EDUCATION AND TRAINING # Topol digital fellowship aspirants: Understanding the motivations, priorities and experiences of the next generation of digital health leaders

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ABSTRACT

Introduction
The Topol Programme for Digital Fellowships in Healthcare is a flagship national programme for digital health aspirants in England. This programme is heavily over-subscribed with applicants, representing a cross section of healthcare professionals interested in a future digital health career. The aim this study was to identify motivations, priorities and experiences of these applicants.

Method
Systematic qualitative and semi-quantitative analysis of an entire cohort of anonymised applications to the 2021 Topol Programme for Digital Fellowships in Healthcare were performed.

Results
Two-hundred and eighty applications were received from diverse healthcare professional roles. There were limited applications from mental health or social care sectors. Most applicants reported good organisational support from their employers, but limited interaction with senior digital leaders within their organisations. Relatively limited consideration of health inequalities or engagement with industry was noted.

Women were statistically significantly more likely to consider health inequality/inequity implications in their applications.

Discussion
The analysis offers an insight into motivations, priorities and experiences of the next generation of digital health leaders. There is a need to link aspirants with local digital leaders and to support broader consideration of health inequalities. Supporting such needs and gaps is expected to further help meet recommendations proposed in *The Topol Review* and contribute to optimising the skills of the future digital health workforce.

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Introduction

The secretary of state for health and social care in England commissioned the *The Topol Review: Preparing the healthcare workforce to deliver the digital future* as an important part of the NHS workforce strategy for England.[1,2] This independent review was conducted by Dr Eric Topol, a leading cardiologist, geneticist and digital health researcher, and was published in February 2019.[1,3]

The Topol Review highlighted that the UK has the potential to become a 'world leader in [these] healthcare technologies', yet that digitisation will result in profound impacts on healthcare staff.[1] Indeed, this report specifically identified that the healthcare workforce needs 'expertise and guidance to evaluate new technologies, using processes grounded in real-world technologies', as well as the need to raise awareness of digital literacy among the health and social care workforce and provide leadership development opportunities.[1] Accordingly, it was envisaged that future digital health leaders will sit at board level, with other senior roles providing responsibility for advisory boards on digital technologies. To achieve this, there is a need to build skills in 'data provenance, curation and governance' and strengthen the necessary skills to carry out specific critical appraisal.[1] Furthermore, *The Topol Review* specifically highlighted the need to develop and augment the artificial intelligence (AI) skills of the workforce, and the requirements for specific investment in this area. *The Topol Review* further highlighted technological advances impacting

healthcare, as well as the magnitude and timeline of the relevant impact, with the earliest change envisaged being the potential introduction of telemedicine initiatives, while AI-related workforce changes are expected later.[1]

One of the earliest initiatives that resulted from *The Topol Review* was the launch of the Topol Programme for Digital Fellowships in Healthcare, a 12-month flagship programme that provides digital health aspirants with funded, dedicated time to design and deliver a digital health project at their own organisation.[4,5] The programme also includes a schedule of workshops designed to stimulate these fellows to confidently lead digital health transformations for NHS patients and staff. The first cohort of fellows was recruited in 2019 with 18 fellows, while the second (current) cohort recruited 35 fellows. In line with its core objectives, this fellowship programme is open to all healthcare professionals working in the NHS in England (above band 5 or post-foundation year 2) and is advertised broadly by Health Education England (HEE) and by its National School of Healthcare Science who designed and delivered the programme to date. Applications are invited online before being shortlisted by a panel, with a subsequent interview process being used to confirm the final fellowship cohort.

Topol digital health fellows are expected to develop the skills required for the future generation of digital healthcare leaders.[5] Indeed, this is one of very few programmes of its kind offering protected time for digital health training in a structured and nationally recognised format for those at the start of their journeys in digital health.[5] However, *The Topol Review* clearly identified that the NHS has a far greater need for digitally trained leaders than the number that can be provided through the Topol digital health fellowship programme alone.[1] This is also reflected in the number of applicants to this programme, which has proved very competitive with 40 applicants for only 18 places in the first cohort and 280 applicants for just 35 places in the second cohort. All those who applied for this programme, whether successful or not, can be classified as digital health aspirants who have expressed a committed interest in dedicating substantial effort and time to digital transformation. As such, it is important that the motivations, priorities and experiences of this next generation of digital health leaders are properly understood to support their training and development needs, ensuring a more sustainable digital health workforce. To that aim, the digital health fellowship programme, alongside providing intensive support to the selected fellows, also has the potential to support identification of additional healthcare professionals interested in digital health in order to potentially support them to apply in the future or direct them to other relevant interventions and offers. This potential aspect of the programme has increasing importance, particularly given the COVID-19 pandemic context, which has triggered a rapid increase in digitisation of healthcare services well in excess of that previously envisaged in *The NHS Long Term Plan.*[6]

The aim of our study was to identify the motivations, priorities and experiences of the next generation of leaders in digital health by a thematic analysis of the applications of an entire cohort of applicants to this programme. This work provides a profile of people applying to be a Topol fellow. This is relevant because it enables a better understanding of professionals applying to the fellowship and their motivations. This is important given the concerns raised regarding a lack of support for people looking to improve the digital health proficiency and the need to drive greater diversity in the digital health cohort. Our research question can, therefore, be defined as 'What are the motivations, priorities and experiences of applicants to the Topol digital health fellowship?' In the discussion section, we consider the implications of this question on the recruitment and delivery of a world-class digital workforce.

Methods

There was a total of 280 applicants to the Topol digital health programme for the 2021 cohort. The application period was from the beginning of September 2021 to mid-October 2021. The application process was designed and managed by HEE's National School of Healthcare Science. Each applicant was asked to complete the white-space questions presented in Table 1, which were then used to score the applications.

All applications received for the Topol digital health fellowship programme within the application window were fully anonymised by the National School of Healthcare Science team before being subjected to our analysis by independent reviewers.

A thematic analysis of these anonymised applications was performed. This was performed through a deductive process, guided by the themes presented within *The Topol Review.*[1,7] We based our thematic analysis on the six-step method of qualitative thematic analysis adapted for the nature of the data that we were able to extract.[7] Initially, a familiarisation review of the applications was performed by two reviewers/authors to identify potentially common themes. This was benchmarked against key principles identified within *The Topol Review*. Following the familiarisation exercise, an initial data collection template was created and piloted by two of the reviewers/authors. A subsequent review and an adapted data collection template were then used for data collection from all 280 applications, representing the coding step.[7] This allowed a search for themes within the data with subsequent review and synthesis and to report the final themes in the narrative description later. Where semi-quantitative responses were available, these were tabulated and a chi-squared statistical test was applied to check for statistical significance ($p < 0.05$ was considered statistically significant).

Prospective ethical approval for our work was granted by the local NHS trust research ethics committee (approval number 10014).

Table 1. White-space questions in the application for the 2021 cohort of the Topol Programme for Digital Fellowships in Healthcare

"Your prior experiences: Please outline and reflect upon prior experiences you have that you feel will prepare you well to be a Topol digital health fellow. (Your prior experiences do not have to be directly involved with digital health.)" (250 words)

"Your professional aspirations: Please outline and reflect upon where you see the Topol digital health fellowship fitting into your professional and career goals." (250 words)

"The problem you would like to explore: Please provide a description and an analysis of the problem you would like to focus on solving with the protected time you will have as a digital fellow." (500 words)

"The support you can access and organise." (250 words)

Table 2. Breakdown by professional group of the 280 applications for the 2021 cohort of the Topol Programme for Digital Fellowships in Healthcare

	Applications, n (%)
Profession	
Doctor	134 (48)
Allied health professional	56 (20)
Nurse	42 (15)
Healthcare scientist	18 (6)
Pharmacist	17 (6)
Other	9 (3)
Dentist	4 (1)
Gender	
Men	156 (56)
Women	124 (44)

Results

From the 280 applications received, 156 (56%) were from men. Based on professional group, the largest number of applications were received from clinicians/doctors. Table 2 presents the breakdown by professional group for the 280 applications of the 2021 Cohort.

Of the 280 applications, only 18 (6%) and two (1%) were from applicants with a mental health or social care background/role, respectively.

More than half of the 2021 applicants (146; 52.1%) reported that their digital aspirations had been influenced by COVID-19.

In total, 266 (95%) applicants had previous experience in digital health, with 258 (92.1%) having existing support in place for the proposed project of their fellowship. For 260 (92.9%), this support was from within their existing organisations.

Interaction or discussion regarding their digital health ambitions with senior digital leaders within their organisation (such as the chief clinical information officer (CCIO), chief nursing information officer (CNIO), chief information officer (CIO) or similar) was reported only by 80 (28.5%) applicants. Furthermore, only 54 (19.3%) applicants discussed engagement with the industry in their proposals.

One-hundred and three (36.9%) applicants focused their proposed project around telemedicine or remote monitoring, while 36 (12.9%) applicants described a proposed AI-based project.

Finally, 54 (19.3%) applicants considered health inequalities in relation to digital health within their application. This proportion was higher for those proposing remote consultation-based projects, where 39.3% considered health inequalities.

Assessment of potential differences for the aspects/themes previously mentioned (Table 3) showed no statistically significant differences for the proportion of men and women reporting COVID-19 for their aspirations, discussing industrial involvement or engaging those in formal digital health leadership roles (eg CCIO or CNIO). Women were significantly more likely to consider the aspects/themes relating to considering health inequalities, and proposing an AI-based or remote monitoring project.

No statistically significant differences (p>0.05) were noted for the aforementioned aspects/themes of the applications between the three larger professional groups of applicants (doctors, nurses and allied healthcare professionals).

Discussion

It is vital for the NHS that the future multidisciplinary healthcare workforce has access to opportunities to gain both digital literacy and digital leadership skills.[1,8] The Topol digital health fellowship programme represents a key initiative that aims to support such ambitions but is only able to offer a limited number of fellowships per year. The applications received to this flagship national programme provide an additional important source for insight into the motivations, priorities and experiences of healthcare professionals looking to gain greater exposure and experience in digital health.

Our analysis of the applications for the 2021 cohort demonstrated that this programme attracts a diverse range of men and women applying from across healthcare professional groups. However, the limited number of applicants from mental health or social care is a matter for concern. This is important as it may suggest that those in such roles are potentially not being sufficiently encouraged and supported to apply for these fellowships. Given that the digitisation of social (and integrated) care is known to be a particular challenge, this finding requires further attention, particularly since key national initiatives (such as the Topol digital health fellowship programme) are in an prime position to detect and address such issues.[9,10] There is further interesting evidence based on the high proportion of applicants (roughly 50%) who are from a doctoral background, advertisement of the programme was done broadly via multiple channels with specific targeting of the professional groups that had a previously lower uptake. Current work by the Faculty

Table 3. Differences in selected aspects/themes of the applications for the 2021 cohort of the Topol Programme for Digital Fellowships in Healthcare

	Consideration of COVID-19	Consideration of health inequalities	AI-based project	Remote monitoring project	Industry involvement	Engagement of a formal digital health leader
Women, %	57.7	25.2	7.3	46.3	16.3	26.0
Men, %	36.8	16.1	4.7	29.5	10.4	30.6
Chi-squared	2.7	4.9	6.0	9.1	1.3	0.7
p-value	0.98	0.03[a]	<0.01[a]	0.02[a]	0.256	0.4

[a]considered statistically significant, p<0.05.

of Clinical Informatics has highlighted the importance of all specialties contributing to successful digital transformation in the NHS and the importance of programmes such as the Topol fellowship and NHS Digital Academy. This work particularly highlights the low proportion of nurses who have applied in the two cohorts of the programme contrasting with the overall proportion of nurses in the workforce. Nursing contribution to digital health informatics and digital health leadership is vital, and it is important that organisations (despite staffing pressures) ensure nursing colleagues are supported and enabled to develop these skills and make use of these opportunities.

On the other hand, it is relatively reassuring that our findings indicate that these applicants who aspire to become future digital health leaders were able to gain exposure to digital health training prior to applying to the fellowship, and that their applications and proposed projects were directly supported by their organisations in advance of their fellowship. However, it is concerning that only a minority of the applicants had interacted with those in formal digital health leadership roles within their organisations (eg with a CCIO, CNIO or CIO) who are able to and expected to further support such initiatives/applications.[11,12] Indeed, the reported support received from their organisations was typically from within the departments of the applicants and their supervisors rather than from the local digital health leadership. The introduction of formal digital health leadership roles, increasingly with board representation, is a step change in digital health leadership structures within health and social care organisations.[13] As such, it is vital that those in such roles see the development and support of the next generation of digital health leaders as an integral part of their professional role and remit, and that they are also given the required time and support to undertake this mentoring/advisory role. To that aim, the NHS Digital Leadership Academy may be an important opportunity to further inform these digital health leaders regarding ways to effectively support the next generation of digital health professionals.[14] In this context, a potential requirement for all applicants to discuss their planned application/project to the Topol digital health fellowship programme with their local digital health leader (eg with a CCIO, CNIO or CIO) may prove highly beneficial (even for those who are not eventually successful in their application). Indeed, such a requirement/process may further empower the applicants to establish contact with the digital health leaders within their organisations, thus increasing the potential of relevant networking and promoting awareness, and the aspirations of the more junior colleagues interested in digital health.

It is also noteworthy that the current COVID-19 pandemic has resulted in broad ranging changes to the healthcare and digital health landscape, which had an influence on a large proportion of the proposed projects of the 2021 applicants.[6] However, it can be considered reassuring that nearly half of the proposed projects were not COVID-19 related, offering optimism that a broad range of digital health interests exists among healthcare professionals, and that the continued drive towards broader digital health delivery in the NHS is not solely focused on the current needs and experiences relating to the COVID-19 pandemic.

Successful digital transformation often relies on close collaboration with industrial partners, as was also clearly recognised by *The Topol Review* in the UK.[1] Based on our findings, only a small number of the 2021 applicants had considered engagement with industry within their application, and yet such engagement could represent a key learning and development opportunity for many of the Topol digital health fellowship candidates. It should be recognised, of course, that many applicants were not successful in their applications (taking into account the finite number of available fellowships), and they may benefit from support outside the structured fellowship programme (eg helping with effective engagement with the digital industry for healthcare professionals, covering topics such as information governance, intellectual property protection, and funding routes and opportunities). Such support could be provided (or even developed as e-learning content) by Topol digital health fellows or even via a future Topol digital health fellowship project.

Another important finding of our study is the relatively low consideration of health inequalities/inequity in relation to the proposed digital health projects. The potential for digitisation to widen inequalities is widely reported and represents a particular concern relating to digital innovations that were rapidly implemented during the COVID-19 pandemic.[6,15,16] This may represent a relatively unexpected finding since more applicants would have perhaps been expected to be aware of and discuss the potential impact of inequalities, as well as how to address these in the context of their proposed project. It is possible that this extends beyond the digital health agenda; thus, it may be beneficial if future Topol fellowship applications recommend to applicants to research and discuss inequalities relating to their proposed project. Interestingly, in the applications for the 2021 cohort, women were more likely to consider health inequalities within their application, which may further highlight the value of supporting current initiatives to ensure diverse recruitment and to encourage the recruitment of women to digital health roles.

The Topol Review details the projected timeline of impact for potential digital advances to the NHS, recognising that telemedicine and remote consultation represent changes that will deliver early influences, while there will be a delay before the effects of AI are fully observed.[1] Accordingly, from our findings, it is reassuring to note a spread across these two innovations among the analysed applications, with a greater focus on interventions that are more likely to offer an earlier benefit to patients. Harnessing the full benefits of AI in healthcare will require dedicated training programmes for healthcare professionals, working closely with data scientists, clinical scientific computing specialist and other relevant experts.[17] This cannot be fully delivered through a single initiative (such as the Topol digital health fellowship programme), therefore, it is important that interested healthcare professionals are directed and supported to undertake relevant educational opportunities, often provided by higher education institutes.

Overall, our analysis may support the range of pertinent recommendations (Table 4) that can build on the initial success of the first two cohorts of the Topol digital health fellowship programme. These recommendations can further enhance the support and training for future digital health leaders based on the identified motivations, priorities and experiences of such applicants.

Strengths and limitations

Our analysis has a number of strengths. The applied thematic analysis aimed to identify the motivations, priorities and experiences of digital health aspirants as documented in the

Table 4. Pertinent recommendations based on thematic analysis of the applications for the 2021 cohort of the Topol Programme for Digital Fellowships in Healthcare

Ring-fence places in future Topol digital health fellowship cohorts and in similar digital training programmes for those in social care, promoting applications from such roles/backgrounds.

Where social care representation among participants in digital health training programmes is limited, actively promote targeted engagement and training in social care (eg through site visits and partnership working).

For future Topol digital health fellowship cohorts, request or require that applicants discuss their proposed project with a local senior digital health leader (eg CCIO, CNIO, CIO etc) and document this within the submitted application.

Support senior digital health leaders through their training, and provide encouragement and protected time within that training for those senior digital leaders to support the next generation of digital health leaders.

Support those not successful in their applications to the fellowship programme to gain knowledge/experience regarding how to effectively engage with the digital health industry (eg through the availability of relevant e-learning content).

Since there is greater need to reinforce the importance of reducing health inequalities when delivering new digital health (and other innovation) projects for those in postgraduate healthcare roles, a combined approach to address this issue is needed within but also beyond single initiatives, such as the Topol digital health fellowship programme.

For future Topol digital health fellowship application rounds, the necessary consent and information governance structures could be established to allow follow-up of applicants for a period of 6–12 months in order to document how their digital health aspirations progressed and what resources may have been useful.

applications of an entire cohort of applicants to the Topol Digital health fellowship programme. This allowed the study of a robust dataset of applications from digital health aspirants taken from across England, and across a broad range of professional roles/backgrounds. Indeed, this can be regarded as a representative national sample of those actively interested in digital health across England. Moreover, the sample size captured by analysing this entire cohort can be also considered relatively large for the objectives of this work.

However, it is important to acknowledge that there may be individuals who have not heard about the Topol fellowship or been able to apply to this programme due to a lack of institutional support or other challenges within their training or clinical practice. This may, therefore, limit the utility of the sample. Moreover, this work is limited to the latest cohort of applicants and, thus, cannot offer insight on how such applications may have changed since the initiation of the Topol digital health fellowship programme. Such an analysis would have challenges due to differences in the application form and process between cohort 1 and cohort 2.

The ethical approval for this work did not include extraction of protected characteristic information on ethnicity; this would be an important area of further study, however, a considerable amount of high-quality work has already been done in this area such as by the Shuri Network.[18] Finally, another limitation is that the analysis was restricted to information provided within the application form. Future work may involve consent for the applicants to be contacted for qualitative interviews following the initial review of the application form. This could be particularly helpful for themes/issues, such as elucidating information around inclusion (or lack of inclusion) of health inequalities safeguarding within the proposed projects, and potential factors that may impact on this issue.

Further future work is required to consider the impact of the fellowship on individuals who have completed the fellowship. This will be needed to consider the impact on the individual, their future aspirations and on others working at their organisation. This is currently not possible as only one cohort has completed the fellowship (and only less than 12 months previously), and the second cohort has yet to complete. We would suggest that, in the following 12–24 months, a complete assessment of 3 years of the programme would provide an important and interesting evaluation of the fellowship initially proposed in *The Topol Review*.[1]

Conclusion

This work demonstrated the potential of the thematic analysis of the applications to the national the Topol Programme for Digital Fellowships in Healthcare to further elucidate the motivations, priorities and experiences of a substantial cohort of future digital health aspirants. Based on our findings, the extent to which these healthcare professionals are being supported by their organisations is reassuring. However, these findings also suggest that further support is required to facilitate the collaboration between those in formal digital health leadership roles and those with digital health aspirations during their early career stages. There is also targeted work to be done regarding emphasising the importance of reducing/eliminating health inequalities in proposed digital health projects and supporting effective collaboration with the digital health industry. Overall, developing a better understanding from the in-depth analysis of the applications to the national Topol Programme for Digital Fellowships in Healthcare can be a useful additional source of information to further support the ambitions outlined in *The Topol Review*. ∎

Conflicts of interest

Dr Tim Robbins received funding as a Topol digital fellow from 2019 to 2020 but was not in receipt of the fellowship funding during the duration of this study. He sits on the Topol Digital Health Fellowship Steering Group and receives no payment for this role.

This research received funding from the Topol Programme for Digital Fellowships in Healthcare team, while the research work was conducted independently of the Topol fellowship team.

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