

Digital technologies to support self-management of asthma: early-use assessment

HealthTech guidance

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Your responsibility

This guidance represents the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, healthcare professionals are expected to take this guidance fully into account, and specifically any special arrangements relating to the introduction of new interventional procedures. The guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

All problems (adverse events) related to a medicine or medical device used for treatment or in a procedure should be reported to the Medicines and Healthcare products Regulatory Agency using the [Yellow Card Scheme](#).

Commissioners and/or providers have a responsibility to implement the guidance, in their local context, in light of their duties to have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity, and foster good relations. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties. Providers should ensure that governance structures are in place to review, authorise and monitor the introduction of new devices and procedures.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should [assess and reduce the environmental impact of implementing NICE recommendations](#) wherever possible.

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1 Recommendations

1.1 Seven digital technologies can be used in the NHS during the evidence generation period as options to support self-management of asthma. The technologies are:

- Astmahub
- Astmahub for parents
- Digital Health Passport
- Luscii
- myAsthma
- RDMP (Respiratory Disease Management Platform)
- Smart Asthma.

These technologies can only be used:

- if the evidence outlined in the [evidence generation plan for technologies to support self-management of asthma](#) is being generated
- as long as they have appropriate regulatory approval including NHS England's Digital Technology Assessment Criteria (DTAC) approval.

1.2 The companies are responsible for ensuring that data collection and analysis takes place. They must confirm that agreements are in place to generate the evidence. NICE will contact the companies annually to confirm that evidence is being generated and analysed as planned. NICE may revise or withdraw the guidance if these conditions are not met.

1.3 At the end of the evidence generation period (3 years), the companies should submit the evidence to NICE in a format that can be used for decision making. NICE will review the evidence and assess if the technology can be routinely adopted in the NHS.

What this means in practice

These digital technologies can be used as options in the NHS during the evidence generation period (3 years) and paid for using core NHS funding. During this time, more evidence will be collected to address any uncertainties. Companies are responsible for organising funding for evidence generation activities.

After this, NICE will review this guidance and the recommendations may change. Take this into account when negotiating the length of contracts and licence costs.

Potential benefits of use in the NHS during the evidence generation period

- **Patient benefit:** The technologies may support people to follow their personalised asthma action plan (PAAP) and could help them use their medicine and inhalers more effectively. The technologies can increase confidence in self-managing asthma and may improve communication with healthcare professionals, leading to improved asthma management.
- **Clinical benefit:** Clinical evidence suggests that the technologies may improve asthma control, which could help reduce exacerbations and improve quality of life.
- **System and resource benefit:** The technologies may improve asthma control, which could reduce hospitalisations and emergency department visits.
- **Equality of access:** Digital technologies offer an alternative format to written PAAPs. Some people may find it easier to use digital technologies.

Managing the risk of use in the NHS during the evidence generation period

- **Costs:** Early results from the economic modelling show that the technologies could be cost effective. But there is wide variation in the prices and costing mechanisms of the technologies and NHS trusts should take this into account when choosing a technology.
- **Patient outcomes:** The technologies are not intended to replace clinical review. So, the risk from using them is low because people will still have regular reviews with healthcare professionals.
- **Equality:** Some people may find it more difficult to use digital technologies and

may need additional support. This includes people who:

- are less comfortable using digital technologies
- have limited access to hardware or the internet
- are neurodivergent
- have learning disabilities
- have problems with manual dexterity
- have visual or cognitive impairments
- have difficulty reading, writing or understanding health-related information (including people who cannot read English).

What evidence generation is needed

More evidence needs to be generated on:

- clinical effectiveness, including:
 - the long-term impact on outcomes such as exacerbations, asthma control and quality of life
 - how effective the technologies are at improving self-management of asthma
 - how effective the technologies are in the following subgroups:
 - ◇ adults (aged 17 and over), including families or carers
 - ◇ young people (aged 12 to 16) and children (aged 5 to 11), supported by families or carers
 - ◇ families or carers of children under 5
 - ◇ people with severe asthma
 - ◇ people with newly diagnosed asthma

- the additional value of connected devices, such as spirometers, peak flow meters and smart inhalers
- rates of people both starting and stopping use of the technologies, and reasons for stopping use
- the experience of people using the technologies, including ease of use and how comfortable people feel using them
- healthcare resource use, including staff time.

The [evidence generation plan](#) gives further information on the prioritised evidence gaps and outcomes, ongoing studies, potential real-world data sources and generalisability of findings to NHS practice. It includes how the evidence gaps could be resolved through real-world evidence studies.

Why the committee made these recommendations

There is a high unmet need for effective self-management support for asthma control. Improving asthma control can reduce exacerbations and enhance quality of life.

Evidence on the clinical effectiveness of digital technologies to support self-management of asthma is limited, but studies suggest that the technologies may help to improve asthma control in the short term. People who have used the technologies report that they are easy to use and acceptable in terms of comfort and willingness to use. There are no reports of harm or adverse events from the technologies. The risk to people from using the technologies is considered low because they do not replace clinical review by a healthcare professional.

The long-term clinical effectiveness is uncertain. The studies are mostly observational and some have small sample sizes. So, more evidence is needed on the long-term impact of the technologies on important outcomes such as asthma control, exacerbations and quality of life.

Early results from economic modelling suggest that the technologies could be cost effective. But more evidence is needed on the impact of the technologies on clinical outcomes and the numbers of people who start and continue to use them.

2 Information about the technologies

2.1 Digital technologies aim to support self-management of asthma by providing a digital personalised asthma action plan (PAAP), tailored education and tools for tracking symptoms and medicines. These features may improve medicine adherence and asthma control, reduce exacerbations and improve quality of life.

2.2 Technologies included in the scope vary in terms of:

- target population
- mode of delivery (apps, online platforms and additional hardware requirements)
- features and components.

The final scope specified that the technologies should function independently of clinical oversight from healthcare professionals, such as through remote monitoring. It also specified that, as a minimum, the technologies should include:

- access to a PAAP
- evidence-based education on self-management
- tracking and monitoring of symptoms or lung function.

The technologies identified had the following additional features:

- inhaler technique support
- alerts to seek medical help (except JOE Digital Therapeutic)
- environment alerts
- reminders for medicines or appointments
- medicine tracking (except Luscii).

Digital technologies are offered after diagnosis or treatment initiation or during routine reviews. They could be offered in:

- primary care, such as GP surgeries
- secondary care, such as hospitals or specialist clinics
- tertiary centres
- the community, such as pharmacies or schools.

They could also be used by carers, parents and community workers to support children or adults who are not able to self-manage their condition.

2.3 Details of the 9 technologies included in this assessment are in table 1. Further detail on mode of delivery and features (including symptoms and peak flow monitoring and PAAPs are storage and management) is in table 2 of the [external assessment group \(EAG\) report](#) and the addendum. Costs were estimated by the EAG using information provided by companies (see appendix C2 of the EAG's report and table 7 in the addendum). All the technologies are designed to be used on an ongoing basis, except JOE Digital Therapeutic. The company states this technology is intended to be used for an average duration of 6 months. Seven of the technologies are in use in the NHS. Two of the technologies (AsthmaTuner and JOE Digital Therapeutic) reported a planned release in the NHS in 2026. These 2 technologies will be included in recommendation 1.1 when they have Digital Technology Assessment Criteria (DTAC) approval and are available for use in the NHS.

Table 1 Technologies included in the assessment

Technology (company)	CE or UKCA mark	Target users	Upfront cost per person, including hardware, £	Ongoing costs per person, £
Asthmahub (ICST)	I	People aged 18 years and over	29	0
Asthmahub for parents (ICST)	I	Children and parents or carers	29	0

Technology (company)	CE or UKCA mark	Target users	Upfront cost per person, including hardware, £	Ongoing costs per person, £
AsthmaTuner (MediTuner)	IIb	People aged 6 years and over and healthcare professionals	Not disclosed (commercial in confidence)	Not disclosed
Digital Health Passport (Tiny Medical Apps)	I	People aged 5 years and over and parents or carers	77	0
JOE Digital Therapeutic (Ludocare)	I	Children (aged 3 to 11 years) with persistent asthma	103 (includes end-of-use cost)	620 to 1,240, depending on duration of use (range represents 6 to 12 months of use)
Luscii (Luscii Healthtech BV)	IIa	All age groups and healthcare professionals	8.50	180 per year
myAsthma (My MHealth Limited)	I	People aged 13 years and over	35	30 per year
RDMP (Aptar Digital Health)	I	People aged 16 years and over and healthcare professionals	112	180 per year
Smart Asthma (Smart Respiratory Products Ltd)	IIa	People aged 5 years and over and parents or carers	66.65	0

Abbreviations: CE, Conformité Européene (European Conformity); ICST, Institute of Clinical Science and Technology; RDMP, Respiratory Disease Management Platform; UKCA, UK Conformity Assessed.

Sustainability

2.4 For information, Carbon Reduction Plans for UK carbon emissions, or a commitment to reducing greenhouse gas emissions and achieving net zero, for 3 of the technologies are published here:

- [Aptar Digital Health: Climate Transition Plan 2024 \(PDF only\)](#)
- [My MHealth Limited: Delivering a Net Zero NHS](#)
- [Smart Respiratory Products Ltd: Carbon Reduction Plan \(PDF only\)](#).

The following companies did not disclose a Carbon Reduction Plan for UK carbon emissions or a net zero commitment:

- ICST
- Ludocare
- Luscii Healthtech BV
- MediTuner
- Tiny Medical Apps.

3 Committee discussion

The medical technologies advisory committee considered evidence on digital technologies to support self-management of asthma from several sources. This included evidence submitted by the companies, a review of clinical and cost evidence by the external assessment group (EAG), and responses from stakeholders. Full details are available in the [project documents for this guidance](#).

The condition

- 3.1 Asthma is a long-term respiratory condition that can affect children, young people and adults. It happens when the airways swell and narrow because of allergies or other stimuli, making it hard to breathe. This can cause symptoms such as recurring episodes of wheezing, shortness of breath, chest tightness and coughing. The symptoms may get worse over time and can limit a person's ability to undertake daily activities. There may also be flare-ups or exacerbations, which can result in hospitalisation.

Current practice

- 3.2 Recommendations for self-management of asthma are in [section 1.14 of the BTS, NICE and SIGN guideline on asthma](#). These include offering a personalised asthma action plan (PAAP) and education to adults, young people and children aged 5 years and over with a diagnosis of asthma (and their families or carers, if appropriate). A PAAP should include:
- information on minimising exposure to asthma triggers
 - for adults who are using an inhaled corticosteroid in a single inhaler, guidance on increasing inhaled corticosteroid dose if asthma control worsens and guidance on what to do if symptoms do not improve
 - advice on when to contact a healthcare professional if asthma control deteriorates.

- 3.3 The clinical experts reported that in current practice PAAPs are not always provided. They added that, even when they are provided, some people can misplace or forget their PAAP. Some people may also find it difficult to remember the steps in their PAAP or may apply them incorrectly because they do not fully understand their PAAP.

Unmet need

- 3.4 Uncontrolled asthma is common and can lead to emergency department visits, hospital admissions and avoidable deaths. The clinical experts said that many people do not have structured self-management support. They added that people can have poor engagement with written action plans, incorrect inhaler technique and non-adherence to medicines. People do not always get tailored advice, especially young people, people who are underserved and people with newly diagnosed asthma. Asthma service provision varies, and inequalities are barriers to access and quality of care. The clinical experts reported that self-management is key in managing asthma, and there is a significant unmet need for effective self-management support.

Patient considerations

- 3.5 A patient expert explained how reminders from a digital technology had helped them remember to take their medicine. They said that using the technology had reduced their anxiety about managing their asthma. They said that it also helped improve efficiency and focus at GP appointments because of data sharing and because their PAAP was stored digitally. But the patient expert cautioned that these tools should complement and not replace current care. They highlighted that the technologies could help overcome barriers such as poor engagement with written PAAPs and incorrect inhaler technique. They emphasised that digital technologies needed to be simple and inclusive and should consider diverse needs and incorporate safeguarding when used by younger people.

Clinical effectiveness

Evidence base

3.6 The evidence comprised:

- 5 published studies, including:
 - 1 UK observational study
 - 1 UK service evaluation
 - 3 international studies (including 1 randomised controlled trial)
- 12 unpublished studies
- 5 conference abstracts.

The committee acknowledged that the quantity and quality of studies for each technology vary. Some of the evidence from peer-reviewed studies was done outside of the UK, in Sweden, the US, Thailand and the Netherlands. The clinical experts explained that because of differences in healthcare settings and care pathways this evidence is unlikely to be generalisable to NHS clinical practice. So, the committee agreed that UK-based evidence is needed.

3.7 Qualitative data exploring patient perspectives, usability and acceptability was available for 5 technologies. There is limited evidence on user experience from the UK.

Impact on asthma and patient outcomes

3.8 The committee noted that evidence focused on clinical outcomes (asthma control and exacerbations) and patient-reported outcomes (quality of life and acceptability) and included some data on medicine use and adherence. The committee noted that evidence from some of the studies suggests that the digital technologies:

- improve asthma-control and quality-of-life scores
- reduce exacerbations, hospitalisations or emergency department visits
- reduce rescue medicine use or increase controller medicine use.

The committee agreed that early evidence suggests that the digital technologies can support self-management of asthma.

- 3.9 When reported, ease of use and acceptability was generally high. The committee noted that qualitative evidence suggests the digital technologies may improve symptom awareness and understanding of asthma.

Clinical evidence gaps

- 3.10 The committee noted several evidence gaps that should be addressed in future research. It said that demographics (such as age, sex, ethnicity and socioeconomic status) and clinical details (such as asthma control and comorbidities) were poorly reported. It also said that disease severity was inconsistently defined across studies. Evidence was mainly related to uncontrolled asthma populations, which it said limited generalisability to the wider asthma population. Other limitations included a reliance on self-reported outcomes, variation in measurement tools, small sample sizes and short follow-up periods (less than 12 months). Evidence was lacking for some subgroups, including different age groups, particularly children under 5 years (supported by parents and carers) and people with severe or newly diagnosed asthma. The committee agreed that further evidence is needed to address these gaps and strengthen confidence in the clinical effectiveness of the digital technologies to support self-management of asthma.
- 3.11 The committee highlighted the need to generate evidence using validated tools (such as asthma control test, asthma quality of life questionnaire, asthma control questionnaire, lung function tests) to assess the impact of the technologies on key asthma outcomes, particularly in the longer term. It also highlighted the need for robust peer-reviewed studies with adequate sample sizes and to include diverse populations, including children, adolescents and people with severe or

newly diagnosed asthma. It agreed that further qualitative evidence on whether the technologies can help improve people's knowledge, support self-management and promote appropriate use of their PAAPs and treatment regimens would also be useful.

Value of connected devices

3.12 The committee noted that some of the apps can be connected to spirometers, peak flow meters or smart inhalers, enabling people to track and monitor lung function, medicine use and inhaler technique. The clinical experts explained that there is no evidence that tracking lung function is linked to improved outcomes, and questioned the additional value of connected devices. They also noted that there is no evidence to suggest whether spirometry or peak flow would be more useful as an add-on. They added that there may be resource implications for training people to use these devices properly and questioned how reliable the outputs would be, particularly for spirometry. Company representatives confirmed that the apps can also be used independently without connected devices. The committee concluded that further evidence is needed to determine whether the addition of a connected device affects outcomes such as asthma control or exacerbations.

Safety

3.13 The committee noted that no adverse events associated with the technologies had been reported and discussed the safety of using these technologies in the NHS during the evidence generation period. It noted the nature of the technologies, which are intended for self-management and should not replace clinical review. The clinical experts added that for most people self-management is based on a written PAAP. They said that additional features, such as education, symptom tracking and a digital plan, are unlikely to represent a clinical risk. The committee noted that data security and privacy risks should be mitigated through standard compliance measures and regulations. The clinical experts highlighted that feedback from the patient survey noted an overfocus on data and questioned whether tracking symptoms or lung function could lead to anxiety for some people. The committee agreed that it would be important to collect data on

quality of life to see whether there were any adverse effects of increased tracking. The committee concluded that the overall clinical risk of using these digital technologies during the evidence generation period is low.

Barriers to implementation and uptake

3.14 The committee noted that a patient survey provided useful insights and was informative, but was not fully representative of the UK population. So, the committee said that caution is needed when generalising feedback on usability and accessibility. It noted that, although these technologies are not yet widely used, people reported positive experiences but with varying ease of use. But concerns were noted around privacy and data sharing. Practical issues, such as lack of a smartphone or internet access, were identified as barriers for some people. The committee also noted the British Thoracic Society's submission, which highlighted risks such as short-term increased healthcare use, widening inequalities and implementation challenges. Comments received at consultation highlighted the potential burden on NHS staff time to allow for training and helping patients to set up and use the technologies. The committee agreed that more data on healthcare resource use is needed and that barriers to use (such as device access, connectivity and digital literacy) and implementation would need to be considered. It said that further evidence exploring these barriers in diverse populations would be useful.

Cost effectiveness

Economic model

3.15 An exploratory economic model was developed to identify key cost and utility drivers and areas of uncertainty for digital technologies for self-management of asthma compared with standard self-management programmes. Because of the lack of data on clinical outcomes, the model could not be fully developed and was instead used to explore different value propositions. Improved asthma control was considered the most plausible scenario, based on the clinical evidence, despite uncertainty in the magnitude and duration. For this reason, the clinical

impact of the technologies was assumed to be the same for all technologies. The EAG used a 5-year time horizon but noted that the time period for most clinical studies was less than a year. The EAG did not include any subgroup analyses in the economic model because there was not enough evidence to inform inputs. The committee concluded that the model structure was appropriate and that the results suggested that the technologies could plausibly be cost effective if they could improve asthma control. But it stated that the inputs were highly uncertain because of very limited clinical evidence and that further evidence generation is needed to address this uncertainty.

Technology costs

3.16 The committee highlighted that the cost of the technologies is the key driver in the model. But it acknowledged that the clinical impact was assumed to be the same for all technologies because of a lack of data (see [section 3.15](#)). So, the clinical impact would not affect the model's results. The committee noted that costs varied widely between the technologies and that technologies with connected devices had higher costs. The committee recalled that there was no clinical evidence to suggest that the addition of a connected device improves outcomes more than a standalone app (see [section 3.12](#)). The committee concluded that further evidence generation could reduce uncertainty around clinical outcomes and strengthen future evaluations, particularly for more expensive technologies.

Uptake and attrition rates

3.17 The committee noted that initial uptake and dropout (attrition) rates appear to be important drivers in the model for some technologies and there is no data available. The committee agreed that further evidence generation should include reporting on uptake and dropout rates and that qualitative data on user experience would be useful to understand the impact on different groups.

Equality considerations

- 3.18 The final scope and the equality impact assessment describe the equality considerations for this assessment. The committee noted that the patient survey highlighted some barriers in accessing the technologies, such as neurodiversity, cognitive impairments and communication difficulties. All the companies confirmed that the apps can use the accessibility and adaptability features on a smartphone. They also confirmed that multiple language options are either already available or in development, although for some technologies the range of languages is currently limited. The committee highlighted the importance of gathering insights from more ethnically diverse groups and from people for whom English is not their first language. It said that this would identify barriers that might affect equality of access and emphasised that technologies that provide multiple language options would be important to meet the needs of NHS users. The committee emphasised that future engagement should prioritise diversity and inclusion to ensure that digital tools are designed and evaluated to address potential inequalities and support equitable access for all patient groups. The committee thought that, by providing an alternative format of the PAAP and more personalised support, digital technologies could reduce inequalities in care and help engage younger people. It emphasised the importance of involving young people, as well as their parents and carers, in evidence generation.

4 Committee members and NICE project team

This topic was considered by [specialist committee members appointed for this topic](#) and [NICE's medical technologies advisory committee](#), which is a standing advisory committee of NICE.

Committee members are asked to declare any interests in the technologies to be evaluated. If it is considered there is a conflict of interest, the member is excluded from participating further in that evaluation.

The [minutes of each committee meeting](#), which include the names of the members who attended and their declarations of interests, are posted on the NICE website.

Chair

Teik Goh

Chair, medical technologies advisory committee

NICE project team

Each evaluation is assigned to a team consisting of 1 or more health technology analysts (who act as technical leads for the evaluation), a technical adviser, a project manager and an associate director.

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