

The role of accelerator programmes in supporting the adoption of digital health technologies: A qualitative study of the perspectives of small- and medium-sized enterprises

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Abstract

Objective: Evidence-based digital health technologies are increasingly important in delivering care to an ageing population with constrained resources. In the United Kingdom, accelerator programmes (APs) have been developed to support the adoption of digital health technologies within the National Health Service. This study aims to explore the perspectives of stakeholders using APs.

Methods: Stakeholders representing nine small -and medium-sized enterprises (SMEs) that were engaged with three different APs ($n=9$). Semi-structured interviews were conducted with key informants between April and September 2018. Framework analysis of the data was performed to explore their perspectives on APs.

Results: Four key themes were generated. Informants reported the need to generate evidence before and during the programme, appreciating different types of evidence and their importance. Informants identified several key factors that were a catalyst for success, including involvement in the programme and access to individuals and organisations that were crucial for support. However, several barriers were identified at the programme and system levels. Finally, informants identified key supporting processes that enhanced the adoption of their innovations.

Conclusion: SMEs that develop digital health technologies report that, while APs are useful in supporting the adoption of these technologies, some issues remain. These relate to the emphasis on traditional research evidence that remains a challenge for SMEs to generate. Also, several system-level barriers to innovation in healthcare persist. As APs and SMEs continue to create an entrepreneurial ecosystem, there is increased potential for the development of supporting processes and infrastructure to accelerate the efficient and timely adoption of new digital health technologies.

Keywords

Technological innovations, Technology assessment, Innovation diffusion, Digital health, Evidence-based healthcare

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Introduction

Digital health (DH) technologies are increasingly important in supporting the delivery of healthcare.^{1–3} Prominent issues such as an ageing population, long-term care needs, multi-morbidity and more recently the COVID-19 pandemic, have all demonstrated the potential of digital

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technology within constrained resources.⁴ Harnessing the potential of these new technologies offers a way to reduce the burden on health systems, but adoption of such technologies has historically been slow, such as in the National Health Service (NHS) in the UK.³

While there is a broad range of Digital Health (DH) technologies that aim to support different areas of the health system, multiple barriers exist that relate to both the complexity of the intervention and the context.¹ Within DH, mobile health has seen the greatest uptake with a global increase of 55% between 2014 and 2018, largely due to mobile phone applications and wearables.⁵ Factors such as their ability to raise funding, the demand for the technology, regulation, and their immediate competitors are all important in the subsequent adoption and scale-up of DH products. In addition, another important factor is the “effectiveness” of DH technologies, which has been defined as the ability to demonstrate clinical utility through both clinically and patient-relevant outcomes.⁶ Tensions exist between the timely implementation of innovations and the need to generate robust evidence of the effectiveness of the innovation.^{7,8} While recent events have accelerated the adoption of some technologies within healthcare, many of which were developed by small- and medium-sized enterprises (SMEs) and not just large companies, there have historically been concerns about the pace of adoption. For example, the recent COVID-19 pandemic highlighted the data gaps in electronic health record systems.⁹

Some challenges in generating evidence of effectiveness relate to the time and cost of undertaking evaluation studies, but there are also methodological considerations and the acceptability of different types of evidence to different stakeholders.⁷ This is framed by the traditional hierarchy in evidence-based medicine that prioritises randomised controlled trials (RCTs) and has led to academics, clinicians and to, some extent, policymakers only accepting this type of evidence.^{10,11} In response, a framework for assessing the evidence for DH technologies was created through a collaboration between Public Health England, MedCity and DigitalHealth.London.^{12,13} The framework aims to clarify the required levels of evidence for DH technologies for both innovators and commissioners.

The introduction of accelerator programmes (APs) in 2014 aimed to support the adoption of evidence-based DH in the NHS. Existing research has focused on the impact of APs in the fields of Fintech, Agritech, Edtech and Cybersecurity.¹⁴ However, there has been little research on the impact of APs in the healthcare field, despite the expansion of APs over the last 10 years. There are three main types of APs: investor, matchmaker and ecosystem, of which the latter is the most common type seen in healthcare. APs usually recruit SMEs in cohorts and deliver training sessions, workshops and practical learning-oriented events to help the companies develop their ideas

and propositions. APs are considered valuable to SMEs because they provide a supportive and intensive environment for companies to quickly develop and refine their products and business models. APs are designed to help SMEs overcome the challenges that are inherent in bringing a new product or service to market by offering a variety of resources, such as mentorship, access to networks and funding opportunities to help SMEs grow and succeed. Mentorship is often provided by individuals that are influential in their field and can help in the commercialisation of the technology, although cohorts are assigned a limited duration of engagement with the APs between 3 and 12 months.¹⁴ Admission to the APs is usually competitive and the selection process is highly challenging, although selection criteria vary, typically include a company’s potential for growth, the innovative nature of their product or service, and the strength of their team.¹⁵ However, the benefits of participating in an AP can be significant, including access to mentorship, networks, funding, and a supportive environment that can help SMEs refine its product and business model that can lead to improved customer traction, employee growth and reduce the time taken to be acquired.¹⁴

While few SMEs have the opportunity to receive the support of an AP, those that do presumably represent the more promising enterprises. It is thus important to understand the enablers and barriers to engagement from the SME perspective, which is the aim of this study.

Methods

Study design

This research used a qualitative design with semi-structured interviews. Data were analysed using framework analysis.¹⁶

Participants

Key informants were recruited through three UK APs that promoted the study to SMEs that were either currently or previously engaged in those programmes. Nine informants agreed to be part of the study and were either founders or Chief Executive Officers of an SME linked to three APs. The sample size was dictated by practical challenges in recruitment but can be sufficient to describe key findings.^{17,18} The main inclusion criterion was DH SMEs engaged with APs between 2016 and 2018. The SMEs included produced DH technologies that were broadly in the m-health domain. Prior to the interviews, each participant was briefed on the project background and the purpose of the study. Each participant was given a consent form to sign acknowledging the purpose of the study, consent to be recorded, and anonymisation rights. All interviewees consented to an audio recording of the interview. Audio recordings were transcribed via an external company. The interviewees’ names and companies were anonymised

along with the APs that they were supported by. The transcribed interviews were then analysed using NVivo 10. Table 1 gives a summary of the SMEs that participated in the study and which of the three APs they were supported by.

Data collection

Interviews were conducted by CN either face to face ($n = 8$) or on a video call ($n = 1$). Semi-structured interviews were conducted using a topic guide (Supplementary File) using open-ended questions to promote the discussion of new themes that were explored with the informants.¹⁹ Interviews lasted between 30 and 45 min and were audio-recorded, transcribed verbatim and anonymised.

Data analysis

Interview data were subject to framework analysis to identify key ideas, concepts and specific words, especially commonly repeated terms and phrases that were grouped, and colour coded in the developing framework matrix.²⁰ Transcripts were reviewed line by line for familiarisation with the data. Then the coding took place with the software tool NVivo 10. Firstly, key ideas, concepts and specific words were identified. Then, specific attention was given to repeated terms and phrases. In the next step, common words and phrases were grouped using the NVivo software. Similar words and phrases were grouped, and colour coded in the developing framework matrix. A theme was attached to each colour – group of words, phrases and concepts and refined accordingly

Table 1. Summary of Small and Medium Enterprises included in the study and the different APs that supported them.

AP	SME service
1	Digital programme to support lifestyle changes
1	Instant messaging app for healthcare professionals
1	Online patient appointment management tool
1	Signposts clients to local appropriate services
1	Technology to support stroke prevention.
2	Care management for older adults
2	Physiotherapy video games
3	Medical imaging analysis
3	Support for people with communication disabilities

AP: accelerator programme; SME: small- and medium-sized enterprise.

(QSR International). Together there were four major themes with 13 sub-themes.

Results

The analysis generated four main themes: the generation and importance of evidence of effectiveness; factors that act as a catalyst for success; programme and system barriers; and processes that support the adoption of innovations. These factors are presented with sub-themes and quotes from participants.

Generating evidence

Evidence generated before the programme. Participants reported mixed accounts of the requirements to have evidence about their innovation prior to being accepted on the APs. Some reported that they had a minimal viable product with limited evidence of effectiveness:

Only very ad hoc and not in a way that we could present as properly trialled evidence; testing on families and friends.

Others reported they had a fully functioning product with evidence of effectiveness and successful implementation:

Yes, we had good evidence for the use of the service, for the effectiveness of the service prior to joining the programme.

Evidence generated during the programme. APs were successful in generating evidence; however, emphasis varied. Participants found the focus on evidence varied depending on the programme they participated in.

Well, I think just to even qualify to submit my content we had to do a four-page evidence background. Certainly, [AP 3] won't even look at what you're doing unless you've already done those studies. So, it's very kind of academic and evidence led.

This contrasted with the AP1 where participants reported that evidence was not emphasised, with relevance waning towards the end.

I wouldn't say specifically, [evidence] but it was a key component to that programme. But it wasn't like a strong emphasis on it or anything.

AP 2 generated evidence but informants found the process too slow in starting.

First three months was getting everything in place by the academics, finding a postdoc in it, in the project that we need to take in terms of ethics and all that.

Importance of evidence. Across all participants, there was agreement on the importance of generating evidence and that the role of evidence was pivotal in the successful validation of their technology, standing out from competitors and securing contracts.

We need to stand out from 350,000 applications out there, that have little evidence behind them. Evidence is for product validation and evidence on it is necessary to show that it is a useful product.

Different types of evidence. Informants recognised different types of evidence and their importance was dependent on where they were in the commercialisation of their products, with different types of evidence relevant to different stakeholders. The sources of evidence identified by informants included publications, anecdotal, health economic, trend analysis, RCTs and customer satisfaction.

And I found you need different sorts of evidence for different circumstances, so you need peer reviewed RCT evidence for journals but also need trend analysis.

Evidence is really nebulous, there's evidence from like anecdote and then there's evidence from copy review of multiple meta analyses and they're not the same thing.

Catalysts for success

Importance of individuals. Informants recognised individuals, such as academics and clinicians, were important contributors to their success, which included validating, advising, signposting, networking and supporting applications.

Yeah, yeah, we did. There's a guy called [name] who was amazing, he was the biggest advocate of what we're doing, he's a GP in [location]. There was a lady called [name] who's a GP in [location], who's also a really big advocate of what we're doing, she's a really big fan, she saw some amazing results from people going on the programme, so yeah, that was good. Yeah, they were amazing, finding those people was really, really worth it.

Importance of organisations. Organisations in the form of hospitals and universities were also acknowledged to be critical to success. Universities were identified as critical in building up evidence for the technologies, while hospitals were important for generating a different type of evidence through the introduction of pilots that can be used at a later stage.

But for us it's more important [for our progress to have] that stamp of approval we're working with this organisation that's in high esteem, that's seen by the rest of the world

and by investors as a gold standard at [academic university], at the [hospital], so that opens doors for us and discussions for us.

Impact of the programmes. Through involvement in the APs, SMEs reported winning contracts and being involved in pilot studies and clinical trials, all of which contributed to raising the profile of the SME and their products and sometimes leading to the creation of new products.

Yeah, it's absolutely aided the company's growth I think, it's meant that we can upscale our staff, we can take on new employees, we've certainly had lots of interest from media, from other businesses about the product that we're developing.

A whole new product came from it [the AP]. We killed the product and created a new one, which is now doing very well.

Barriers to achieving success

System barriers. Key issues include changing the mindset of health system stakeholders, for example, patients and doctors who were apprehensive of change and may have traditionally had a negative response to the culture of innovation.

[It's about] changing that culture around how people do stuff, no evidence in the world, unless you've got to change mind-sets as much as anything else and that, no amount of money is going to do that, and I think that's what we've come to realise in the last couple of years.

AP barriers. A major issue that SMEs reported was the lack of available feedback from APs.

Very rare that you'll actually see the published applications of the ones that were successful to give you an idea of how you might write it next time to be successful, that would be good to see why that was marked up as accepted.

Regulation. The work required to meet the governance requirements related to grants was highlighted as a potential barrier.

The thing in start-ups is if you want to fail, fail fast and just move onto the next thing whereas a grant, if you've got something for two years you set your ethics and your protocols and your projects before you even start and then you're not allowed to change it all the way through.

Support process for adoption of innovation

Networking. London was acknowledged as an entrepreneurial capital and networking in the APs was highly valued by the informants.

The big advantage [is that] London has every industry [i.e., fashion, insurance], these [are all] industries supporting technology. So, to recruit and find people, to get good office space, to find partners and things, all of it [is] happening in London all the time. The fact that digital health is happening now is just a demonstration of an industry that's having a big boom at the moment and London is a brilliant place for it. And I met people who have been working in travel who now work in digital health, they just can move onto digital health without even moving [to a new house]. Whereas that's difficult to do in many parts of the world because the industries are quite separated.

So, you find, but I will, I do enjoy going out and finding likeminded people, even if they're completely different area of med tech or just to hear their ideas, how they're trying to overcome the obstacles, see if they can introduce me to someone new. So that's the reason I usually do those things.

Information hub. Most informants were against having a central hub for information on all APs available due to competitor advantage.

No, people don't know [about APs]. I feel like I don't want to tell anyone because we know but I go to networking things and people have no idea how to access NHS funding. They have no idea how to get a project, how to get products into the NHS, they've got no idea how this works I'm happy about that.

Discussion

This study generated four main themes. The first related to the generation and importance of evidence and how this varied between APs, but also differed according to the needs of the SMEs, which were at different stages of product development and commercialisation. The second covered factors identified as catalysts for success mediated through the programme that allowed SMEs access to individuals and organisations. Thirdly, some AP barriers to success and wider systemic barriers persist and impede adoption. Lastly, the study identified the value placed on the support processes that were created (or co-created) within an entrepreneurial ecosystem that was accessible through the APs.

The study found that the value of participating in an AP in healthcare is multi-faceted. APs provide access to

individuals and organisations that can act as catalysts for success. They also create or co-create support processes within an entrepreneurial ecosystem, which is beneficial for SMEs at different stages of product development and commercialisation. However, there are also challenges that SMEs face in being selected for an AP and the value that they achieve. Generating the right type of evidence required for the adoption of innovations is one such challenge. The focus on evidence can vary between APs and SMEs need to understand what form of evidence is acceptable and when. Additionally, system-level barriers to innovation still persist in the healthcare system, making it difficult for SMEs to navigate their way through the highly fragmented system. Despite these challenges, the study found that APs can help SMEs overcome these barriers and provide a valuable platform for the development and commercialisation of DH technologies.

What role does the evidence have in the adoption of innovations?

Evidence-based medicine is the predominant model in medicine and it seeks to empower clinicians so that they can develop independent views regarding medical claims and controversies.¹⁰ RCTs have long been seen as the 'gold standard' method for evaluating interventions in healthcare and are accepted as 'top of the pyramid' in a hierarchy of evidence.¹⁰ Likewise, there was recognition from the SMEs that there are different types of evidence that are critical to success. However, they also noted that this depends on the stakeholder that you are speaking to. Clinicians, who are often instrumental in the success of technology adoption, are more likely to accept RCTs as the standard of evidence. SMEs realised that they were likely to encounter those in the sector that espouse an evidence-based medicine perspective. However, researchers have criticised the use of RCTs as evidence for complex interventions such as DH.¹¹ Furthermore, RCTs are not always possible, and policymakers and system leaders may have to consider other forms of evidence for some interventions. The limitations of RCTs for evaluating interactive DH technologies have been summarised.²¹ There is a broader discussion around when RCTs are appropriate, when alternatives would be better and how RCT designs can be improved, as well as identifying new research methods for evaluating complex interventions.^{8,22}

There is a traditional view from the healthcare community that the entrepreneurial community do not understand the importance of evidence to validate their technologies.²³ However, as this study has demonstrated, informants expressed the need to have evidence, the issue is about the lack of clarity about what form of evidence is required and the differing thresholds that are acceptable. We have seen the rise of institutions such as NHSX that have a

clear mandate to accelerate the adoption of DH technologies in the NHS, although this has now been subsumed into NHS England.²⁴ There are non-profit organisations, such as MedCity, that have been created to support companies to develop and commercialise the best innovations in the region. In addition, national institutions such as NICE have introduced guidelines, for example, ‘Evidence standards framework for digital health technologies’, which aim to make it easier for innovators to understand what represents ‘good’ levels of evidence for DH.²⁵ Public Health England has also published ‘Evaluating digital health products’, with guidance on how to conduct an evaluation.²⁶ Moreover, there is emerging evidence that healthcare professionals and researchers are also becoming entrepreneurs, and this was evident from the results of several start-up founders from the medical sector. This is supported by the rise of medical entrepreneurs with the introduction of programmes such as the ‘Clinical entrepreneur training programme’.²⁷ The programme is the first of its kind in the UK to offer fellowships to junior doctors to help them develop their ideas and take them to the market, under the mentorship of international entrepreneurs and health innovators.²⁸

APs within healthcare generally accept applicants with varying evidence of their innovation and this was evident from the results. Informants found the focus on evidence varied dependent on the APs they were involved in. This is understandable due to the APs having varying levels of focus on evidence, that is, AP3 being the most evidence-focused due to it being academic and research-orientated. AP1 had a good focus on the evidence at the beginning, but this waned towards the end for the informants. However, due to the sample size, it makes it difficult to directly compare the programmes. Nonetheless, the objectives of some APs within healthcare are changing to specifically target areas of research needs and support companies with generating evidence to meet those needs. So, a needs assessment or review of the evidence as part of the selection criteria or post-selection review is now undertaken.

Clearly, there is a need for evidence-based interventions and the entrepreneurial community has realised its importance in healthcare. However, there are clear challenges in generating the type of evidence required. While there is enormous potential for new evaluative methods to assess the effectiveness and implementation of innovative technologies and they need further exploration moving forward.

How can APs help navigate system-level barriers to innovation in healthcare?

There was recognition from the informants of the system-level barriers that still existed in the healthcare system, which can be observed at both a meso and micro level.

At the meso level, the NHS is a highly fragmented system that has more than 200 Clinical Commissioning Groups, nearly 200 provider trusts, more than 7500 primary care practices and structural separation between the NHS and social care. This can cause a confusing myriad of entry points for entrepreneurs and industry. It has led to significant geographical variation in digital readiness, infrastructure and competencies regarding procurement.²⁹ Moreover, financial pressures are distributed differentially in the NHS and can lead to a lack of money to support innovation. This has a massive impact on start-ups as struggling organisations are more likely to be risk-averse with respect to investing in new initiatives unless they are nationally accredited or endorsed.²⁹ However, the NHS has recently announced moves towards an Integrated Care System that aims to create a more collaborative system through a more even distribution of financial resources, operational delivery, workforce planning and delivery.³⁰ This has been accelerated by the COVID-19 pandemic with numerous reports of hospitals balancing a load of patient admissions by re-routing demand to places where there is a spare capacity.³¹

At the micro level, innovative technologies need to fit the values, priorities and routines – of staff and patients. Resistance to technological innovation may be based on legitimate concerns that it will lead to hidden work or undermine the quality of patient-professional interactions.^{32,33} Several studies have shown there is uncertainty as to how technological developments will change the roles of clinical staff, which may naturally result in scepticism. One of the biggest issues is that too often senior NHS managers and healthcare professionals seem suspicious of SMEs’ motives, for example, the ownership of intellectual property is often a contentious issue with tensions regarding the share between the SME and NHS partner.²⁹ While research has shown that acceptance by professional staff may be the single most important determinant of whether a new technology-supported service succeeds or fails at the local level, the acceptability of these services to patients and carers has an important role in determining their uptake.³⁴ These findings are consistent with the results as most of the barriers that informants encountered were in the traditional culture against innovation in the NHS and the scepticism of healthcare professionals with respect to the motives of SMEs. The Topol review highlights the need to appoint ‘clinical informatics translators’ who can support leadership through chief clinical information officers and other clinical informatics professionals and develop broad expertise in informatics across all healthcare professionals.³⁵ However, there is evidence that, in response to the COVID-19 pandemic, innovation in the NHS has accelerated, with examples of practitioners bringing together different services across primary, community services, hospitals services and social care using digital tools.³⁶

The role of individuals within the healthcare system is critical for the successful uptake of innovations, as demonstrated by research which has shown that interpersonal connections are critical for creating the necessary trust in innovations.³⁷ At the very localised levels, there are many examples of innovations being championed by local clinicians in the NHS. This was consistent with the results as informants highlighted how critical the support of academics and clinicians was crucial in the success of their innovations. This is why it is imperative that there are more opportunities for interactions between clinicians, commissioners and other health and care professionals, technology developers and patients to encourage collaborations of innovations within the sector.³⁸

Regulation in the healthcare system has proved to be a major issue for innovators. Research has shown the main challenge facing those who are responsible for the planning and commissioning of NHS services for their local area is that they are expected to draw upon robust evidence.²⁹ While companies producing medical devices are given clear guidance about evidential requirements for technological appraisals undertaken by NICE, SMEs within the eHealth sector often do not have the funding or the capacity to address the technical, clinical or cost-effectiveness standards required by NHS Digital and NICE. This is contentious as SMEs that do tend to roll out their digital products do so without appropriate evaluation.²⁹ In July 2018, *The Lancet* published an editorial, calling for a clearer assessment framework in the UK for DH, to 'differentiate efficacious digital products from commercial opportunism'.³⁹

Overall, it is clear that APs have a major role in connecting and brokering relationships between entrepreneurs, individuals and organisations in overcoming barriers in the system. APs can be crucial catalysts to begin discussions with key personnel that can assist in the building of these relationships.

Can an entrepreneurial ecosystem be co-created?

The life science sector is integral to the creation of an entrepreneurial system. The recent *Life Science Industrial Strategy* vision is to build the lifestyle industry into a global hub that makes the UK the home of clinical research and medical innovation.⁴⁰ One of the key aims of the report is enabling SME growth, manufacturing and supporting infrastructure across the regions of the UK through investment.⁴⁰ Furthermore, the importance of entrepreneurial support networks, such as those offered by APs, has long been recognised and been variously termed a 'social structure of innovation', an 'ecosystem', an 'incubator region' or a 'habitat'.⁴¹ Research has shown that creating a supportive culture within an entrepreneur ecosystem normalises activities, increasing both the supply of potential entrepreneurs and the number of people willing to accept

the risks of working, investing and supporting new ventures.⁴² Silicon Valley is often considered the ideal-typical innovative region, and many have credited its networks of organisations and individuals that are dedicated to assisting start-ups as being a key factor in the region's innovative vitality.

The second major theme that came out from the results was the idea of a support network.⁴¹ The results showed that equitable access to APs was surprisingly not supported by informants. In fact, informants were against the idea of having a central hub of information on current APs that will be accessible to all interested SMEs. This is an interesting perspective as it contradicts the literature where SMEs benefit from a support network. However, the SMEs in this study could have been influenced by several factors. First, APs within healthcare are still novel and so demand is extremely high for their limited spaces, which can result in a more competitive environment for entrepreneurs. Second, the SMEs clearly did not want to publicise APs to other SMEs as it would give them a competitive advantage. However, this is clearly not in the public best interest as potentially good companies could miss out so on joining these APs.

Networking is important in any industry; however, it is more integral to start-ups and can be crucial in their success or failure. The literature has shown over the years that networking helps entrepreneurs build more effective relationships with customers which can help claim legitimacy and credibility in the marketplace, can lead to the potential of new opportunities, and is linked to business survival and growth.⁴³ We found the same: our results showed how essential networking in the APs was in the areas of awarding contracts, getting pilots in hospitals, clinical trials, raising of profile, and the launch of new products. Moreover, networking events are important for entrepreneurs as it helps people or stakeholders in their ecosystem. These events are more crucial for early start-ups as it brings light and gives signals to others that they can exist in the market.⁴⁴ A key outcome of the post-COVID context is that many industries have moved to a hybrid model of working. This has resulted in networking opportunities being done virtually rather than face to face, so it will be valuable research to investigate how SMEs are changing their practices to establish and build networks in the hybrid world.

Although the APs offered all these benefits, informants still felt that more support could have been provided. This was predominantly in writing applications as it was suggested by the majority of informants that there should be an application support system for those applying for APs. Most SMEs that apply to APs will be doing so for the first time and have no experience in these processes, while SMEs that are more experienced in applying will have a competitive advantage. So understandably, this will be a popular request from informants.

While it is clear that the co-creation of an entrepreneurial ecosystem benefits those within the APs, which can offer competitive advantages, there are also SMEs that lose out from not belonging to this network. While this can be explained as ‘normal competition’ for entrepreneurs in business, there is a counterargument that there are structural inequalities that contribute to the exclusion of certain groups.⁴⁵ However, more research about equality of access within this space is critical as success is dependent on establishing networks and connections, which have historically favoured some groups over others.^{46,47}

Strengths and limitations

This study used qualitative methods to get an in-depth understanding of the usefulness of APs in supporting the uptake of innovations in the NHS. However, the generalisability of the findings might be limited by the number of participants in the study. Additionally, those interviewed came from SMEs that were supported by the three APs and there are other programmes that work with DH companies.

Conclusion

SMEs should realise that evidence is now integral in the creation of digital technologies; APs can aid in facilitating this. APs cannot solve all of an SME’s problems: there are other factors that impact the success of digital products. However, APs can provide opportunities for the further advancement of technology and networking in the system. For example, APs and Academic Health Science Networks can support the creation of an environment which encourages the development of DH technologies produced by SMEs and the generation of evidence that assesses their effectiveness and develops structures that support these technologies by the health and care sector.

It is clear APs have matured greatly since their inception and now have national frameworks in place to support them. APs are important mechanisms for partnerships and collaborations with NHS, and universities. However, APs still need better mechanisms to support evidence generation, for example, APs need to learn to support innovative technologies to fail fast and rapidly develop improved products. They need a more flexible and inclusive approach to choosing appropriate evaluation methodologies. The use of quality improvement methods could support this process, but the existing research grants system hinders this process. APs could have better support systems for prospective SMEs, that is, a more transparent application process with tailored feedback could potentially form part of the selection process knowledge mobilisers are key for the progression of APs, that is, NHS managers, GPs, and Heads of procurement. APs need to become effective at marketing their services to prospective SMEs. For

example, APs should develop a central hub describing their programmes: this is in the public interest, although it may not be in the interest of individual SMEs who want to maintain a competitive advantage by limiting the knowledge of APs to a small number of SMEs.

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