type="checkbox"/>	Name	Hospital number	Phone number	Time & Date	Clinic description	Speciality	Appt type	Prediction	Status
<input type="checkbox"/>	Jane Garner	0000001	0799000000, 0799000000	11 March, 09:00 am	C-1AK11 Transplant Clinic Knight,AJ	Cardiology	In person	98%	✓ Contacted
<input type="checkbox"/>	Griff Shepard	0000001	0799000000	11 March, 09:10 am	C-1AK2C General Surgery Knight, AJ	Cardiology	In person	97%	⊘ Unable to contact
<input type="checkbox"/>	Abdallah Cairns	0000001	0799000000	11 March, 09:20 am	C-1AKSC Surgical Care Practitioner Clinic Knight, with some extra content, and it should wrap	Cardiology	In person	97%	⊘ Left message
<input type="checkbox"/>	Elora Adams	0000001	0799000000	11 March, 09:30 am	C-1CC2A General Haematology Chang,C	Cardiology	Telephone	97%	
<input type="checkbox"/>	Caille Blackwell	0000001	0799000000	11 March, 09:40 am	C-1GS4C Stroke Medicine Subramanian Prof G	Cardiology	Telephone	80%	
<input type="checkbox"/>	Mariyam Coombes	0000001	0799000000	11 March, 09:50 am	C-1MD4C Gynaecology Das,M	Cardiology	Telephone	80%	
<input type="checkbox"/>	Nadeem Higgins	0000001	0799000000	11 March, 10:00 am	C-1MG3R RADIOTHERAPY PATIENT Griffin,M	Cardiology	Video	80%	
<input type="checkbox"/>	Kia John McCormack	0000001	0799000000	11 March, 10:10 am	C-1SR10 Kingsmill H/D Nephrology Roe,S	Cardiology	Video	75%	
<input type="checkbox"/>	Rochelle Ramos	0000001	0799000000	11 March,10:20 am	C-2AB1C Respiratory Medicine Binnion,A	Cardiology	In person	66%	
<input type="checkbox"/>	Glyn Bowden	0000001	0799000000	11 March, 10:30 am	C-2JBTC Post Critical Care Follow Up Telephone Cl	Cardiology	In person	66%	

<< < 1 2 3 4 5 >> | Rows per page 10 | 1 to 10 of 198

Dr

£7m a month opportunity across our clients..



Even a 0.37 pc.pt reduction in DNA across our client base (~23m appointments a month) is 60k additional outpatient appointment or £7,100,000 at a blended tariff of £120...

Next step is automated calls

Intervention 2: Smart SMS reminders

Notification Settings

Appointment confirmation	<input checked="" type="checkbox"/>	Send patients confirmation when appointments are booked, cancelled or rescheduled
Reminder	<input checked="" type="checkbox"/>	Send patients reminders before their appointments
Reminder days notice	9	Days prior to appointment (recommended 1 - 3 days)
Extra reminder	<input checked="" type="checkbox"/>	Send patients an extra reminder before their appointment
Extra reminder days notice	14	Days prior to appointment (recommended 7 - 14 days) Feature flag
DNA prediction extra reminder	<input checked="" type="checkbox"/>	Our AI model will predict the likelihood that each appointment has to DNA. You can set the threshold to only send extra reminders to those most likely. Learn more
% of appointments	35	% of appointments to receive an extra reminder

Confirmation and reminder intro

Confirmation and reminder end

[Show advanced notification options](#)

Preview ⓘ

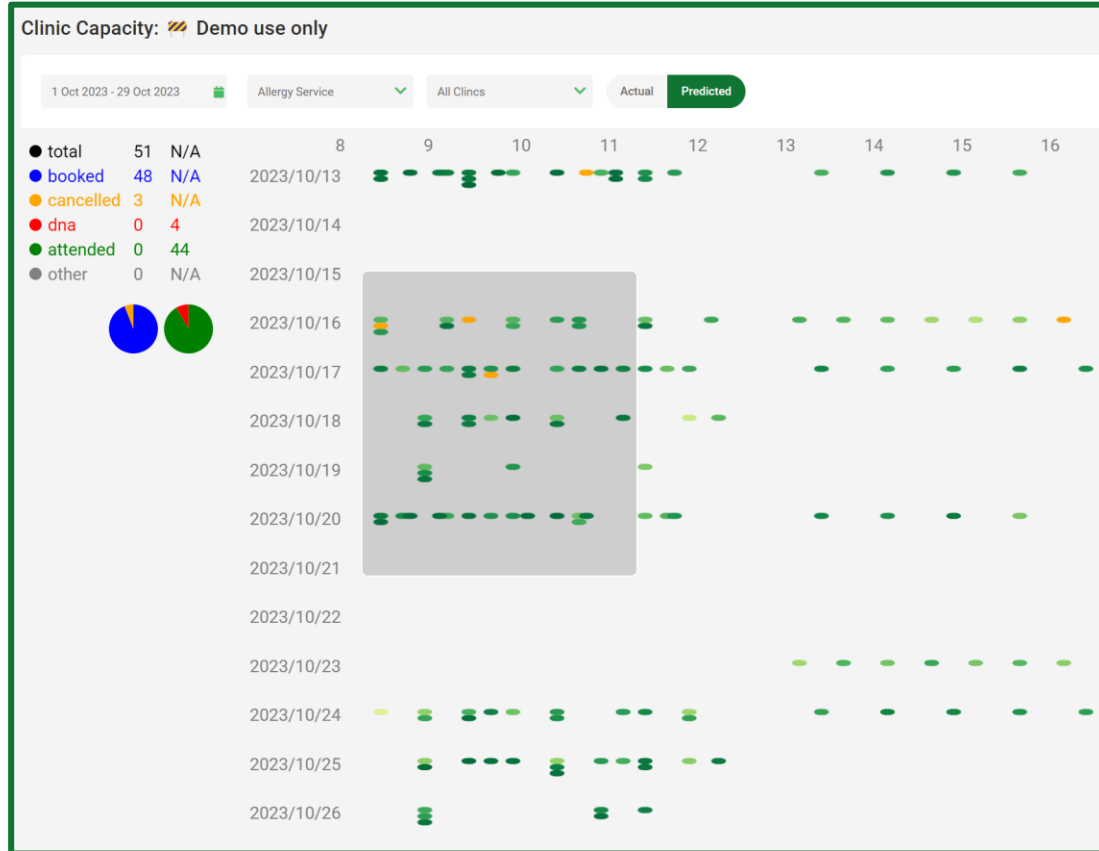
at DrDoctor Unreal Hospital

Text CHANGE for alternatives, CANCEL to cancel

📞 For queries call 02089999999

Characters: 116/1377, Fragments: 1, Estimated cost per SMS: 1.9p

Predicting true clinic capacity to book efficiently



Thanks! Any questions?
@twhicher

aide

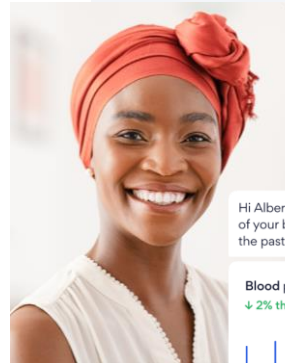
Using conversational AI
to support long-term condition
management.

Ian Wharton
Founder, CEO



Mary's most problematic symptom is [chest tightness](#).

Her adherence rate over the [last 30 days](#) is 78%.



[See my progress](#)

9:41am

Hi Alberta. Here is a summary
of your blood pressure over
the past 7 days.

Blood pressure
↓ 2% this month



127/84 mmHg

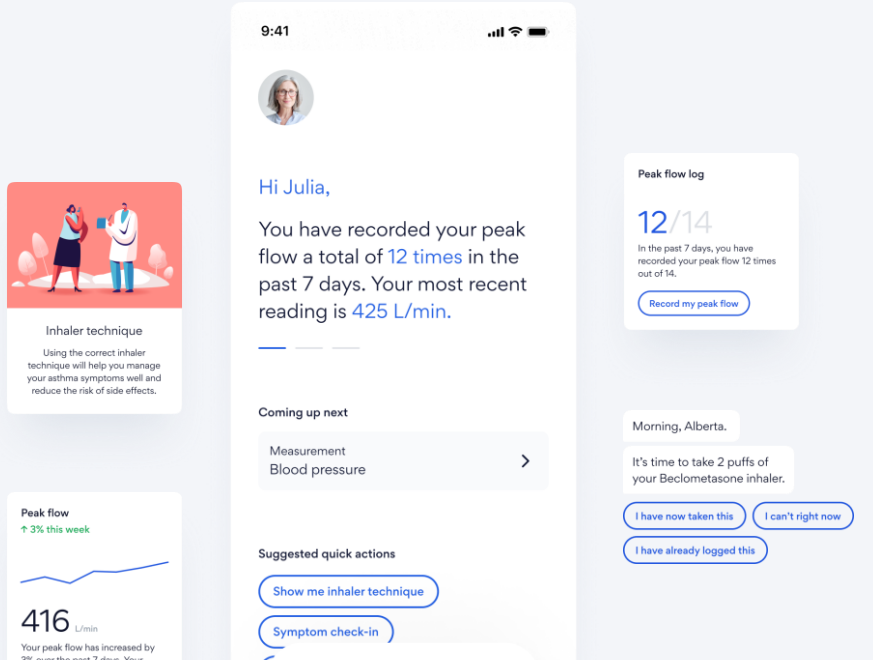
Your average blood pressure has



aide

Patient platform

Improving multi-condition self-care with medicine optimisation, monitoring and education.



9:41

Hi Julia,

You have recorded your peak flow a total of **12 times** in the past 7 days. Your most recent reading is **425 L/min**.

Inhaler technique
Using the correct inhaler technique will help you manage your asthma symptoms well and reduce the risk of side effects.

Coming up next
Measurement
Blood pressure

Suggested quick actions
Show me inhaler technique
Symptom check-in

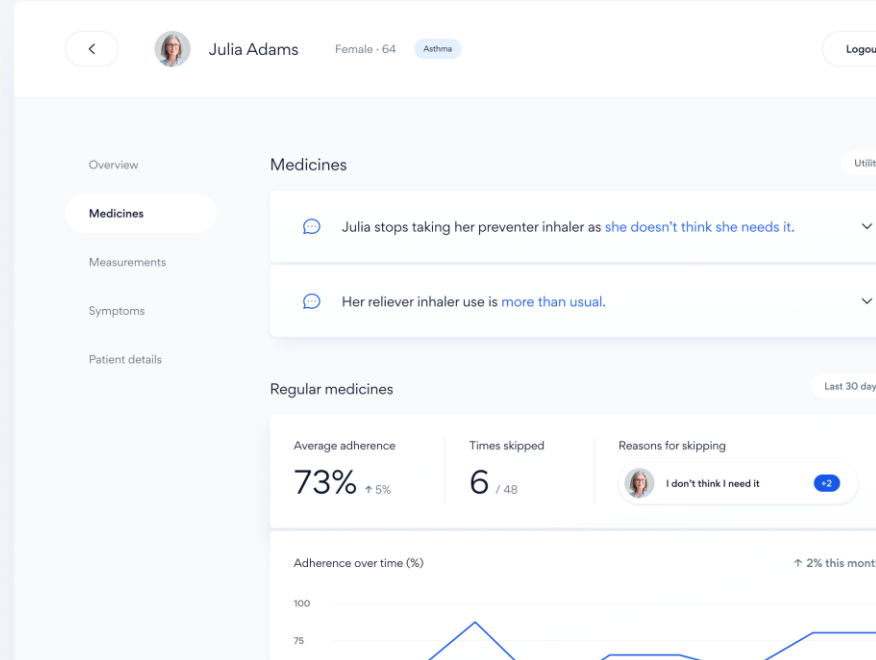
Peak flow log
12/14
In the past 7 days, you have recorded your peak flow 12 times out of 14.
Record my peak flow

Morning, Alberta.
It's time to take 2 puffs of your Beclometasone inhaler.
I have now taken this I can't right now
I have already logged this

Peak flow
↑ 3% this week
416 L/min
Your peak flow has increased by 3% over the past 7 days.

Clinician platform

Improving clinical decision-making with real-world patient data and insights.



Julia Adams Female · 64 Asthma

Overview Medicines Measurements Symptoms Patient details

Medicines

- Julia stops taking her preventer inhaler as *she doesn't think she needs it.*
- Her reliever inhaler use is *more than usual.*

Regular medicines

Average adherence **73%** ↑ 5%
Times skipped **6** / 48
Reasons for skipping: *I don't think I need it*

Adherence over time (%) ↑ 2% this month

Our platform

Meeting the complexity of patient engagement at scale with **natural language**.

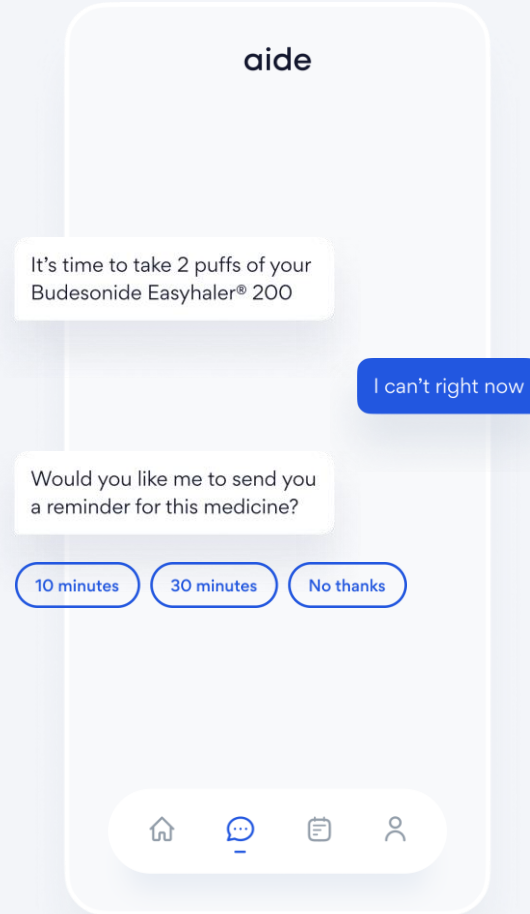
Aide has short, daily conversations with patients to help them adhere to their medicines, capture structured monitoring and improve their levels of health literacy.

Designed for comorbidity

Asthma, type 2 diabetes and hypertension today. Building support for top-10 conditions.

Safe, structured pathways

Aide conversations are clinically designed and do not diagnose or suggest prescription changes.



Proven patient impact. Achieving 75% average adherence in patients with asthma or type 2 diabetes in NHS England pilot.

15 seconds or less

Time it takes for patients
to record symptoms in Aide.

70% after 30 days

Number of patients still using
Aide every day.

71 years old

Oldest user of Aide, with a
median user age of 61.

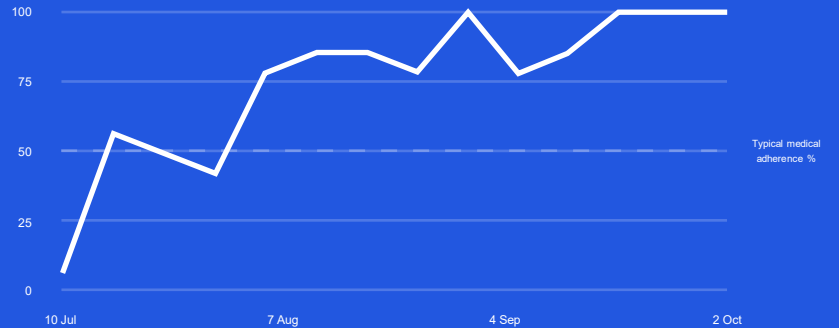
Rural, ageing, hard-pressed

Average area classification of
patients in the pilot.



Adherence % over time

Most-improved patient, aged 71, prescribed beclometasone twice daily



Morning, Alberta.

It's time to take 1 tablet of
your Amlodipine 5mg.

I have now taken this

I can't right now

I have already logged this

Morning, Alberta.

It's time to take 1 tablet of
your Amlodipine 5mg.

I have now taken this

I can't right now

I have already logged this

Morning, Alberta.

It's time to take 1 tablet of your Amlodipine 5mg.

I have now taken this

I can't right now

I have already logged this

I don't feel up to it

Concerns with side effects

I have difficulty taking it

I don't feel I need it

I have run out

Morning, Alberta.

It's time to take 1 tablet of your Amlodipine 5mg.

I have now taken this

I can't right now

I have already logged this

I don't feel up to it

Concerns with side effects

I have difficulty taking it

I don't feel I need it

I have run out

I don't feel up to it

Concerns with side effects

I have difficulty taking it

I don't feel I need it

I have run out

Sorry to hear that, Alberta.

In a few words, let me know how you feel after taking your Amlodipine 5mg.

Headaches for a couple of hours after taking it

Would you say this side effect is mild, moderate or severe?

Mild

Moderate

Severe

3/4

Do you ever stop taking your medicines if you feel ill?

Yes

No

4/4

When you feel like your condition is under control, do you sometimes stop taking your medication?

Yes

No

41% of patients told Aide they stop taking their medicines when they feel that their condition is under control.

Research Report

It's only a computer: Virtual humans increase willingness to disclose

Gale M. Lucas ^a, Jonathan Gratch ^a  , Aisha King ^b, Louis-Philippe Morency ^a

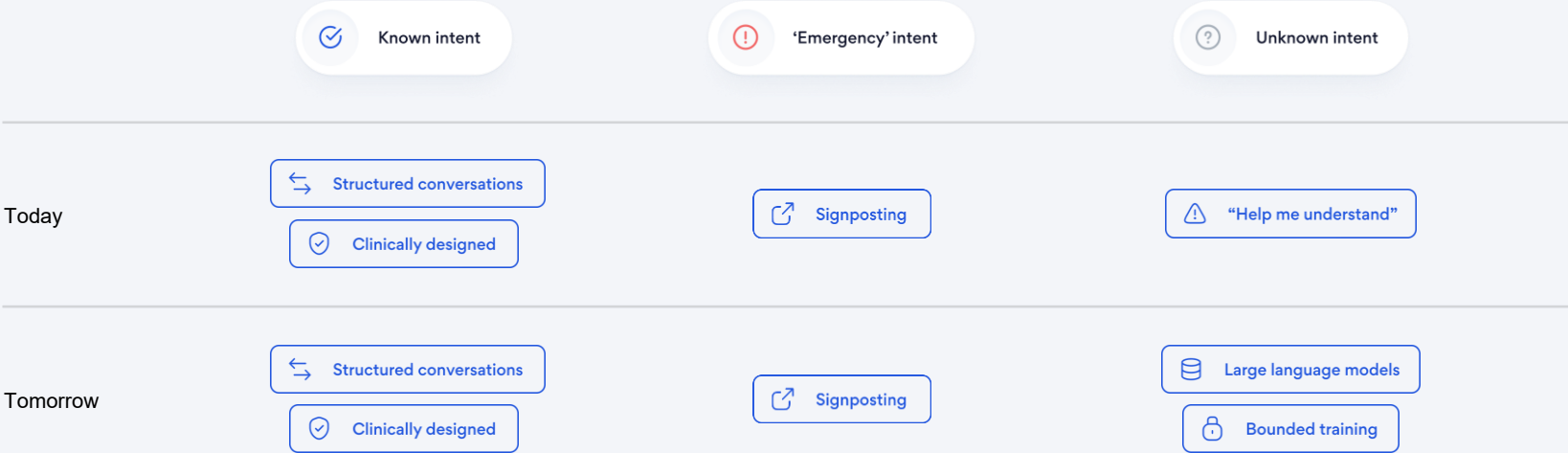
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<https://doi.org/10.1016/j.chb.2014.04.043>

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Conversational AI approach in Aide



→ ian.wharton@aide.health

→ [@aidehealthco](#)

Autonomous Telemedicine

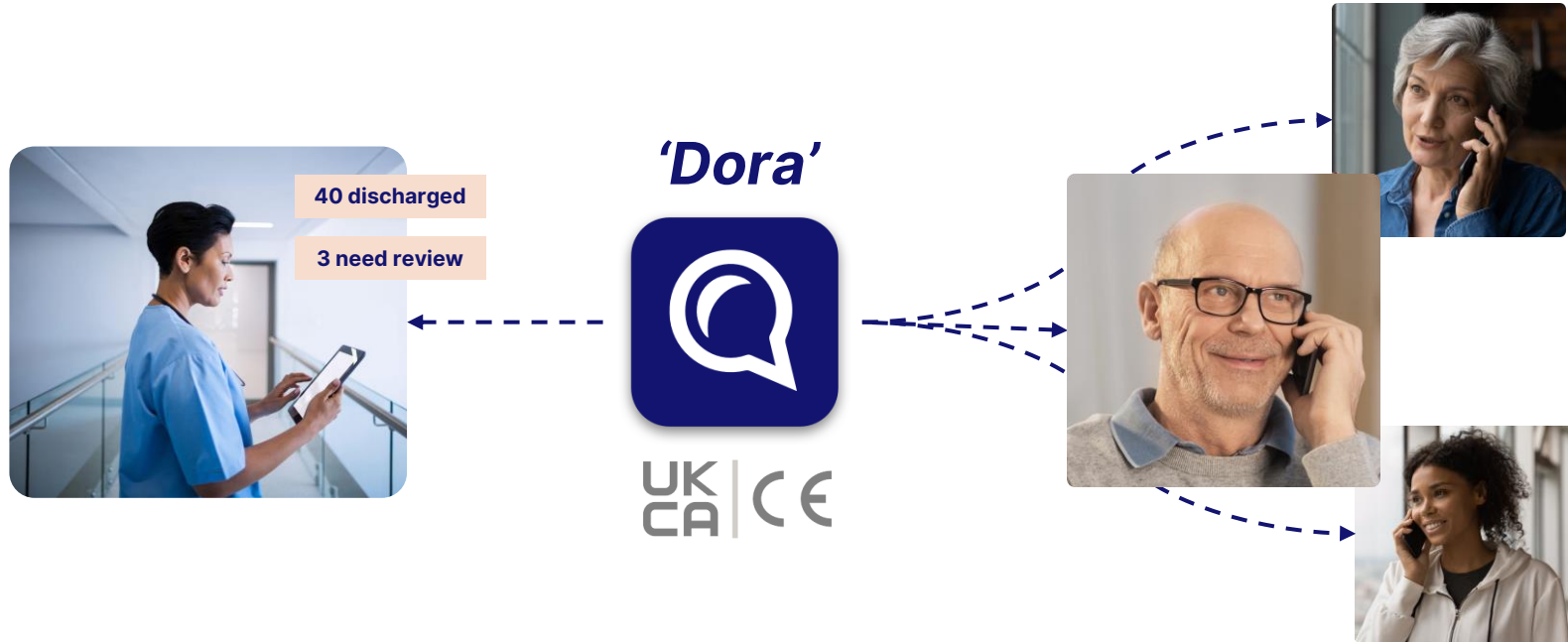
Dr Ernest Lim

Medical Director, Ufonia

PhD Candidate, Computer Science, University of York



We use AI to automate routine clinical conversations...



We aim to allow clinicians to work at the *'top of their licence'*...



***Unlimited
Scale***

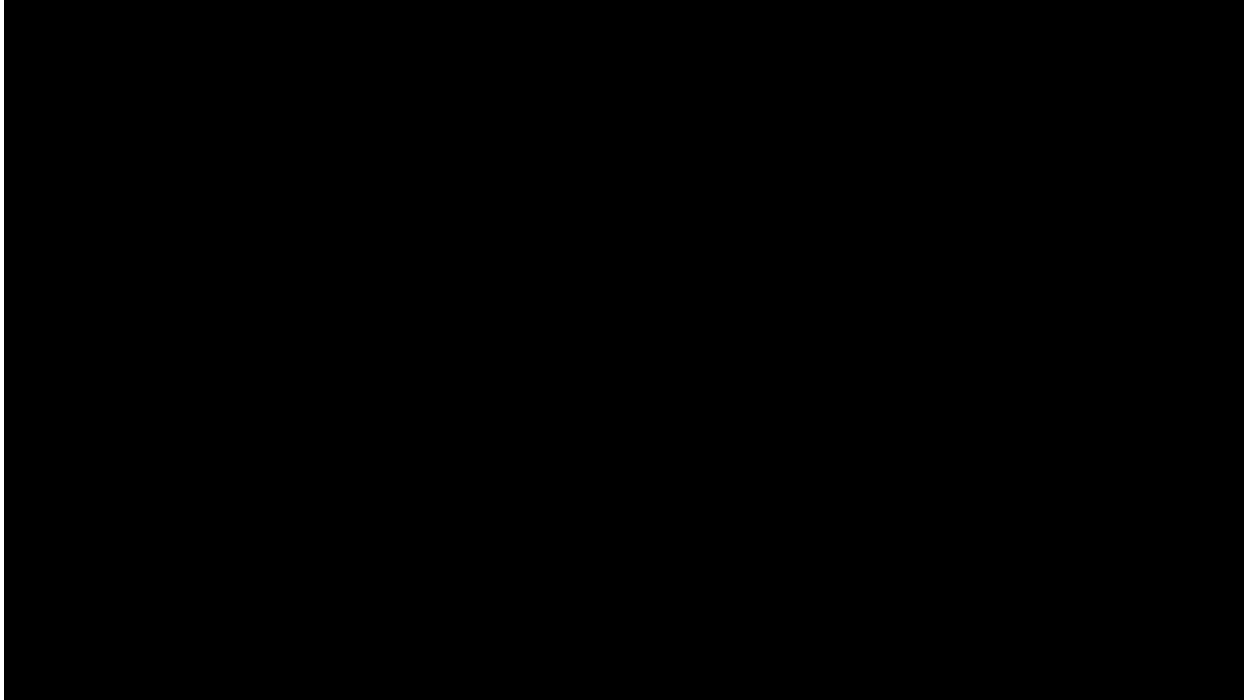


***Clinically
Validated***



***Highly
Accessible***

Dora demo...



Dora is already making a tangible impact on high-volume pathways...

3,120

Appointments
avoided

~700

Clinic sessions
saved

2,705

Service hours
freed

137t

CO2
savings



~65% of patients need no clinician
follow-up post *Dora*



Nurse-led pre-assessment history
taking replaced by *Dora*

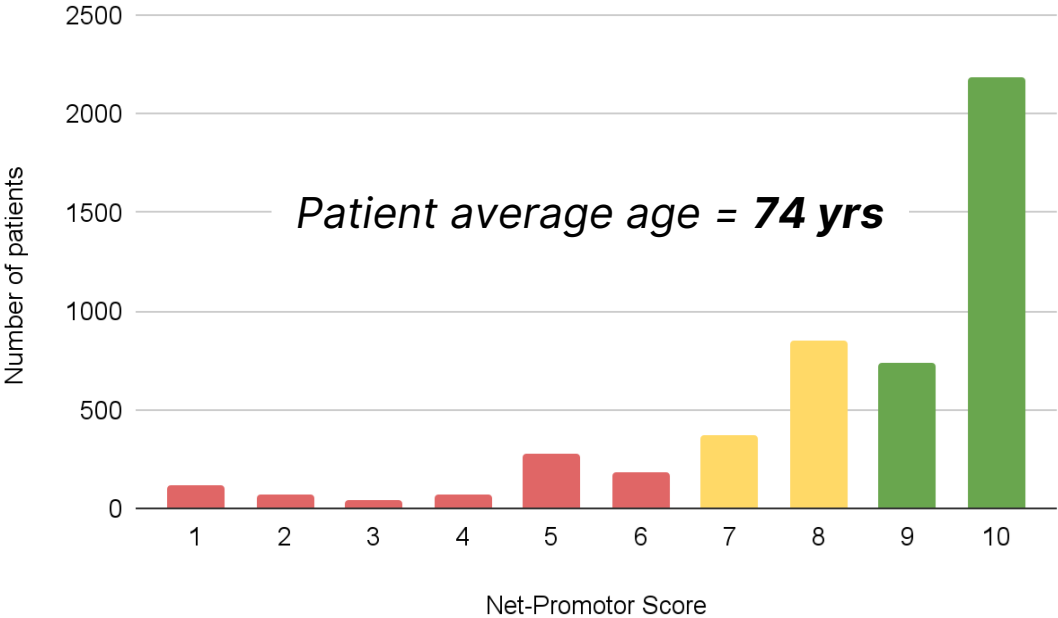


A day of admin time per-list saved
through *Dora* pre-op reminder



PROMs consistently collected for ~70%
of patients

Most importantly patients give excellent feedback...



*"Well it was **unbelievably efficient**"*

*"The questions are **simple questions**... everything's easier to answer"*

*"Very **clear**, very **easy**, very **straightforward**"*

*"It was much **much easier** than I thought it would be"*

*"I was quite satisfied... **everything was explained** to me and I knew what to expect when you called"*

Using conversational AI for healthcare presents safety and new ethical challenges...

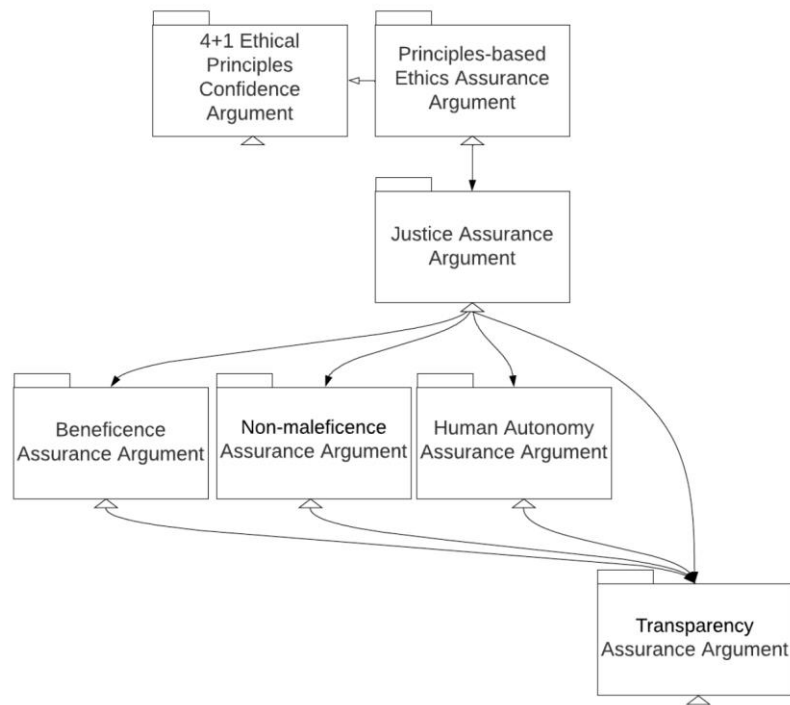
Ethics in conversation: Building an ethics assurance case for autonomous AI-enabled voice agents in healthcare

Authors:  Marten H. L. Kaas,  Zoe Porter,  Ernest Lim,  Aisling Higham,  Sarah Khavandi,  Ibrahim Habli
[Authors Info & Claims](#)

TAS '23: Proceedings of the First International Symposium on Trustworthy Autonomous Systems • July 2023 • Article No.: 19 • Pages 1–13 • <https://doi.org/10.1145/3597512.3599713>



**ASSURING
AUTONOMY**
INTERNATIONAL PROGRAMME



And the impacts it may have on professionals' activities...

THE MPS FOUNDATION

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CASE STUDY

Examining the impact of AI enabled automation on clinician wellbeing

PROJECT LEAD

Dr Sarah Khavandi, Ufonia Limited

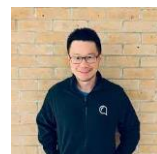
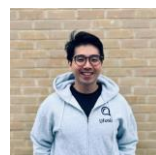
PROJECT TITLE

COUNTRY

The impact of autonomous telemedicine on clinician wellbeing and how this affects system success. UK

<https://www.thempsfoundation.org/case-studies/examining-the-impact-of-automation-on-clinician-wellbeing>

Thank you to our amazing collaborators...





for further information please contact:

Dr Ernest Lim, Medical Director

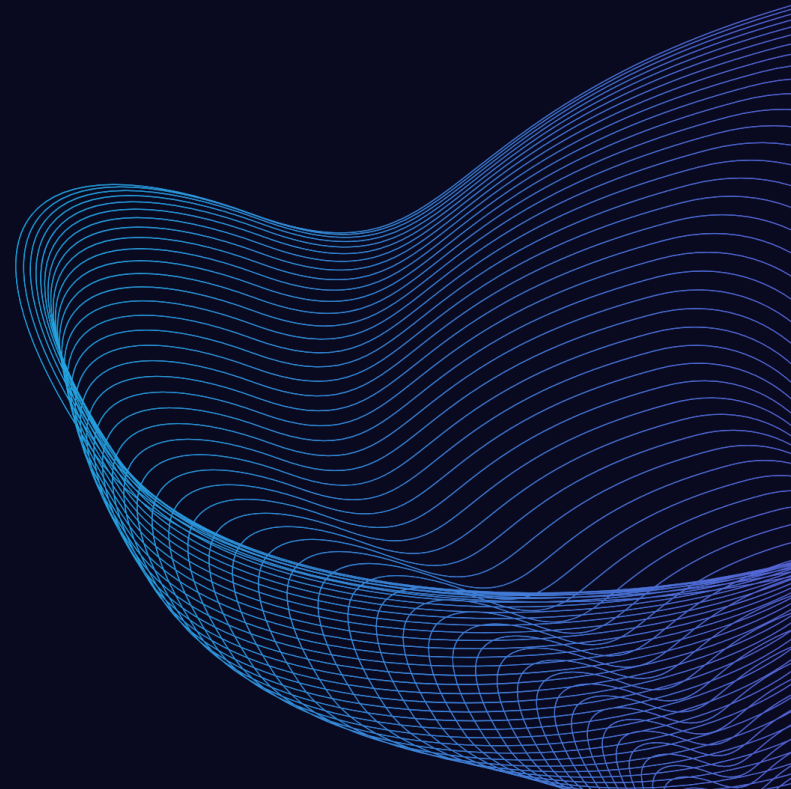
el@ufonia.com

+44 7585554340



deepmedical

Using AI to increase clinic utilisation and drive equitable access to healthcare





Patient Experience in England Today

Dr Mark Lomax- CEO- PEP Health

Are patients listened to today?

Today, the standard for capturing and reporting on patient feedback are **surveys** and **patient forums**.

Why are these no longer effective?

Inadequate

Surveys are top-down
Often miss the essence
of what matters most.
Many voices do not
engage with surveys

Unrepresentative

Declining response
rates
Inconsistent
methodologies

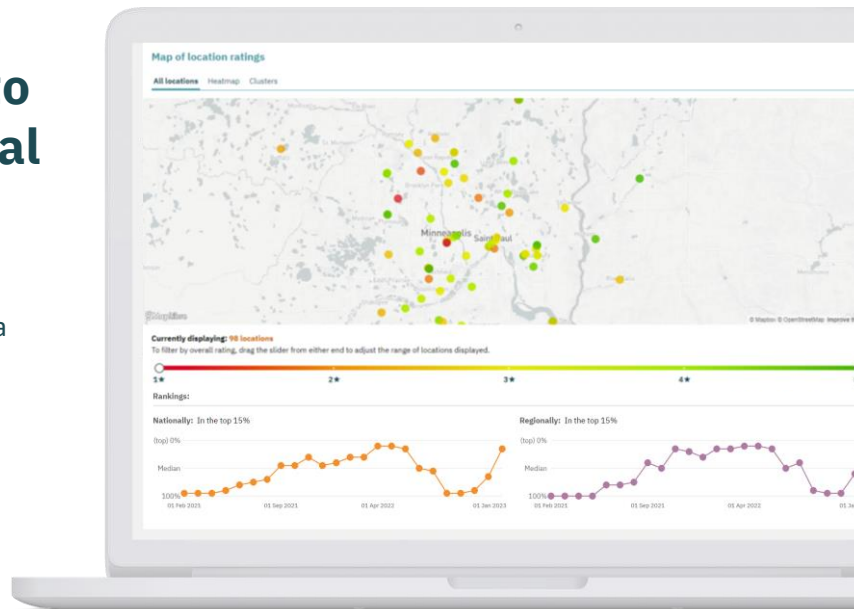
Poor VFM

Costly and time-
consuming to run
effectively
Limited insights

PEP Health uses AI to provide deep insights into what patients think in real time across 400M lives

Our dashboards transforms millions of patient comments into measurable and comparable data that can be used to:

- **Benchmark** variation in care
- **Improve** quality
- **Provide** transparency to unmet needs
- **Drive** better outcomes
- **Identify** safety issues
- **Listen** to the entire population



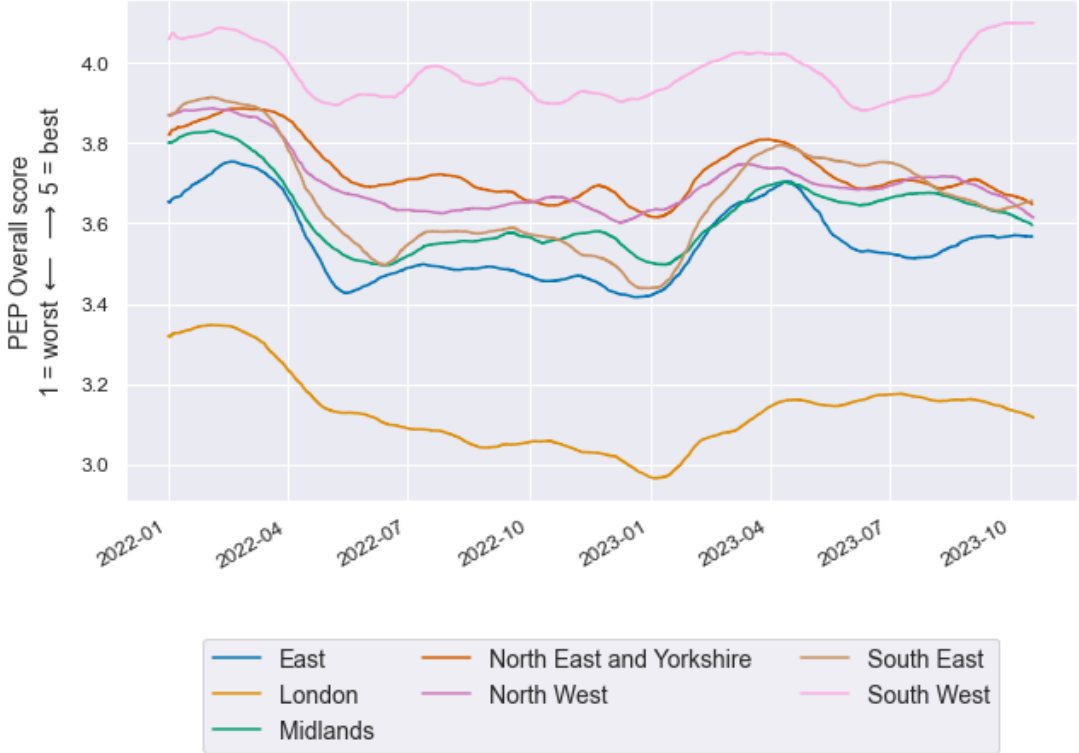
How the Patient Experience Platform Works

Through a rigorous application of data science and healthcare-based NLP, PEP Health generates actionable insights in real time.

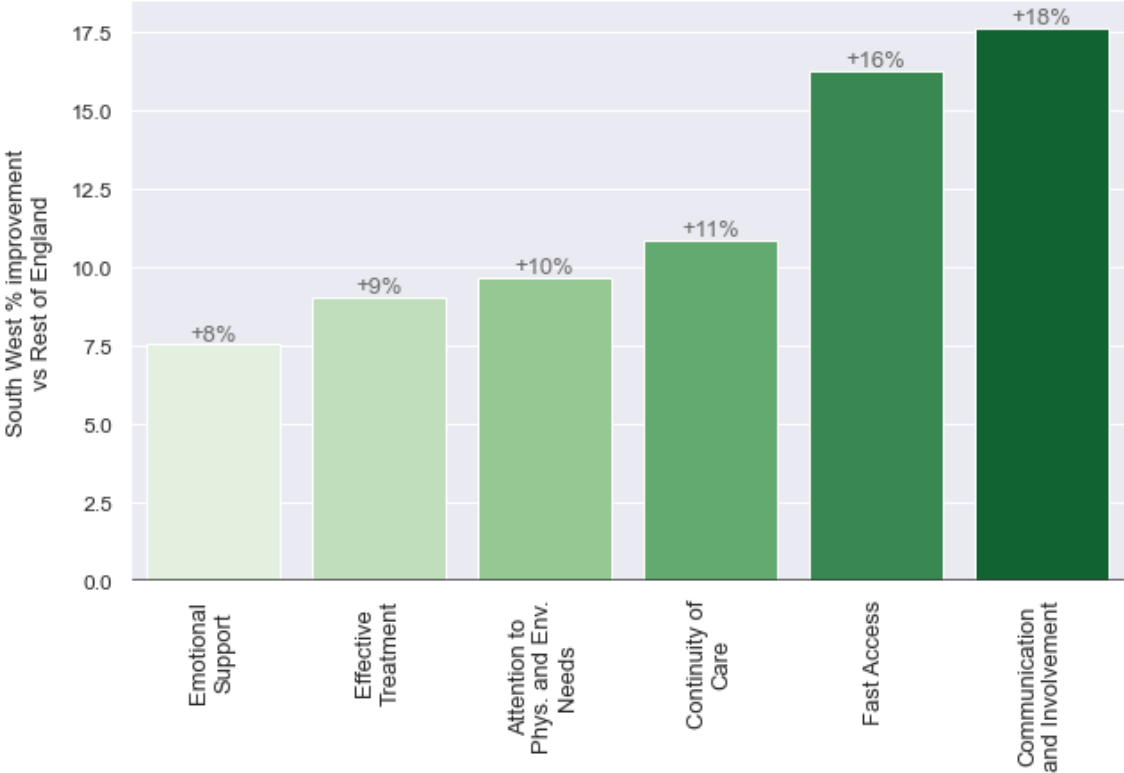


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4

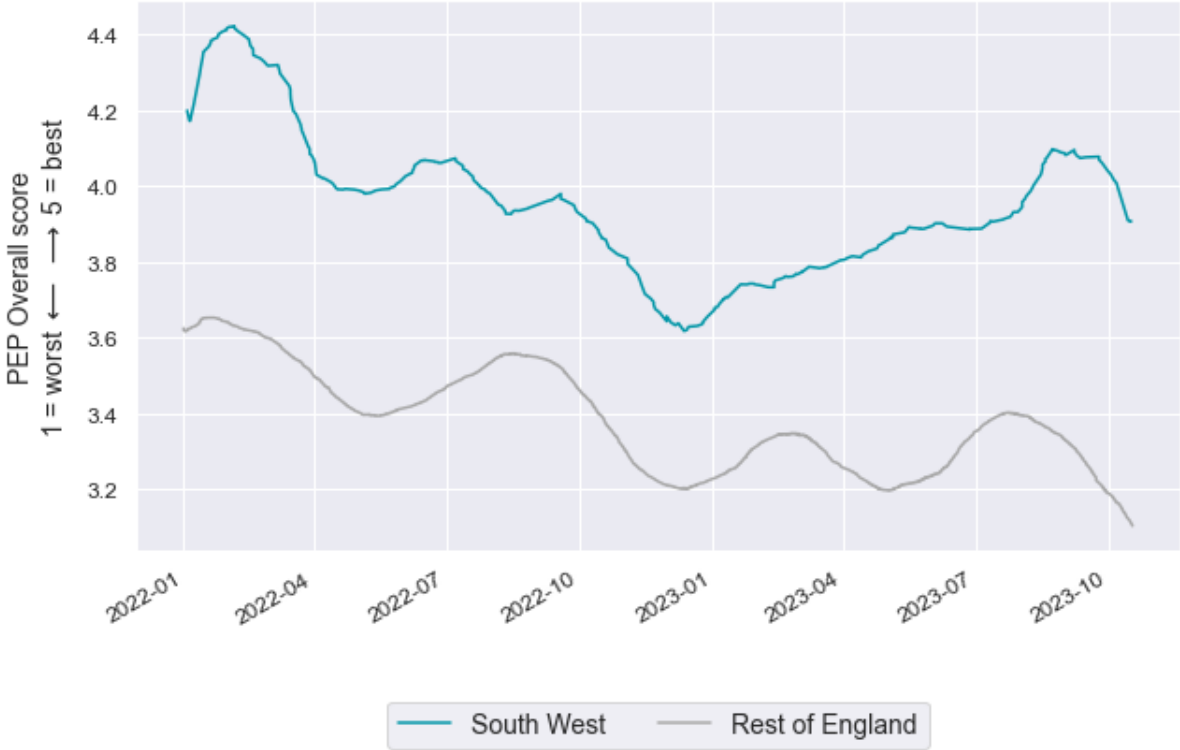
National overview of Patient Experience, every NHS Acute Service, Jan 2022 – Oct 2023



South West Acute Trusts deliver for patients across Access and Communication



Spotlight on Maternity Services- South-West bucking the trend



Real-time listening to patients can support improved care delivery, understand what patient's value, drive transparency and hear more diverse voices

PEP Health insights can be used to target improvement

- Identifies relative risks
- Provides actionable areas to target improvement
- Allows performance to be understood in multiple ways
- Enables benchmarking at multiple levels: between regions, trusts, locations and wards
- Standardises the performance of specialties across the country

Thank you

enquiries@pephealth.ai

Mark.lomax@pephealth.ai



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