

Can health apps make a real contribution  
to delivering sustainable healthcare?



## Digital Health & Care Innovation Centre

Transforming great ideas into real solutions

Prof George Crooks OBE

# Scotland's national innovation centre for digital health and care



Based in the Inovo Building, with a Demonstration & Simulation facility in the TIC building, University of Strathclyde

[dhi-scotland.com](https://dhi-scotland.com)



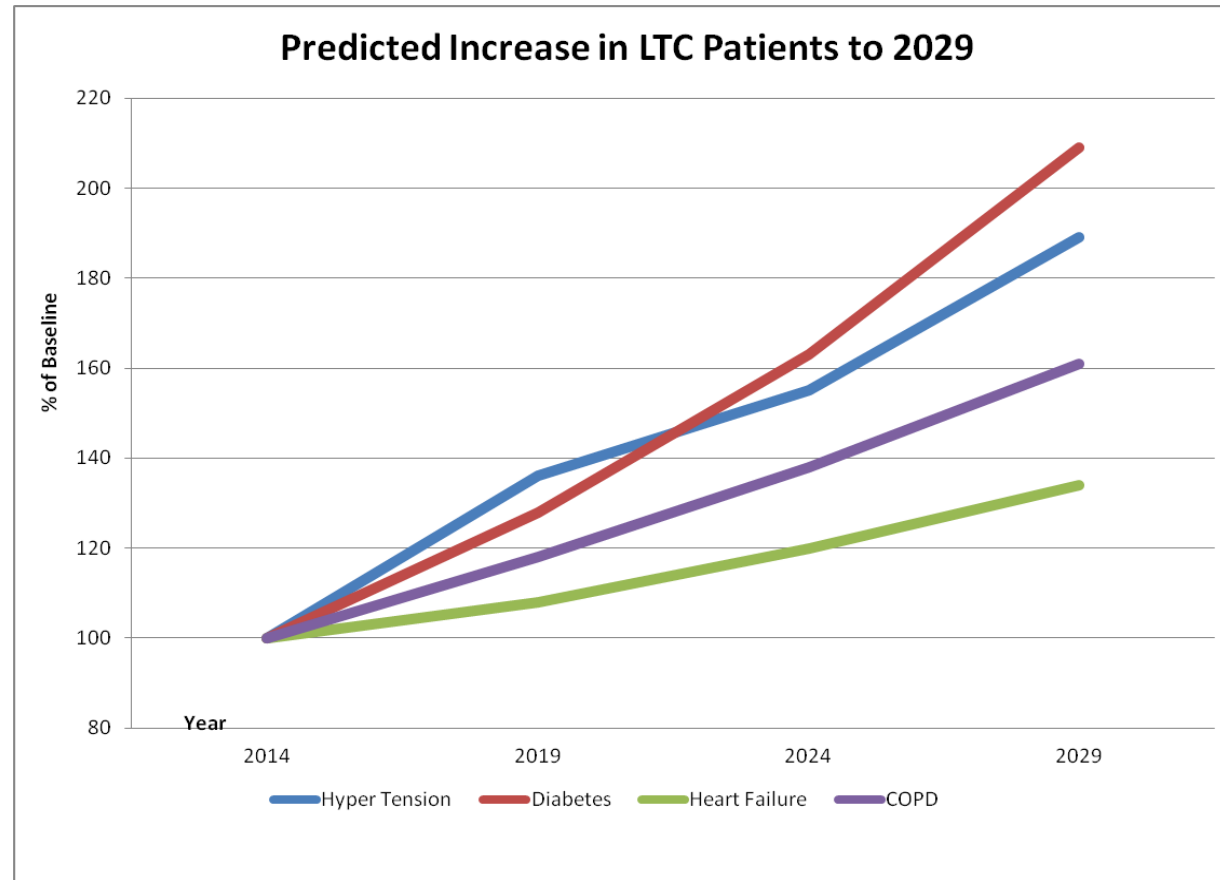
GET  
THE  
FACTS







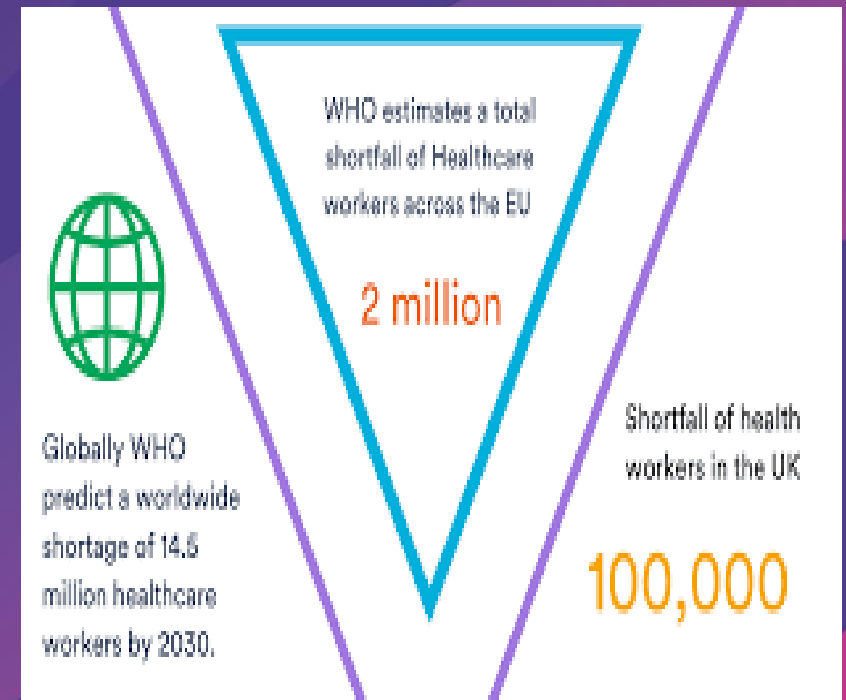
# Projected prevalence of Chronic Disease













The World is Changing.....

We must look to 21<sup>st</sup> century solutions to deal with 21<sup>st</sup> century challenges







**#Think  
Digital**





The appeal of digital..... The digital health and wellness market by revenue is expected to grow at a CAGR of 21.97% from 2022 to 2028.



A graphic of a lightbulb where the interior is filled with various sized gears of different colors (black, grey, blue, green). The base of the lightbulb is a simple black outline.

**"CHANGE  
happens  
at the  
speed of  
TRUST."**

-Stephen Covey

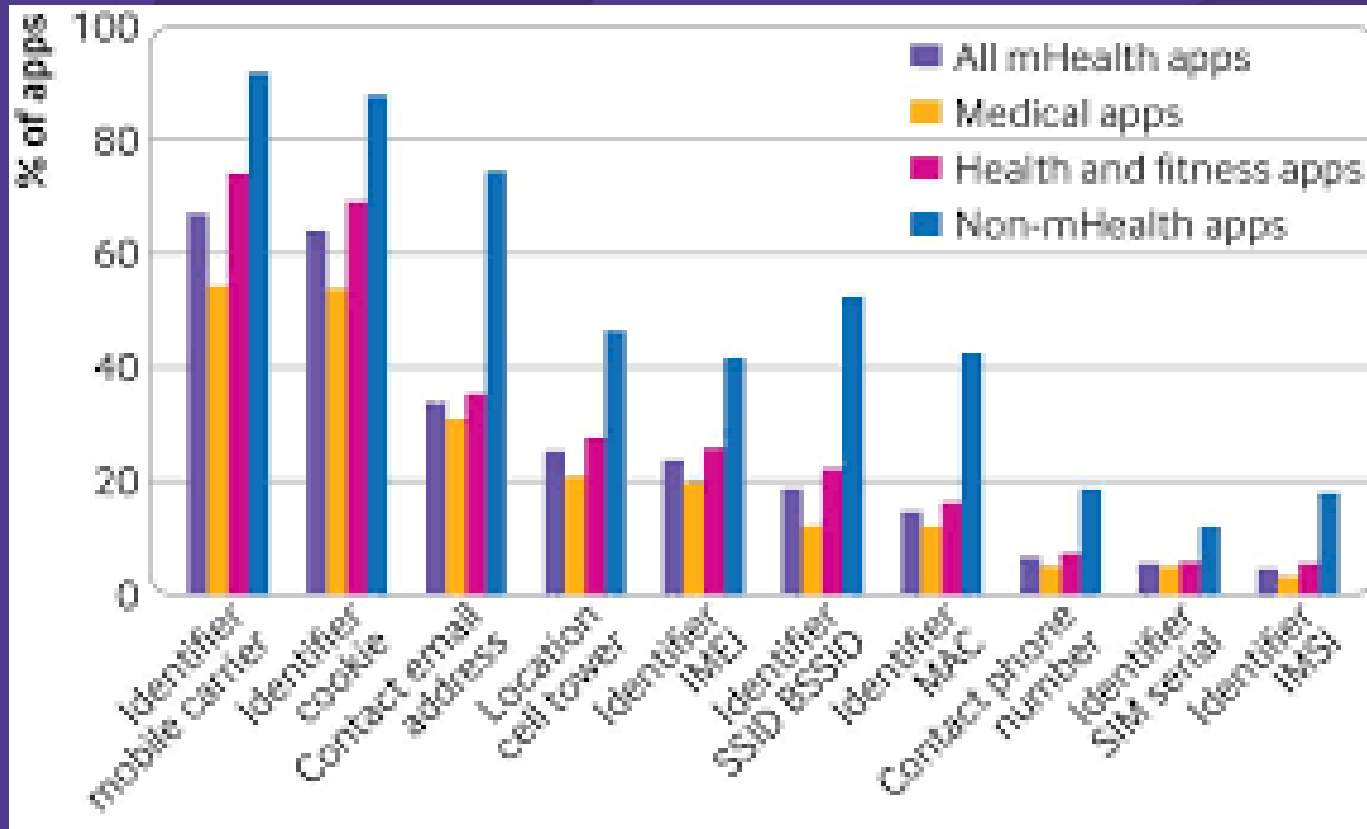
COLLABORATIVE  
DEVELOPMENT  
COLLECTIVE  
LLC.





5G/6G





IT IS JUST ME AND MY DEVICE!!!!







Create a fertile environment



# Integrating innovation strands to enable adoption



DEMONSTRATING



Service model innovation



Technical/Digital innovation



Business model innovation

ACCEPTED SERVICE MODELS

READINESS TO ADOPT/ SCALE

# DHI help partners get **READY** for SCALING Digital Health and Care Innovation



Technical readiness levels		Service readiness levels		Business readiness levels
TR9 – Live implementation proven	LIVING LABS	SR9 – Service change implemented		BR9 – Commercial sale
TR8 – system complete/qualified		SR8 – Develop Case for scale		BR8 – Reference site, real world test - business model accepted
TR7 - working model demonstrated		SR7 – Evaluation and Evidence concluded		BR7 – procurement route/framework – clarified
TR6 - fully functional prototype		SR6 – Change pilot test - RWE/LL		BR6 – Regulation and Standard check (CE/FDA/MDR/IG/SSP)- interoperable
TR5 - rigorous testing undertaken	SIMULATIONS	SR5 – Future state accepted in principle - Simulated to de-risk		BR5 – Business model review
TR4 – technical validation		SR4 - Future state options co-designed		BR4 – Product fit, tested and adapted and made interoperable etc....
TR3 - proof-of-concept constructed		SR3 – Current state understood/accepted		BR3 – Business plan for industry - developed
TR2 - basic principles studied		SR2 – Market/Gap analysis; best practice (hypothesis dev)		BR2 – Market size and strategy reviewed
TR1 - scientific research (defined)		SR1 – Demand – needs analysis		BR1 – Business idea (defined)

©Hughes 2019 – related publication - [https://www.mdpi.com/1660-4601/18/23/12575/review\\_report](https://www.mdpi.com/1660-4601/18/23/12575/review_report)







BLEND CITIZEN GENERATED DATA  
WITH  
FORMAL HEALTH AND CARE DATA



DELIVERS AN UNDERSTANDING OF THE TRUE LIVED EXPERIENCE OF A CITIZEN

[dhi-scotland.com](https://dhi-scotland.com)



# Examples from Scotland

# National guidelines for COVID assessment in primary care



02-UK 15:14

Healthcare Improvement Scotland | **SIGN**

**SIGN Decision Support**

DIGITAL HEALTH & CARE INSTITUTE

The Right Decision Service

POWERED BY **QRIS**

02-UK 17:42

COVID 19 assessment in primary care - predicting severe disease

<p>Triage guide</p>	<p>Symptoms</p>
<p>Comorbidities</p>	<p>Other risk factors</p>
<p>Clinical signs</p>	<p>Consultation method</p>

02-UK 17:42

COVID 19 Scottish Primary Care Hub triage guide

Clinical course

1. Clinical symptoms and red flags +

2. At risk of deterioration +

3. Connect +

4. Clinical Triage +

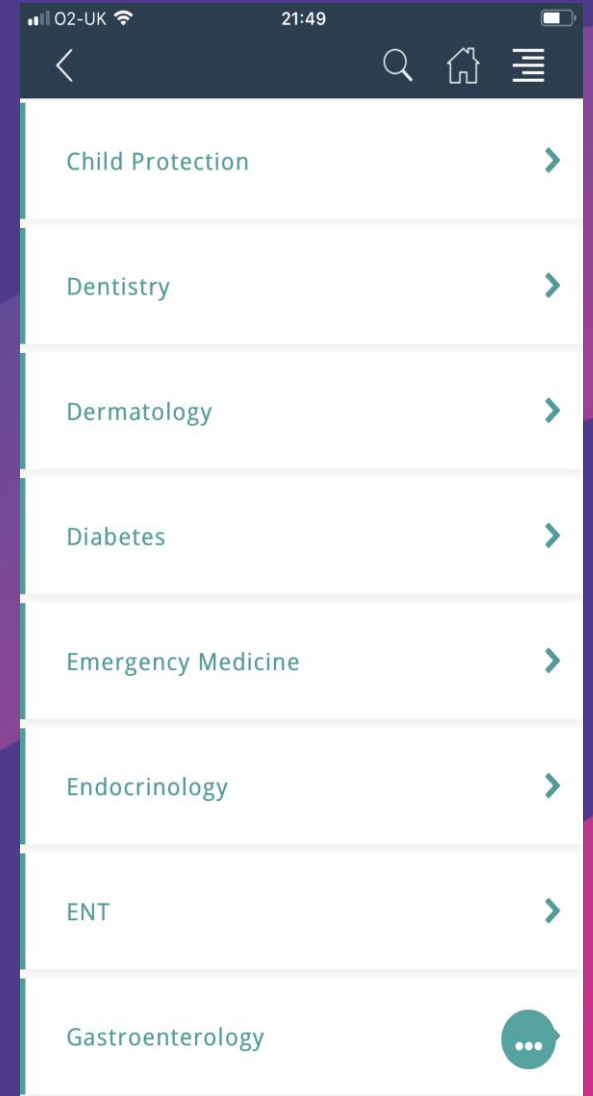
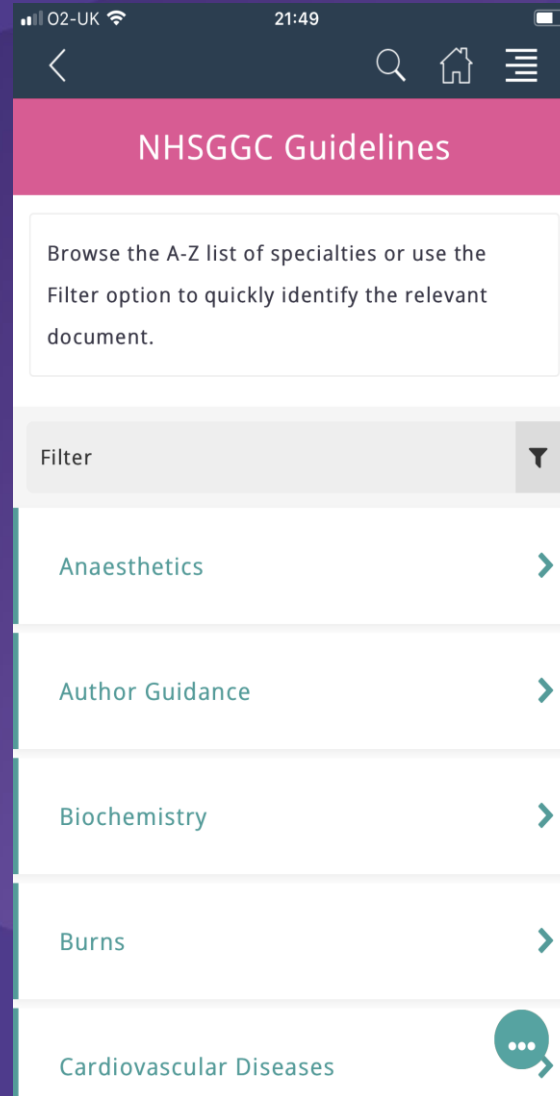
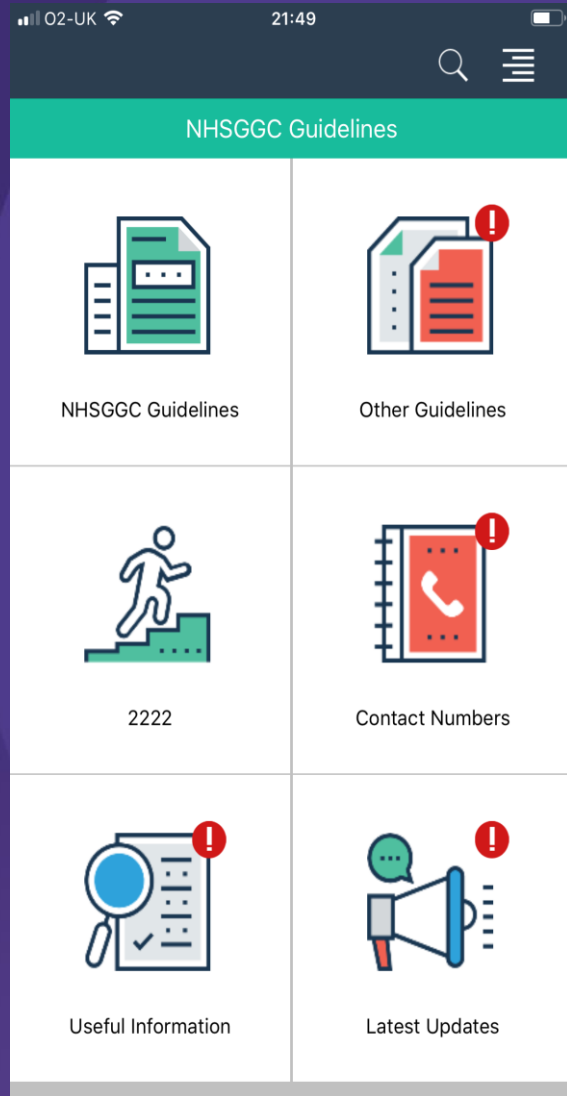
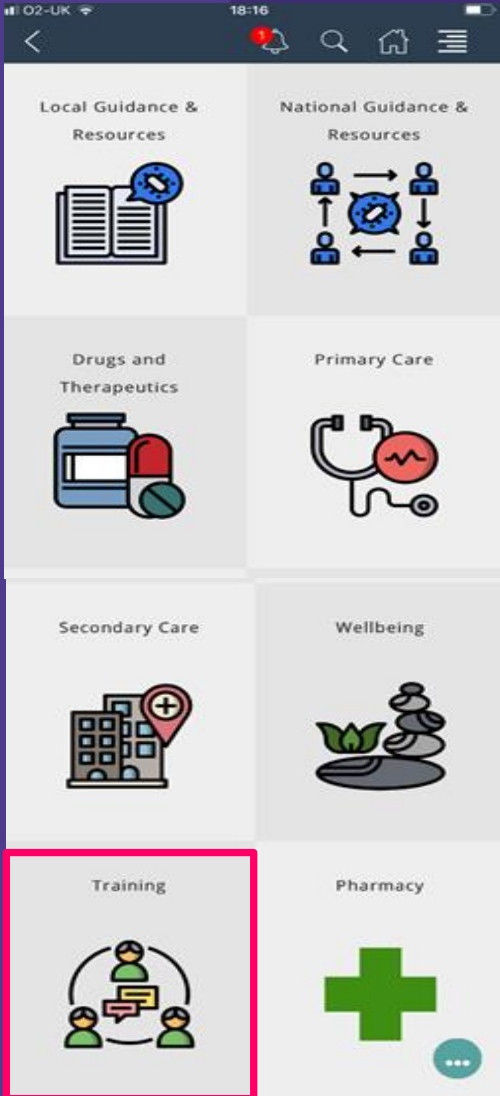
5. Clinical assessment +

6. COVID most likely diagnosis? NO +

7. Clinical Frailty Scale (CFS) +

# Local COVID guidelines and training

# Local paediatric guidelines



# Pathways optimised for mobile devices



SIGNdecision 19:31  
signdecisionsupport.uk

### Diagnosis of LUTI in women under 65 pathway

\*do not unhide\*



```
graph TD
    Start([START]) --> US[Urinary Symptoms  
Discrete frequency urgency  
voiding abnormalities, nocturia]
    US --> S1[Single urinary symptom  
See]
    US --> S2[Two or more symptoms  
Exclude urinary calculus, test for  
nitrites to confirm bacteriuria]
    US --> S3[Any urinary symptoms  
Exclude urinary calculus, test for  
nitrites to confirm bacteriuria  
vaginal irritation or discharge]
    S1 --> SC[Self-care  
Provide self-care advice click V  
button for more information  
Advise the patient to repeat the  
symptom fails to improve]
    S2 --> NR[Negative test result  
Provide self-care advice click V  
button for more information  
Consider sending a urine  
specimen for culture to inform  
the diagnosis]
    S2 --> PR[Positive test result  
Provide self-care advice click V  
button for more information]
    S3 --> DD[Differential diagnosis  
Exclude UTI, urethritis and other  
causes of symptoms to rule out  
conditions that present in similar  
ways to uncomplicated UTI]
    NR --> MR[Mild symptoms  
Consider NSAIDs as first line  
treatment]
    NR --> MS[Moderate or severe  
symptoms  
Consider NSAIDs as an  
alternative to an antibiotic  
following a discussion of risks  
and benefits]
    PR --> MR
    PR --> MS
    MS --> AB[Antibiotics  
Where antibiotics are required,  
prescribe a 3-day course of a  
narrow spectrum antibiotic  
following local guidelines]
    MS --> UR[Urinalysis  
Send a urine specimen for  
culture if the patient has a history  
of resistant urinary isolates, has  
taken any antibiotics in the past  
six months or fails to respond to  
treatment]
    SC --- F1[FINISH]
    NR --- F2[FINISH]
    PR --- F3[FINISH]
    DD --- F4[FINISH]
    MR --- F5[FINISH]
    MS --- F6[FINISH]
    AB --- F7[FINISH]
    UR --- F8[FINISH]
```

```
graph TD
    Start([START]) --> US[Urinary Symptoms  
Discrete frequency urgency  
voiding abnormalities, nocturia]
    US --> S1[Single urinary symptom  
See]
    US --> S2[Two or more symptoms  
Exclude urinary calculus, test for  
nitrites to confirm bacteriuria]
    US --> S3[Any urinary symptoms  
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nitrites to confirm bacteriuria  
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    MS --- F6[FINISH]
    AB --- F7[FINISH]
    UR --- F8[FINISH]
```

# Question-response style pathways




Scottish Antimicrobial Prescribing Group



ANTIMICROBIAL COMPANION

POWERED BY **QRIS**



Regulated by the MHRA in the UK

02-UK 18:14

Are there any symptoms suggestive of non-urinary infection?

**Respiratory** – shortness of breath, cough or sputum (phlegm) production, new pleuritic chest pain (sharp pain across ribs)

**Gastrointestinal** – nausea/ vomiting, new abdominal pain, new onset diarrhoea

**Skin/soft tissue** – new redness, warmth, swelling, purulent drainage (pus)

Yes ✓

No ✗

02-UK 18:14

Does the patient/ resident have a urinary catheter?

Yes ✓

No ✗


02-UK 18:14

Does patient/resident have TWO or more of following signs or symptoms?

dysuria (pain on urination)  
urgent need to urinate  
frequent need to urinate  
new or worsening urinary incontinence  
shaking chills (rigors)  
pain in flank (side of body) or suprapubic (above pubic bone)  
frank haematuria (visible blood in urine)  
new onset or worsening of pre-existing delirium (confusion) or agitation

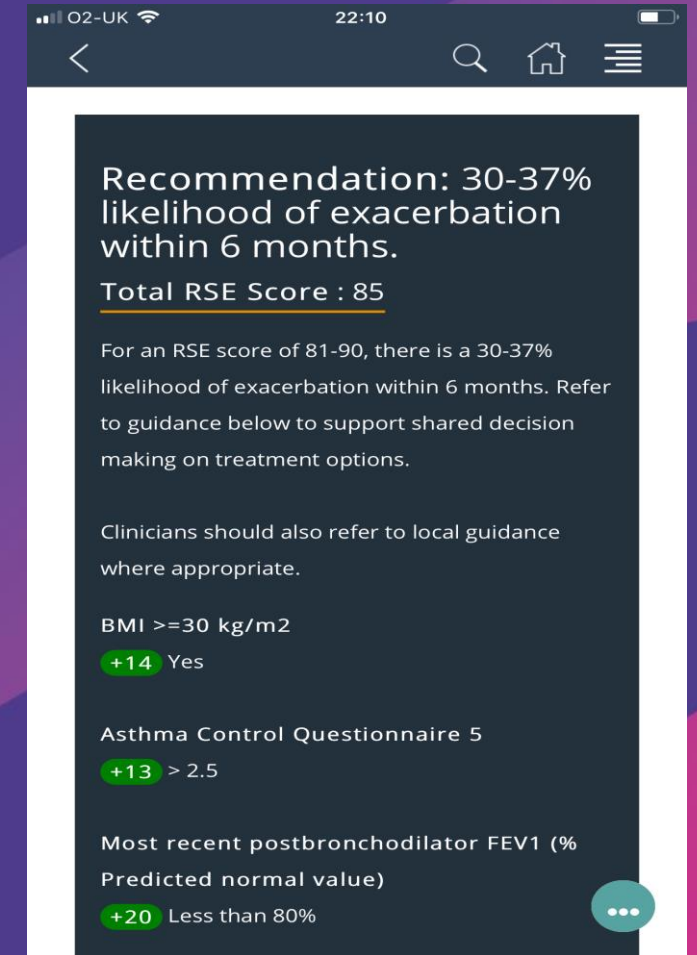
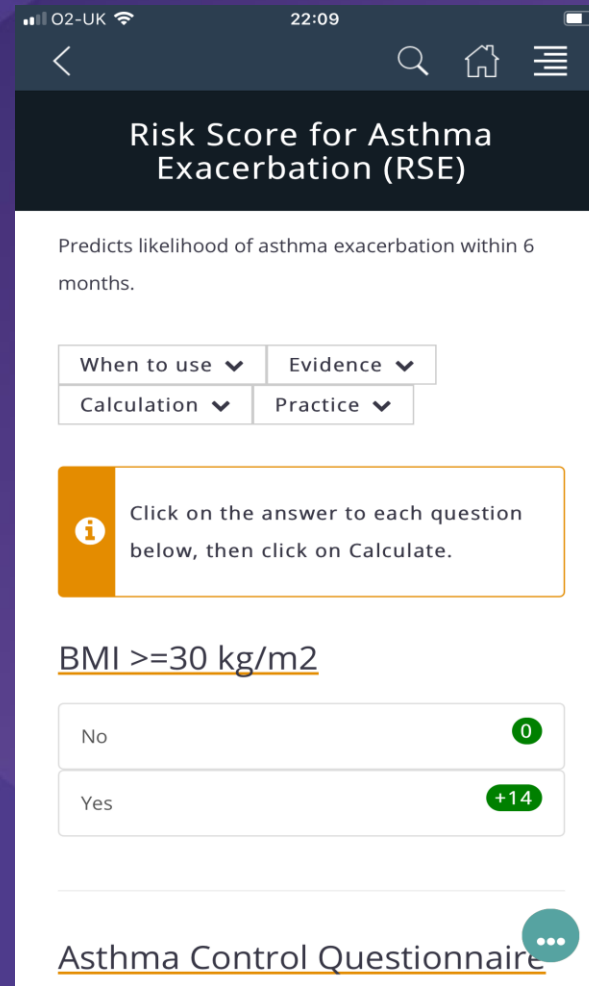
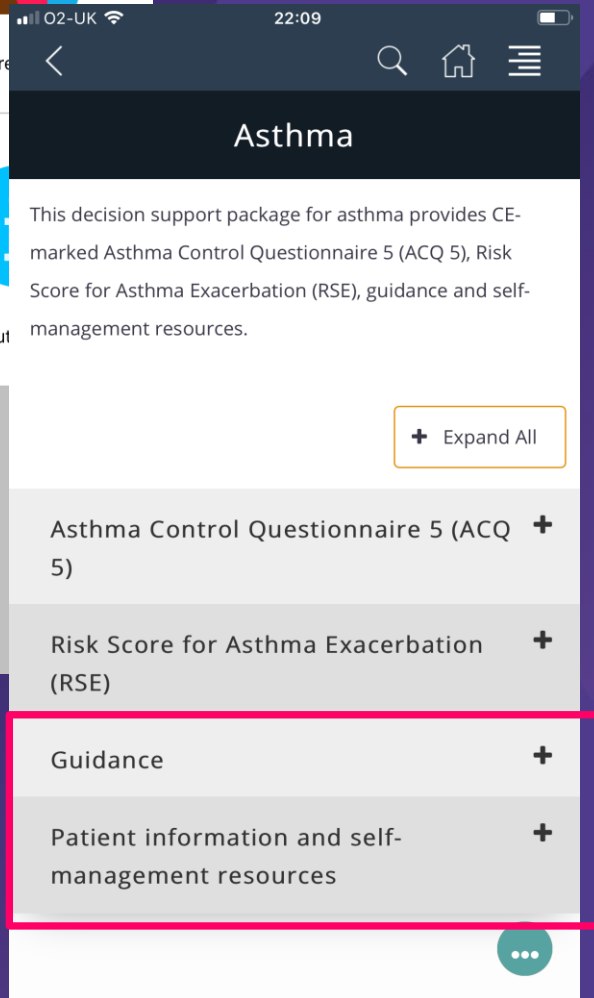
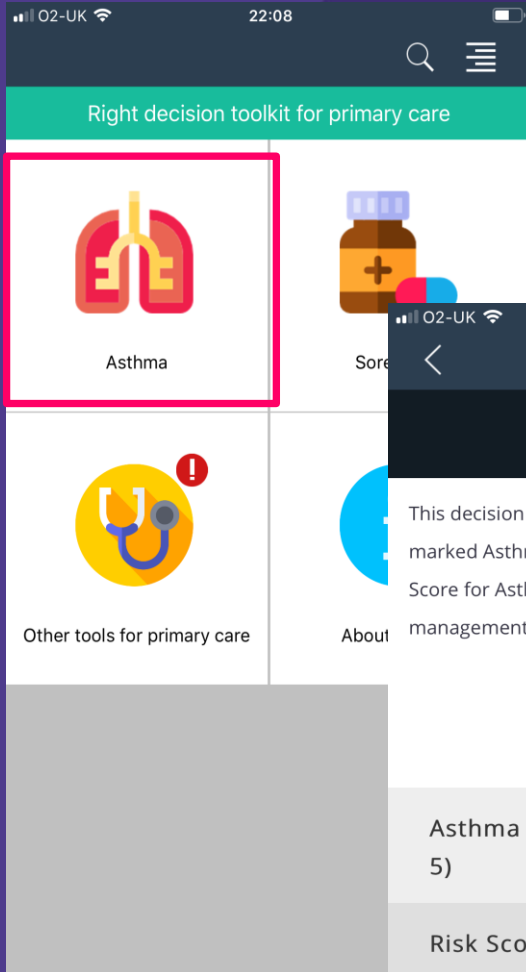
Yes ✓

No ✗



# Risk calculators with guidance and patient information

- Re-usable across apps. CE-marked.











## Contact us

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## Join our network



