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UK Vaccine Network Project: Interim Evaluation

Final report

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Executive summary

The UK Vaccine Network Project is a £110m ODA-funded project that contributes to the ‘prevent and reduce the likelihood of public health emergencies’ aim of the Global Health Security (GHS) programme. The project aims to support the development of new vaccines and vaccine technologies for emergent threats so that outbreaks of such diseases can either be prevented, through proactive vaccination campaigns, or controlled, through quick development of new vaccines and/or responsive vaccination campaigns upon outbreak detection. The UK Vaccine Network Project programme specifically focuses on diseases that cause outbreaks in low and low-middle income countries (LMICs).

The UK Vaccine Network Project has one year of activity remaining, with the scoping of a second stage of work underway. A previous evaluation conducted focused on the processes used by the Department of Health and Social Care (DHSC) to implement the UK Vaccine Network Project. This report provides an independent interim evaluation of the UK Vaccine Network Project, including how the UK Vaccine Network Project is progressing towards the four key outputs (High quality research, Clear UK Vaccine investment strategy, Supporting UK research and Effective governance, management and oversight), as well as emerging benefits and key challenges. This report draws upon evidence from interviews and an online survey with UK Vaccine Network (UKVN) members, delivery partners and UKVN funded research project staff.

The UK Vaccine Network Project has provided a unique opportunity for the UK to contribute to the development of a portfolio of vaccines and vaccine technology that can be used to respond to current and future epidemics in LMICs, as well as the potential to contribute to global epidemics in other disease areas. This has included building a collaborative environment to bring together experts, researchers, policy makers, industry, Government departments and other organisations together through working groups to create a strong vision and strategy for the UK Vaccine Network Project.

Several challenges were faced by the UK Vaccine Network Project. The UK Vaccine Network Project has exposed the absence of long-term investment in UK vaccine research and development. Researchers have had to rely on overseas research facilities and laboratories which has caused delays in several projects. Financially supporting and maintaining newly installed laboratory facilities in the UK will be important to ensure researchers are not dependent on overseas facilities. There is also a lack of consistency in the management and governance of funded projects, with some projects granted more financial and research output flexibility than others. Grant holders have felt overwhelmed by the level of administrative work required to produce reports for delivery partners and GHS.

Whilst UKVN has provided collaborative opportunities through its working groups, the UK Vaccine Network Project as a whole has not provided enough opportunities for others outside of the network to engage and collaborate effectively. This includes grant holders and their research teams, as well as other experts, industry and others working in the vaccine fora. For existing UKVN members, there are long gaps between meetings with no other communications provided in between nor a standalone UK Vaccine Network Project branded website separate from Gov.uk (such as that used by CEPI) where further information could be found about existing grant holders, the projects that have been funded and members of UKVN. This will reduce the potential impact of the work of the UK Vaccine Network Project.

Despite the many challenges, the interim evaluation has found that the UK Vaccine Network Project has provided financial support through the delivery partners for twelve pathogens that cause epidemics in low- and middle-income countries (LMICs), enabling UK researchers to begin building vaccine development infrastructure and candidates. Funding has facilitated the training of researchers both in the UK and overseas, therefore increasing the global vaccine research workforce. One clear area of success has been importance of having the UK Vaccine Network Project in place prior to the Covid-19 pandemic: it was clear during the time of the interim evaluation that the UK Vaccine Network Project has been important for the UK's rapid response to Covid-19.

Building on the benefits, challenges and key transferable lessons identified through the evidence, the following are recommendations arising from the interim evaluation findings:

Recommendations for the UK Vaccine Network Project

- Consideration should be given to having a longer study period that is fully funded. A minimum five-year study period is required to yield better research results and impacts.
- Communication strategies should be reviewed, revised and strengthened to promote engagement and discussions between researchers, UKVN, UKRI and other external stakeholders. This should include the sharing of learning to reduce waste in the funding system.
- A clear vaccine development pipeline tool with funding attached to specific elements needs to be put in place and promoted to continue and safeguard the investment that has been made in this area. The UK Vaccine Network Project should consider whether other organisations, such as CEPI, could provide financial support for projects at a certain stage of development.

- As part of the next phase of work, consideration should be given to initiate an independent vaccine development institute in the UK that is not influenced by the major vaccine companies. This could provide funding to facilitate further collaborations with synergistic technology and product offerings to create new products that would surpass the capabilities of the major vaccine companies which could then be licenced.
- There is a need to balance the regional research disparities and work with the wider university research community outside of the 'golden triangle' (Oxford, Cambridge and London) in terms of promotion and dissemination of funding calls, staff capacity and development, and access to resources.
- The UK Vaccine Network Project needs to consider how it will provide support for patents and intellectual property rights to safeguard UK vaccine research for future licencing. This will be important when the UK has left the European Union.
- An impact strategy with monitoring activities needs to be implemented at the start of a future programme of work to ensure impacts are routinely captured, including all advocacy and policy work. Project successes and advocacy work should be disseminated widely, both within the UK Vaccine Network Project and externally, to promote the work that is being undertaken. This will help to increase the overall impact of future programmes of work.

Recommendations for delivery partners

- Reporting of projects need to be standardised across all delivery partners and streamlined to ensure only necessary data is collected.
- Delays in funding contracts being awarded have resulted in project delays and, in some cases, monies not being able to be carried over to compensate for these delays. Delivery partners should consider rapid circulation of contracts and consider a flexible approach to how funds are spent by programmes if they are not able to meet spending deadlines due to delays in signing off contracts.
- Consideration should be given to enhancing the Innovate UK funding model to better support UK SMEs financially to contribute to vaccine research. At present, some SMEs and start-ups cannot absorb the financial costs of undertaking vaccine research without a portion of funding being paid in advance. Having a portion of grants available immediately would enable SMEs

to pay for staff, specialist equipment and materials. This will be important if fast-paced innovation is to be continued in UK vaccine research and development.

- Consideration should be given to project start dates beginning from the date that a contract is signed, rather than when a grant is awarded. This would allow grant holders to have the full period outlined in their proposal to complete research.

Disclaimer

The views expressed in this report are not necessarily those of the Department for Health and Social Care (DHSC) or any other organisations taking part in the interim evaluation of the UK Vaccine Network Project.

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This interim evaluation has been conducted independently of the UK Vaccine Network Project. It is funded by the UK Vaccine Network Project through the Department of Health and Social Care (DHSC).

The evaluator would like to thank all participants for their involvement in this interim evaluation.

Abbreviations

CSA	Chief Scientific Advisor
CEPI	Coalition for Epidemic Preparedness Innovation
DHSC	Department of Health and Social Care
GDPR	General Data Protection Regulation
GHS	Global Health Security
HEI	Higher Education Institute
LMIC	Low- and Middle-Income Countries
ODA	Overseas Development Aid
SMEs	Small and Medium Enterprises
UKRI	United Kingdom Research and Innovation
UKVN	United Kingdom Vaccine Network

Section 1: Introduction

The UK Vaccine Network Project is a £110m ODA-funded project that contributes to the ‘prevent and reduce the likelihood of public health emergencies’ aim of the Global Health Security (GHS) programme. The project aims to support the development of new vaccines and vaccine technologies for epidemic threats in LMICs so that outbreaks of such diseases can either be prevented, through proactive vaccination campaigns, or controlled, through quick development of new vaccines and/or responsive vaccination campaigns upon outbreak detection. The UK Vaccine Network Project programme specifically focuses on diseases that cause outbreaks in low and low-middle income countries (LMICs).

An investment strategy for the project was developed using advice from the UK Vaccine Network (UKVN), a group of experts from academia, industry, government and philanthropic organisations and chaired by the DHSC Chief Scientific Adviser (CSA). The UKVN was established in 2015 in response to the Ebola outbreak and met six times across 2015 and 2016. The group identified twelve priority pathogens with epidemic potential in Low- and Middle-Income Countries (LMICs) on which efforts should be focused. The UK Vaccine Network Project team used this advice to design seven research competitions. Delivery partners with the required experience and expertise were chosen to deliver these competitions and to manage the resulting research projects.

The UK Vaccine Network Project has one year of activity remaining, with the scoping of a second stage of work underway. A previous evaluation conducted focused on the processes used by the Department of Health and Social Care (DHSC) to implement the UK Vaccine Network Project. Therefore, an interim evaluation that considers whether the UK Vaccine Network Project has been established in a way that maximises its impact is required.

This report provides an independent interim evaluation of the UK Vaccine Network Project, including how the UK Vaccine Network Project is progressing towards the four key outputs (High quality research, Clear UK Vaccine investment strategy, Supporting UK research and Effective governance, management and oversight), as well as emerging benefits and key challenges. Recommendations have been produced for future programmes of work, several of which can be implemented in the remaining time of the programme. This report draws upon discussions with UKVN members, delivery partners and research project staff, as well as an online survey. The findings of this interim evaluation cover the period January 2020 until July 2020.

The next section sets out the aim and interim evaluation questions, followed by the methodology for the interim evaluation. Sections four to six set out the key interim evaluation findings and the final

sections set out the evaluators overview, transferable lessons and recommendations for future programmes of work, both for the UK Vaccine Network Project and for both for the team in DHSC and the delivery partners who manage research contracts.

Section 2: aim and study questions of the interim evaluation

The overall aim of this interim evaluation is to assess whether the UK Vaccine Network Project has been established in a way to maximise its impact and meet its objectives. It seeks to answer the following questions:

1. Has the current structure of the UK Vaccine Network Project provided an enabling environment for its internal and external stakeholders to engage and collaborate effectively?
2. Are the research projects in the current portfolio exemplars for impact?
3. What activities have worked well, what have been the challenges and how have these been resolved?

Section 3: Methodology

This interim evaluation was undertaken in five stages as outlined below. The UK Vaccine Network Project interim evaluation took place between January 2020 and July 2020.

Stage 1: Inception and development of research tools

This included meetings between the UK Vaccine Network Project lead and the evaluator to discuss and review activities that were being undertaken by stakeholders and the identification of stakeholders and grant holders.

Stage 2: Interim project transfer and ethical review

In February 2020, the interim evaluation was transferred to Manchester Metropolitan University (MMU), with the final contract being signed off in May. In following MMU guidelines and protocols for conducting research, an application for ethical review was submitted and granted in March 2020 (EthOS: 20938).

Stage 3: Research with grant holders, delivery partners and the UK Vaccines Network (UKVN) members

Research with grant holders, delivery partners and UKVN members had two elements – quantitative and qualitative – as follows:

Quantitative research: In January 2020, key stakeholders were sent an e-survey to be cascaded to all grant holders and members of UKVN. This was to gain a broad understanding of the experiences of internal and external stakeholders involved in the UK Vaccine Network Project. The survey asked questions about the current focus and structure of the UK Vaccine Network Project, the potential benefits, challenges have been overcome or managed and any other issues that participants have experienced. In addition to closed-questions, sections of free text space allowed participants to describe their experiences in more detail.

Qualitative research: Qualitative research was undertaken with a sample of grant holders, delivery partners and members of the UK Vaccines Network (UKVN). In late May to June 2020, semi-structured confidential interviews were completed. Detailed discussions with a sample of UKVN members and grant holders enabled further assessment of participant perspectives on their work and/or involvement in the network. In addition, recommendations were sought for informing current and future delivery of the UK Vaccine Network Project.

Stage 4: Preliminary results shared with the UK Vaccine Network Project

On the 26th June 2020, a slide deck of preliminary findings was shared with the UK Vaccine Network Project. These were based on the initial results from the online survey and interviews that had taken place to date.

Stage 5: Analysis and reporting

A thematic approach was utilised where data from the online survey and interview data were combined to develop themes and identify recommendations to support current and future project decision making. Our analysis strategy used an iterative process, whereby data collection from the semi-structured interviews and data analysis were conducted concurrently. Descriptive analysis of the online survey was used to generate further key themes based on survey question grouping that could then be further expanded using the qualitative data analysis.

Section 4: Results in relation to the UK Vaccine Network Project outputs

Key findings

- The UK Vaccine Network Project has provided a unique opportunity for the UK to contribute to the development of a portfolio of vaccines and vaccine technology that can be used to respond to current and future epidemics that occur in LMICs.
- The UKVN has provided a collaborative environment to bring together experts, researchers, policy makers, industry, Government departments and other organisations together through working groups to create a strong vision and strategy for the UK Vaccine Network Project.
- All interview participants commented on the importance of having the UKVN in place prior to the Covid-19 pandemic: it was clear that the UK Vaccine Network Project has been important for the UK's rapid response to Covid-19.
- There is a lack of consistency in the management and governance of funded projects, with some projects granted more financial and research output flexibility than others. Grant holders felt overwhelmed by the level of administrative work required to produce reports for delivery partners and GHS.
- The UK Vaccine Network Project has provided financial support through the delivery partner funding calls for the twelve pathogens focused on epidemics in LMICs for twelve pathogens, enabling UK researchers to build vaccine development infrastructure and candidates. Funding has facilitated the training of researchers both in the UK and overseas, therefore increasing the vaccine research workforce.

Introduction

This section provides a summary of the interim evaluation in relation to the UK Vaccine Network Project four outputs: output 1: High quality research; output 2: Clear UK Vaccine investment strategy; output 3: UK research from across academia and SMEs supports global vaccine development efforts, and output 4: Effective governance, management and oversight.

Overall, 36 participants completed the online survey. Eleven participants took part in a telephone interview. Interview participants included researchers working on UKVN funded research projects, members of UKVN and staff from delivery partners. Data from both the surveys and interviews have been combined to provide a written narrative of key themes for this interim evaluation report.

Output 1: High quality research

All participants agreed that the UK Vaccine Network Project is providing a unique funding opportunity for UK researchers to develop not only vaccines for the twelve pathogens, but also the technological and scientific know-how that could be used in future vaccine development in other disease areas. Participants found it difficult to say if the quality of the research produced had been high due to the lack of evaluations that had taken place for each project. As projects come to an end, each project should be independently evaluated to ensure that learning is captured for future iterations of a UK Vaccine Network Project.

Most participants stressed that having an understanding as to why vaccine development projects failed was important because it provided evidence on which types of vaccine development for each pathogen had been successful and which ones had not been successful. This would ensure that future funding was not allocated to types of projects with a known failure rate, therefore, reducing financial waste and research time in the long term.

Participants felt that through the UK Vaccine Network Project, the UK now had progressed in terms of developing a portfolio of potential vaccine candidates for further development for twelve priority pathogens in LMICs. Those taking part in interviews noted that the UK was demonstrating clear global leadership by investing in early vaccine development research when compared with other countries. All participants noted that some of the funded projects will have developed new vaccine candidates to Phase 1 or beyond, making the UK better placed to assist LMICs in future outbreaks of the twelve pathogens, as well as increasing preparedness for future outbreaks globally:

“Using multiple delivery partners spreads the risk across the portfolio, and also sets up a good support network for sharing information. Working with the DHSC GHS team has also been a good experience and their perspective on some of our projects' challenges has been very useful”.

Some participants noted that Government funding had allowed for a greater degree of freedom to be more innovative because there was no involvement from the large biotech and pharmaceutical

companies. This allowed researchers to try out new ideas and drive their own research forwards rather than being told what to do by large biotech and pharmaceutical firms who were more risk adverse.

ODA funding has provided further freedoms in conducting research compared with traditional delivery partner funding grants. For one participant, ODA funding had made a difference in being able to fund training for their collaborators in LMICs. This had enabled them to ensure parity in the quality of the research that was being undertaken at both the UK and LMIC institutions.

However, this was not a consistent theme between all researchers. The delivery partner issuing funding determined whether researchers had a positive experience of working on an UK Vaccines Network funded research project. Issues raised were related to the length of time in which contracts were issued to researchers, how and when money could be spent, as well as additional administrative burdens for grant holders who were now required to provide different reports for both delivery partners and GHS. Future programmes should consider streamlining the reporting processes and using one form to collect all information, with templates in place prior to new projects starting.

Output 2: Clear UK Vaccine investment strategy

Whilst most members of the UKVN felt that there was a clear vision and focus for the current iteration of the UK Vaccine Network Project, non-members commented on a lack of communication about the UK Vaccine Network Project, the role of UKVN and how funded projects fitted within the vision. Participants who had been involved with the UK Vaccine Network Project from the start were able to describe how the UKVN had matured since its inception, growing in confidence and starting to develop its own identity within the international vaccine arena, something that many felt had missing from the start. Whilst there was no consensus in what future iterations of the UK Vaccine Network Project might look like, nor in the type of role that the UKVN may play in the future, participants were able to provide the following suggestions that should be considered in developing future programmes of work:

A strong vision and investment strategy for future iterations of the UK Vaccine Network Project and the role of UKVN needs to be clear from the start of a second programme of work. This should include a clear communications strategy and dedicated resourcing with an online presence that includes a dedicated, standalone website outside of the current Gov.uk location, list of all funded projects with the contact details of the researchers involved, as well as case study examples and press releases, particularly those linked to how UKVN has helped to shape international policy or influence funding calls in other organisations. This would promote the work of UKVN to generate further impact, as well

as providing a space to help facilitate further collaboration and share learning between researchers, experts and SMEs, both in the UK and internationally.

The current Covid-19 pandemic suggests that the UK Government needs to be investing long term in both vaccine development, as well as funding research for pathogens that were not considered in the first programme of work. Identifying gaps in the current vaccine research fora through an in-depth evaluation of existing UKVN funded projects would ensure that under-researched pathogens were given funds to develop vaccine candidates.

There did not appear to be a consensus on whether the twelve pathogens were the 'right' ones to be chosen. Whilst some participants felt that the process of having working groups to decide on the pathogens was a good solution to the problem at the time, others felt that in doing so, this excluded many researchers and experts working in the vaccine fora. The working groups may also have been influenced by group dynamics rather than considering the existing evidence base to determine the pathogens. A more systematic and transparent method will be needed to decide on future pathogens that also allows input from all researchers and experts working in the vaccine fora.

As the data collection period coincided with the Covid-19 pandemic, some interview participants commented that although a new form of Coronavirus was considered as being one of the twelve pathogens, it was not included on the final list, which in hindsight had been a mistake. Whilst it is not possible to include every pathogen on future funding priority lists, those that have been highlighted by the WHO are likely to continue to attract funding in the future and therefore, supporting research in other pathogens would ensure that the UK remained a world leader in vaccine development for future outbreaks and pandemics, both in LMICs and globally, that were not covered by existing vaccine development programmes.

Linked to having a clear vision and investment strategy, participants stressed that future iterations of the UKVN or the UK Vaccine Network Project as a whole, needed to have a clear pathway for projects to progress along, with funding allocated to this. Doing so would facilitate longer term investment in UK vaccine research and development, whilst enabling impact to be tracked as projects that were successful could be followed along the pathway.

[Output 3: UK research from across academia and SMEs supports global vaccine development efforts](#)

Researchers noted that whilst the type of work needed to develop vaccines had not changed, the focus of funding vaccine development research has been important in a traditionally underfunded

area. Having ODA specific funding had provided new opportunities to work on the twelve pathogens, with several commenting that other funding streams might not fund this type of research:

“The money that is required to do this type of research...sometimes you can’t go over a certain amount, but that makes it hard to try to do research in this area on a smaller budget...but this is unique in the financial scale that enables us to do this type of work”.

ODA funding also provided some researchers with further motivation to drive forward their projects:

“It has been inspirational at difficult times to remember the purpose i.e. to know that the work is for such a good cause”.

The interim evaluation found that ODA funding has facilitated collaborations outside of the UK, though all participants who were working with collaborators based outside of the UK noted that these were predominantly existing collaborations due to the lack of time to build collaborative bids to meet the funding call deadlines. Only one project noted that they had been able to develop a relationship with a new collaborator. Future programmes of work should provide networking and collaborative opportunities to bring together UK and LMIC researchers.

All participants felt that there needs to be a clear UK pathway for vaccine development put in place to ensure that the work completed to date is not wasted. Most participants agreed that a clear pathway for follow-on funding with money committed to this needed to be put in place as soon as possible to ensure successful projects are brought forward to the trial phases. Researchers in both the survey and interviews noted that their research teams would need to start looking for other work as employment contracts would soon be coming to an end. This will result in a loss of highly skilled and knowledgeable staff, which in the current Covid-19 pandemic is unfortunate. Similarly, without follow on funding, researchers will have no choice but to dismantle laboratories and other vaccine research equipment that has been built over the course of the UK Vaccine Network Project because HEIs and other organisations do not have the finances to maintain them.

Output 4: Effective governance, management and oversight

There was no consensus with regards to whether the UK Vaccine Network Project had provided effective governance, management and oversight. This was dependent on the role the participant, for example, members of the UKVN noted that overall, the network has been well managed and organised

over the four-year period, whereas, grant holders were more likely to be negative based on their experiences of working indirectly with the UK Vaccine Network Project through the delivery partners.

Elsewhere, it was noted that there were some conflicts of interest where UKVN members were also receiving funding for their own projects. Future programmes should ensure that there is clear communication of a UK Vaccine Network Project website that includes publishing members of all working groups, UKVN members and grant holders. Having a standalone UK Vaccine Network website, that is separate from the existing Gov.uk website, listing all future calls would also ensure a sense of fairness amongst grant holders.

Nearly all participants who held grants noted difficulties in working with delivery partners. These included difficulties at the contracting stage when bidders had received confirmation of successful bids. Most researchers receiving funding discussed the delays in receiving contracts issued by delivery partners to the HEIs. The additional delay was not accounted for in the project timelines submitted in the bid, resulting in many projects already delayed prior to signing contracts. Those working with collaborators outside of the UK, who were recruiting staff for secondments or were hiring staff to work in the UK for specific deliverables, noted difficulties in receiving contracts in a timely manner from delivery partners and obtaining relevant visas from the UK immigration office. This should be streamlined and supported by UKVN in future programmes.

In addition, researchers noted that the administrative load on projects was burdensome, however, this was largely dependent on the type of research that was being conducted. Most researchers noted the high volume of paperwork that is required to be completed for delivery partners, DHSC and the drug regulators for vaccine development. Some researchers noted that both Government and ODA funding had caused problems with the HEI financial system due to a lack of flexibility built into funding contracts, such as the ability to carry over funds into the following financial year. Participants commented that the inflexibility of the funding contract was causing issues in meeting milestones and deliverables when projects involved using overseas facilities to manufacture a vaccine due to a lack of UK based manufacturers and equipment. Similarly, researchers working with small industry partners found it difficult to secure SME collaborations on their projects due to the way funding is paid in arrears:

“Funding via (for example) NHS SBRI, is quarterly upfront. This solves a major problem for small independent companies which is the need for working capital to cover (with a safety margin) four to five months of ongoing project costs. Under the Innovate UK vaccines for new epidemics initiatives, funding is quarterly in arrears, which is the usual state for government contracts and grants. This is a major disincentive to small companies to get involved, since they may, at short notice, find it difficult

to find the funds, by way of loan or investment, to respond to a new call that might otherwise be highly appropriate to them.”

Participants that had direct contact with the UK Vaccine Network Project staff within GHS were impressed with the professionalism and support that had been provided. Participants noted that the current team were to be commended in being able to provide the level of support and direction with such a small team, but that future programmes of work would require further staff to ensure communication between UKVN members, grant holders and the wider public was enhanced to enable better visibility and impact on the programme of work.

Section 5: The benefits of the UK Vaccine Network Project

Key findings

- The setting up of the UKVN has been beneficial for the vaccine research community and those working in the vaccine area. It has provided an opportunity for collaboration and a ‘joined-up’ approach to working across the different delivery partners, as well as between government departments.
- Researchers noted that the funding provided enough space for innovation compared to traditional funding calls and collaborations that included large biotech and pharmaceutical companies.
- For some researchers, funding has enabled multidisciplinary collaborations which has included social scientists working alongside trial development researchers. This has enhanced their understanding and knowledge of conducting vaccine research in local communities to increase vaccine acceptance.
- Involving CEPI in the Vaccine Project has further enhanced and expanded the range of expertise that UKVN can draw upon, both before the Covid-19 pandemic and during the Covid-19 pandemic.

Introduction

This section of the report details the benefits of the UK Vaccine Network Project with regards to UKVN activities and funding for vaccine focused projects. This section draws upon the survey and interview data and is divided into two main sections: the main benefits for researchers and the main benefits for UKVN members.

Main benefits for researchers

Interviews and surveys confirmed that the UK Vaccine Network Project has provided researchers with the unique opportunity to collaborate on vaccine research. It has created opportunities to develop a new and innovative programme of work in an area that has been traditionally underfunded, as well as enabling the development of laboratories and research teams, to facilitate this type of research in the UK. As one participant commented:

“I think it has made a real difference in terms of promoting UK vaccinology albeit primarily in the context of emergent pathogens”.

For a small number of vaccine research projects, the collaborations have yielded a multidisciplinary approach through the inclusion of social scientists. This has allowed in a greater awareness of the other problems that may have been previously ignored in vaccine research, such as addressing community concerns and mis-information through patient and public involvement activities, as well as working directly with communities as part of the vaccine development process. Those who were involved in the Ebola response highlighted the importance of conducting social research in parallel to developing a vaccine to ensure safety of research staff and reduce misinformation in local communities.

Furthermore, government funding has allowed some research collaborations to explore innovative ways of working in the vaccine fora without the constraints associated with traditional vaccine development programmes. These included having the freedom to explore technological innovations rather than being confined to the requirement of large biotech and pharmaceutical companies who may not want to undertake high risk research.

The interim evaluation also found that there are more diverse opportunities for staff training and networking. Senior research staff noted how they have been able to build vaccine research capacity, such as training new researchers both in the UK and in other countries, including LMICs. There was a perceptible sense of pride amongst researchers that they were involved in the UK Vaccine Network Project that was at the forefront of UK and international vaccine development:

“As a recipient of UKVN funding we are very grateful indeed for the opportunities it has given, and proud to have made good progress with the funding available.”

Main benefits for UKVN members

In relation to the network itself, participants who were members noted how UKVN had provided a forum for independent expert advice to be sought. Provided an opportunity for collaboration and a ‘joined-up’ approach to working across the different delivery partners, as well as between government departments. This has included bringing together a wide range of experts and researchers from across vaccine research and vaccine related areas, including researchers, industry, policy advisors, funders, Government and other organisations:

“It’s been a very positive experience. I think it’s been a good thing to bring together a range of people with different expertise in different types of vaccines in that particular forum, and I think, you know, it has filled a need with some really good work coming out of it.”

Participants commented that the working groups that were set up at the start of the programme have worked well, both from the start and throughout the duration of the programme. The working groups have enabled practical and pragmatic solutions to be implemented, whilst allowing feedback to be listened to and acted upon. This has resulted in the maturing of both the UK Vaccine Network Project and of the UKVN itself in terms of its vision and identity:

“UKVN has always been open to people’s suggestions and reacting to those suggestions, which is really positive and as time has gone on, it’s very much matured and understands its own role and what the value of some of the activities are.”

Interview participants reflected on the Covid-19 pandemic due to the timing of when interviews took place. All agreed that the UKVN has been invaluable in the current Covid-19 pandemic with researchers and experts already known both through the network itself, the working groups and the funded projects. All interviewed participants stressed how invaluable it had been to be able to rapidly call upon the existing network of members and researchers to respond to Covid-19.

It was noted by UKVN members that bringing CEPI to the table has further enhanced and expanded the range of expertise that UKVN can draw upon, both before the Covid-19 pandemic and during the Covid-19 pandemic. Participants commented that the Covid-19 pandemic has changed the way discussions have been had around vaccine research and the funding for this. UKVN members reflected that Covid-19 has helped to stress the importance of funding vaccine research to ensure the UK is better prepared for future epidemics in LMICs, globally and within the UK.

Section 6: Challenges faced by the UK Vaccine Network Project

Key findings:

- Project reporting requires streamlining due to the duplication of information for different delivery partners, which is placing a large administrative burden on researchers.
- Delays in contracts to grant holders and a lack of support through the contracting process has resulted in shortened project timelines, and in some cases, no extensions have been granted to projects.
- There is a lack of follow-on funding for projects. This will put UK research and development for vaccines at risk where projects become focused on short term gains, rather than long term development and impact.
- The UK Vaccine Network Project has exposed the absence of long-term investment in UK vaccine research and development. Researchers have had to rely on overseas manufacturing facilities and laboratories for some research activities which has caused delays in several projects. Financially supporting and maintaining newly installed laboratory facilities and equipment in the UK will be important to ensure UK researchers are not dependent on overseas facilities.
- There is a general lack of communication about funded projects, ongoing funding and collaborative opportunities. There is the potential that the vaccine research community across the UK is not being utilised for vaccine development, particularly outside of Oxford, Cambridge and London.

Introduction

This section of the report considers the challenges faced by researchers who have been awarded UKVN grants, as well as challenges experienced by participants as a whole. Where possible, how these challenges have been overcome have been stated. This section draws upon the survey and interview data.

Key challenges noted by researchers

All researchers reported that the administrative burden to respond to information requests and write reports for delivery partners and DHSC requires streamlining. Researchers holding multiple UK Vaccine Project research grants from different delivery partners described having to provide duplicated information for each delivery partner and questioned how it was being used by each delivery partner. Whilst some researchers had been able to utilise other members of their research team to complete the project reporting, the majority of researchers were left to do this by themselves. This has resulted in research staff spending less time on their research projects to complete administrative tasks, some of which are required every quarter.

Further concerns were raised in delays in contracts being issued by delivery partners. This has resulted in shortened project timelines, with projects having to deliver the same outputs in a much shorter timeframe which is problematic when developing vaccines. In some cases, no extensions have been granted to projects, though this was dependent on the delivery partner, with some able to provide no-cost extensions. As one participant commented:

“You know, we started late because they were late getting contracts out to us, but then we’re not able to change the end date to reflect that which I think is unfair and puts additional pressure to try to essentially complete the study in a much shorter timeframe. They either need to sort out their contracting system so that you can start your project as per your application or allow you to move your project date from the day the contract is signed”.

Linked to delays in contracts, several researchers noted a lack of support from delivery partners in the contracting processes when grants were awarded. Some research staff described having to act as a ‘go between’ between the delivery partner and their own HEI research offices because the delivery partner only responded to the researcher but were unable to explain why this was the case. Researchers also described a lack of awareness from delivery partners regarding staffing capacity at HEIs and the time needed to fill project posts, which should be reflected in contracts. As one participant commented:

“Research, or rather good research takes time and money, and having small pots of money means we have to start everything from scratch for every project, from having to hire staff to setting-up equipment. We just don’t have a pool of staff that sit waiting for research funding to come in....”

Researchers also commented on the lack of follow-on funding for projects that had been successful as frustrating, with senior research staff noting that they were already losing staff from their teams as fixed term staffing contracts were coming to an end. There is a concern that this will result in projects having to deliver their original outputs with a reduced research team, which could then impact on the quality of the research. Concerns were also raised about having to dismantle UK laboratories and equipment that had been put in place to conduct vaccine research as there were no other funds available to maintain the laboratory facilities and research teams.

Other challenges noted by participants

Concerns were raised by most participants about the way current funding calls and the current funded projects were in danger of becoming focused on short term vaccine development gains, rather than long term development and impact. Participants noted that there was a tension between good research and research being completed in a short time frame. Those working with partners in LMICs, commented that it took time and money to build trusting and effective working relationships with partners in other countries to enable and facilitate research in new pathogens and diseases:

“They don’t understand how the culture works and that these are long-term projects that need to be funded, if you’re going to do it properly, and this is even more complicated when you start trying to collaborate with people in low- and middle-income countries.”

Some interview participants commented that there was the potential that the vaccine research community across the UK is not being utilised for vaccine development, particularly outside of Oxford, Cambridge and London. This was due to a general lack of communication about funded projects, ongoing funding and collaborative opportunities. Future programmes of work should ensure that funding opportunities are widely advertised in a range of medium, as well as ensuring all research sectors, such as industry and SMEs, are included in future communication strategies. This would be important if the UK is to become a world leader in vaccine development.

Linked to this, there is the challenge of needing to move away from relying on ‘Big Pharma’ in and invest in UK SMEs that can manufacture vaccines. Interview participants commented that the Covid-19 pandemic has heightened the over-reliance on overseas manufacturing and testing labs. As one participant noted:

“We have been too reliant on a system that is commercially based, or a small or weak public sector...so I think this is a good time to focus and to come up with some serious thinking about what we need to next in terms of vaccine development”.

Similarly, a lack of follow-on funding for projects was also widely noted as a cause for concern, particularly amongst interview participants. Overall, nearly all participants who took part in the survey and interviews noted that the lack of a clear funding pathway for successful projects was putting UK vaccine research and development at risk for future disease outbreaks and pandemics. Reflecting on the Covid-19 pandemic, participants commented that it was fortuitous that the UK Vaccine Network Project had existed before the pandemic, with some participants who worked with colleagues in other countries noting that this had put the UK ahead of developing Covid-19 treatments and vaccines because of the original UKVN investment.

Those working on developing new vaccine candidates noted the challenges in gaining access to manufacturing and animal facilities. Some participants described the lack of facilities available in the UK and having to go overseas as part of their research projects. It was reported that having to wait to be allocated a date and time slot by manufacturing facilities was causing delays because only one project can access and use the facilities at a time, with additional time added in to clean the premises and facilities to stop cross-contamination between projects. The lack of resources available in the UK for early vaccine development work is a concern, and the UK should work towards having its own manufacturing and testing facilities to reduce reliance on using overseas facilities. This will be even more important in post-Brexit Britain where access to European manufacturing or testing facilities may not be available for some time.

Linked to this, was the lack of funding to enable local UK biotech companies to work on these vaccine projects. Participants working with SMEs were able to explain that this was due to the way funding is awarded to projects, with many SMEs unable to shoulder the initial cost of conducting research due to their size. The way in which funding is paid out to vaccine research projects in arrears will need to change to encourage UK SMEs to work on vaccine research projects and increase SME vaccine development capacity in the UK.

Similarly, participants noted that it takes time to build vaccine research and manufacturing facilities, both within HEIs and elsewhere. The UK Vaccine Network Project has provided funding to investment in laboratory equipment and staff to conduct vaccine research, which in the current Covid-19

pandemic, has been fortuitous. All participants agreed that maintaining research staff and laboratory equipment was important, however, questions remained as to who or how this would be financed.

In developing new platforms for vaccine development, researchers noted challenges in gaining acceptance of newly developed technology and its safety by others, including other researchers as well as funders, despite the evidence that had been collected as part of the research process that documented its safety. Some participants also noted the challenges in trying to meet manufacturing requirements which some felt were outdated and did not reflect current technologies. Those working directly on projects that included developing a vaccine noted that developing long lasting immunity responses was proving difficult.

In developing new technologies for vaccine development, researchers discussed the problems of trying to balance developing high tech solutions versus something that is already approved by regulator. A lack of skilled staff was also noted as an issue for developing new technologies for vaccine development, with some participants noting that it was difficult to recruit highly skilled staff to HEI positions. Like the challenges raised in developing new platforms for vaccine development, those developing new technologies found acceptability by other researchers and funders difficult to gain. Elsewhere, there was a general lack of knowledge and understanding of patent law when developing new technologies. Future programmes of work should consider providing support in Intellectual Property Rights (IPR) as well as patent law to safeguard UK development of new technologies and vaccines. This would enable the UK to licence vaccine candidates and technology.

Elsewhere, some challenges were noted in generating epidemiological or anthropological data and/or tools to support vaccine development or deployment for UKVN priority pathogens. Some of this was due to having only one funding call in this area. It was noted amongst some participants that there was too much of a focus on developing vaccines without considering the social and cultural issues of vaccination and/or immunisation programmes and building on the lessons learned from other disease outbreaks, such as Ebola, as well as the rise of the anti-vax movement.

Section 7: Evaluator overview

The evaluator was tasked with the objective of assessing whether the UK Vaccine Network Project has been established in a way to maximise its impact and meet its objectives. This interim evaluation has collected evidence on how the UK Vaccine Network Project is progressing towards the four key outputs (High quality research, Clear UK Vaccine investment strategy, Supporting UK research and Effective governance, management and oversight), as well as emerging benefits and key challenges. The evidence is covered in detail in sections four, five and six of the report.

Recommendations have been produced for future programmes of work, several of which can be implemented in the remaining time of the programme. This report draws upon discussions with UKVN members, delivery partners and UKVN funded project staff, as well as an online survey. The findings of this interim evaluation cover the period January 2020 until July 2020.

Has the current structure of the UK Vaccine Network Project provided an enabling environment for its internal and external stakeholders to engage and collaborate effectively?

Section four of the report reviews the key four outputs that the UK Vaccine Network Project has been tasked with delivering. These are: high quality research, clear UK Vaccine investment strategy, supporting UK research, and effective governance, management and oversight. Based on the evidence collected in this interim evaluation, the evaluator believes that the UK Vaccine Network Project, the UKVN and most of the funded projects have achieved much in a short timeframe. This includes: establishing working groups that are responsive to feedback and external epidemics (in LMICs, the UK and globally), installing vaccine research and development infrastructure in the UK and globally, making progress on developing vaccines for twelve priority pathogens, and providing an opportunity for collaboration, including a 'joined-up' approach to working across the different funders that form UKRI, as well as between government departments and researchers.

Whilst it is too early to comment on whether this is high quality research due to the lack of individual project evaluations available due to the timing of this interim evaluation, it is clear through the evidence collected that there are many successful projects coming to fruition in a traditionally underfunded area of research in the UK. Furthermore, funding through the UK Vaccine Network Project is supporting UK vaccine research and development through the bringing together a range of experts and researchers through the UKVN, as well as through its work with delivery partners in vaccine specific funding calls. This has enabled the training and development of both UK and overseas staff, creating a pool of highly skilled staff working in a range of vaccine research and development

projects, as well as the building of vaccine research laboratories in the UK and elsewhere. This has proved invaluable in the current Covid-19 pandemic. However, there is a danger that without further financial support, many of the laboratories and equipment will need to be dismantled.

Since its inception in 2015, the UK Vaccine Network Project has evolved and matured into a programme with a clear vision and strategy that has been supported by a generous financial investment. This has allowed the UK Vaccine Network Project to fill an existing gap in vaccine research and development, both in the UK and globally. A future programme of work will need to consider whether to focus on a different set of pathogens that may now be of priority in LMICs, or continue supporting research and development in the existing twelve pathogens. Similarly, the UK Vaccine Network Project will need to consider its role of funding vaccine research, particularly on funding early stage vaccine research or diverging into funding projects that are further along in vaccine development. As other programmes, such as CEPI, have since been established in the global arena, a future programme of work will need to examine what other programmes are supporting and use this information to determine future areas of focus.

Whilst UKVN has provided collaborative opportunities through its working groups, the UK Vaccine Network Project as a whole has not provided enough opportunities for others outside of the network to engage and collaborate effectively. This includes grant holders and their research teams, as well as other experts, industry and others working in the vaccine fora. For existing UKVN members, there are long gaps between meetings with no other communications provided in between, nor a clearly communicated UK Vaccine Network Project website and dedicated resource to facilitate the promotion of the excellent work that is being completed. This will reduce the potential impact of the work of the UK Vaccine Network Project.

The evaluator noted that there are number of UKVN members that are receiving funding for their projects. This is concerning with regards to potential conflicts of interest and the current governance strategy that has been put in place. Ensuring that a transparent process of selecting research proposals is clearly publicised and communicated, as well as a clear communication strategy and dedicated resources to facilitate and promote the UK Vaccine Network Project through events and workshops, will enhance engagement and collaboration.

Are the research projects in the current portfolio exemplars for impact?

Based on the evidence collected to date, potential impacts of the UK Vaccine Network Project include: the vaccine development pipeline tool, advocacy work that has provided scientific and technical

advice to support the Scientific Advisory Group for Emergencies (SAGE), government decision makers and the World Health Organisation (WHO). There are also several successful projects emerging with regards to vaccine development for specific pathogens that will assist future epidemics of these diseases in LMICs. As added value, it is important to note the contribution that the UK Vaccine Network Project has made to the Covid-19 pandemic response. These successes need to be communicated widely and celebrated.

There is a need for a much wider evaluation of each individual project that has received funding to distinguish between those that have been successful and those that have failed. Doing so will enable the UK Vaccine Network Project to determine what the impacts have been in terms of vaccine development. In addition, a series of consultations is required to map out which research projects have been able to secure funding from other sources, such as through other UK funding streams or investment from international programmes (for example, CEPI), as well as to map out which projects have been used to influence or direct policy and practice, both in the UK and internationally. Again, this will provide further evidence of impact and identify gaps in specific pathogen vaccine development.

Furthermore, it will be important to determine if there has been little or no impact made to ensure that future programmes of work have a greater impact. The learning from these activities should be shared across the UKVN network, as well as externally, to ensure that future funding is not wasted, as well as to share learning in the wider vaccine research and development arena. Having a clearly defined monitoring and evaluation framework and strategy in place at the start of a future programme of work will also enable short, medium, and long-term impact to be captured routinely. This will be important in the current Covid-19 climate to maximise research funding to ensure added value is evidenced.

What activities have worked well, what have been the challenges and how have these been resolved?

Overall, the establishment of working groups has worked well for the UK Vaccine Network Project, particularly in the early stages of delivering the programme of work, setting out its vision and the list of pathogens for vaccine development. For researchers, funding has allowed some research collaborations to explore innovative ways of working in the vaccine fora without the constraints associated with traditional vaccine development programmes. These included having the freedom to explore technological innovations and undertake high risk research.

It was noted in interviews that delivery partners have worked quickly to switch projects across to developing Covid-19 vaccine research. This ensured that unlike other researchers, those already funded through the UK Vaccine Network Project were not starting from scratch. As a result, the majority of interview participants noted that the UK was able to make faster progress compared to other countries in developing and testing potential Covid-19 vaccines. This will benefit LMICs, as well as the UK.

However, many of the challenges were specific to carrying out vaccine research and development, as well as external factors, such as changes in the organisational structure of delivery partners and the Covid-19 pandemic. Future programmes of work should consider the governance and administration of contracts, including the monitoring and reporting requirements by delivery partners to better reflect the merging of several funders under UKRI. Contracts should be awarded promptly to enable grantees to have the full time period as outline on their proposals. The administrative aspect of holding research grants, such as project monitoring data and reporting should be streamlined in future programmes of work, with one reporting template used across all delivery partners. This future template should also consider the information required for ODA auditing purposes to further reduce the administrative burden on research staff.

Elsewhere, challenges were found in the lack of UK manufacturing and laboratory capacity for vaccine research. This resulted in an over-reliance on overseas facilities which has caused delays for some projects because of having to wait for other projects to vacate the premises prior to use. Linked to this, future programmes of work will need to consider how to engage with regulators, as well as industry to enable early stage vaccine research to collect evidence to support future trials. Similarly, support or engagement with experts in patents and intellectual property rights will need to be provided for researchers to enable the safeguarding of UK innovations in vaccine development.

As the UK Vaccine Network Project draws to a close, it is envisaged that many of these challenges will be minimised in future programmes of work. As a result, a set of key transferable lessons have emerged through this interim evaluation and are presented in next section.

Key transferable lessons

The key transferable lessons from the interim evaluation evidence are:

Communication – the importance of a clear communication strategy (from the outset) with UKVN and all funded projects, as well as key stakeholders, with dedicated resources and staffing to facilitate and manage this.

Collaboration – the benefits of having a range of highly skilled and knowledgeable experts, researchers and organisations working together in the UKVN and delivery of research was utilised to great effect.

Clear governance structures and monitoring activities – where delivery partners have streamlined their reporting processes, allowed flexibility in the way projects spend money and changed research outputs, this has allowed researchers on those projects to remain agile and responsive to emerging epidemics.

Road map for UK vaccine development – the vaccine development pipeline tool needs to be further developed with input from industry and regulators, as well as those who specialise in scaling-up production of vaccines. It should be made clear what types of funding and organisations are supporting each of the pipeline areas.

Media and engagement – A promoted and standalone website presence that is not embedded within the current Gov.uk website (see for example, the CEPI website), regular networking and workshop events for researchers and others working in the vaccine development and manufacturing area, promotion of successful projects and social media presence will increase the visibility and impact of the UK Vaccine Network Project.

Section 8: Recommendations

Building on the successes, challenges and key transferable lessons identified, the following are the key recommendations arising from the interim evaluation findings:

Recommendations for the UK Vaccine Network Project

- Consideration should be given to having a longer study period that is fully funded. A minimum five-year study period is required to yield better research results and impacts.
- Communication strategies should be reviewed, revised and strengthened to promote engagement and discussions between researchers, UKVN, UKRI and other external stakeholders. This should include the sharing of learning to reduce waste in the funding system.
- A clear vaccine development pipeline tool with funding attached to specific elements needs to be put in place and promoted to continue and safeguard the investment that has been made in this area. The UK Vaccine Network Project should consider whether other organisations, such as CEPI, could provide financial support for projects at a certain stage of development.
- As part of the next phase of work, consideration should be given to initiate an independent vaccine development institute in the UK that is not influenced by the major vaccine companies. This could provide funding to facilitate further collaborations with synergistic technology and product offerings to create new products that would surpass the capabilities of the major vaccine companies which could then be licenced.
- There is a need to balance the regional research disparities and work with the wider university research community outside of the 'golden triangle' (Oxford, Cambridge and London) in terms of promotion and dissemination of funding calls, staff capacity and development, and access to resources.
- The UK Vaccine Network Project needs to consider how it will provide support for patents and intellectual property rights to safeguard UK vaccine research for future licencing. This will be important when the UK has left the European Union.
- An impact strategy with monitoring activities needs to be implemented at the start of a future programme of work to ensure impacts are routinely captured, including all advocacy and

policy work. Project successes and advocacy work should be disseminated widely, both within the UK Vaccine Network Project and externally, to promote the work that is being undertaken. This will help to increase the overall impact of future programmes of work.

Recommendations for delivery partners

- Reporting of projects need to be standardised across all delivery partners and streamlined to ensure only necessary data is collected.
- Delays in funding contracts being awarded have resulted in project delays and, in some cases, monies not being able to be carried over to compensate for these delays. Delivery partners should consider rapid circulation of contracts and consider a flexible approach to how funds are spent by programmes if they are not able to meet spending deadlines due to delays in signing off contracts.
- Consideration should be given to enhancing the Innovate UK funding model to better support UK SMEs financially to contribute to vaccine research. At present, some SMEs and start-ups cannot absorb the financial costs of undertaking vaccine research without a portion of funding being paid in advance. Having a portion of grants available immediately would enable SMEs to pay for staff, specialist equipment and materials. This will be important if fast-paced innovation is to be continued in UK vaccine research and development.
- Consideration should be given to project start dates beginning from the date that a contract is signed, rather than when a grant is awarded. This would allow grant holders to have the full period outlined in their proposal to complete research.