

INSPIRE 'INSPIRING Research' conference report – November 2023

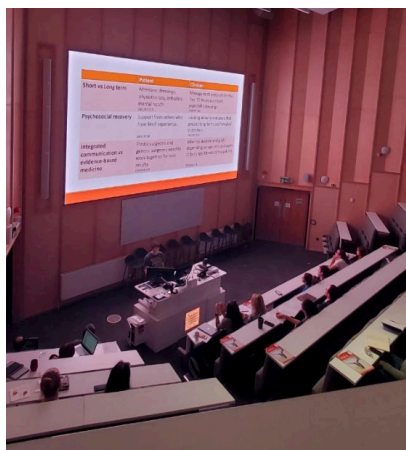
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On the 18 November 2023, I was extremely grateful to attend the INSPIRE 'INSPIRING Research' conference taking place at the Centre for Student Life in Cardiff. The event was attended by over 120 medical, dental and veterinary students from eight UK Universities. The event was informative, engaging and insightful with a positive environment that I felt was extremely enriching for the young professionals present – cultivating a sense of confidence surrounding independent research.



Following a brief history of the INSPIRE scheme, a number of short research talks were delivered by students – all to an extremely high standard. Throughout the presentations, Mentimeter was available for the Q&A, giving guests the freedom and opportunity to ask questions whenever possible.

The research talks started off with **Adam Maher**, a veterinary science student at Bristol, who focused on the current challenges of burn care in the healthcare system. Following this impressive presentation, he aims to publish his secondary data in a journal next year and at a conference focussing on care for individuals affected by burns.

Next, **Annalisa Willmott**, a fifth-year dental student at Cardiff, delivered an insightful presentation on the effects of short promotion materials of UK mouthwash on oral health. The research covered both positives and negatives of the promotional materials and highlighted the evidence-based approach that is so prevalent in current NHS dentistry.

Courtney West, a medical student at Exeter, gave an informative insight into RET gene mutations which are associated with risk of medullary thyroid cancer. West's presentation focused on exploring the treatment options for addressing this particular medical issue and she went on to win the award for the best oral presentation, after which I was able to conduct a short interview with her:



Courtney West pictured receiving her award with Professor Tarr's parents Michael and Susan Tarr

Well done on an extremely engaging and interesting presentation. It was delivered at an incredibly high standard, a well-deserved win. In terms of your research, would you like to expand your findings further and take it elsewhere and if so, where?

The research I presented was developed from the project I undertook as part of my intercalated year; I have since developed the project further with the aid of my supervisor and a summer studentship from the Society of Endocrinology. My aim with this project is to submit it for publication as I believe the findings could help shape official guidelines in the management of incidentally found RET variants.

There are still many unanswered questions surrounding this project particularly around what are the contributing factors in causing medullary thyroid cancer if the penetrance is as low as I found, and I would like the opportunity to work on this. However, I am still new to research and this is a substantial project that may take time to come to life. Therefore, in the meantime I am trying to expand my knowledge of the research space, how it works and what options are out there. With the overall plan for next steps being to apply for the specialist foundation programme with a research placement to be able to continue participating in research, specifically genomics research throughout my career.

Tomas Nicolas at Plymouth followed with a topical issue about how smoking can change the oral biome and presented his interim data as a part of a longer study that was due to be finished at the end of the year. The implications of smoking can cause vasodilation problems resulting in blood pressure issues but, interestingly, Nicolas identified that there was no difference in blood pressure between smokers and non-smokers – an unexpected result that paves the way for further exploration.

To round off the oral research presentations, **Annabelle Lim** – a medical student at Cardiff – delivered an extremely colourful presentation on routine MRI surveillance of people with multiple sclerosis for which she went on to win best runner up oral speaker. I was immensely impressed at the standard of oral presentations by the students of various different ages, seeing the thought and effort that has gone into their long-term research and the ability to which they were able to deliver their ideas to an audience of specialties different to the focal topic.

Plenary speaker, **Dr Arman Eshagi** of UCL, gave a relevant and intriguing talk on the use of Artificial Intelligence (AI) in healthcare. He commenced his talk by revisiting what AI actually is which was refreshing to see as there is so much buzz around this topic that people can forget what it actually is at its core. Dr Eshagi went on to explore the use of AI in viewing the progression of Alzheimer's, designing radiographic reports and neurological diseases, presenting evidence on the accuracy of the results by the AI when cross-referenced by a clinician. Personally, I found that the idea that stood out most to me was the concept of 'self-supervising AI' which involves providing the AI with a large data set from which it then proceeds to learn on its own, which can assist with diagnoses, prognoses and predicting systemic disease. This concept was fascinating to me and I thank Dr Eshagi for such an eye – opening talk.



Everyone then dispersed for lunch and to look at the poster presentations that were displayed across the floor. It was wonderful to see the work that had gone into these posters. The presentations produced were a result of the hard work of students of medicine, dentistry, and veterinary science across all years. The display was incredibly informative with a variety of ideas and provoking thoughts put forward by such intelligent young minds.

After the break, the second plenary speaker **Alex Newberry**, a former Law student now working for Welsh Government, broke up the scientific flow, providing a fresh perspective on the ethics that go into research and healthcare. Newberry discussed data collection, privacy concerns and discussed data ownership. I felt that Newberry was able to give an insight into aspects that healthcare students will have to face as they mature into young professionals, particularly down the research route. Newberry also mentioned the idea of positive research culture which aptly segued into the Hackathon presentations.

The INSPIRE Hackathon was a challenge surrounding the themes of research and innovation to encourage undergraduate students of Cardiff University, Bristol University, Plymouth University and Exeter University (institutions that are a part of the GW4) to tackle a problem and devise solutions using big data for an emerging issue surrounding healthcare, humans and animals – a task that would involve a One Health approach. This is slightly different to the traditional concept of a 'Hackathon' which refers to exercises surrounding computing.



Dr Alex Tasker, Senior Lecturer at University of Bristol, presenting.

The presentations started off with an overview of the challenge presented to the candidates – each team was provided with an image of a bat on a tree indicating Nipah virus and their mission was to plan around a Nipah virus outbreak with the One Health approach in mind. Using analytical techniques to analyse large datasets (big data), the candidates had to present solutions to the emerging problem of the Nipah virus and how various sectors, such as agriculture and the general public, could be managed in order to control this outbreak. Judging was completed by the audience who were provided with a Mentimeter code where there were different categories with sliders from 1 to 10 to indicate how well the proposed approach adhered to each aspect.

The categories were as follows:

1. Scope – How well did they deal with the complexity of this problem?
2. Interdisciplinarity – Who and what did they include in their response, and how did they bring together different expertise and experiences?
3. Pragmatism – What real-world considerations did they anticipate?
4. Feasibility – Have they shown understanding around the importance and potential of big data and data science to inform their decisions?

All teams delivered their presentations with confidence and assurance indicating the level of thought and time that had gone into analysing the problem that they were faced with. After a close competition, the Exeter University team was deemed the winner of the Hackathon challenge.

Team Bristol: Shraddha Sriraman, Jenn Chae, Elin Hardwick and Sruthi Nair Answers by Sruthi Nair



You mentioned in your presentation an approach of tackling the virus from the point of view of a pig farmer. How did you go about conducting research to achieve this perspective?

To answer this, we firstly looked at what pig farming would look like in a country like Babi by extrapolating data from what South-East Asian rural Pig farming looked like. Then we looked at the problem from the perspective of our imaginary Farmer in Babi, Farmer Mo and structured what our interventions would be based on the problems he would most likely face in getting support. For example, how he would sell his produce and not be out of pocket if his pigs had to get culled. We also looked at whether it was currently possible to test pigs for infectious diseases, as this is an important step in our plan. The vet in our team Elin had lots of baseline knowledge about pigs and infection which was very helpful and to help supplement our ideas she found a few papers.

You talked about a farmer connecting app, please could you tell us more about this?

We thought that as smartphones are very common in South-East Asian countries it would be useful to have a method to connect farmers when they're going through something as difficult as isolations and the potential culling of pigs. It would alert farmers when a nearby farm had an outbreak, governments would be able to communicate to farmers using the app and farmers would be able to share advice about how to implement biosecurity. It would also be used to report pigs for testing and allow tests to be ordered. This hopefully would enable people to still feel connected, access support and share ideas. Furthermore, it would help governments keep track of the spread of the disease.

What do you feel that you have gained out of participating in the Hackathon?

I think the most important thing that we gained was a greater understanding of inter-disciplinary work. Our team was mostly medics, but we also had a vet. Her perspective of the problem really changed the way we decided to tackle it and I think will change the way we look at healthcare problems in the future. We have also gained a greater understanding of the complexities of infectious outbreaks and the sheer volume of things you have to think about, not just keeping people safe but making sure their livelihoods are intact. Lastly, I think we also learned how important targeted interventions are.

Team Cardiff: Riya Rao; Tsz (Eunice) Pak; Tsz (Vanessa) Yeung; Samuel Njoroge; Hamza Khan Answers by Tsz Pak (Eunice)



Thank you for such an engaging presentation and representing Cardiff! How did you find the process of doing something new such as this Hackathon that involved concepts like big data which is not something you tend to come across in a healthcare degree?

I found the process extremely exciting and enlightening because big data is such a massive topic whether or not in the healthcare field, as its application crosses so many sectors of our daily lives. Learning how to solve problems in healthcare such as via policy making, involving multiple stakeholders, expanded my horizons on thinking from different perspectives and thinking on a broad societal point of view. Moreover, learning how to use machine learning and AI models in solving problems in healthcare is a very cool and innovative concept which I would be keen to explore more in the future, through learning techniques such as coding.

Your network model was very impressive, what went into making that?

One of our team members studies Data Science and has the template as a basis for the model. Another team member has basic knowledge on machine learning and how it can be applied to create transmission modelling and statistics, so it was really down to their contributions!

What was the most exciting part of preparing a presentation for this challenge?

The most exciting part is having to have different team members contributing their own point of views and coming to a common conclusion towards the solution of the problem through brainstorming. I learnt a lot of important One Health concepts throughout the discussion process, different public health issues and ways of tackling emerging diseases in a country. It was also particularly interesting to apply the machine learning models into the project as it brought about real-life applications of the use of machine learning.

Team Exeter: Riyea Akhtar, Tobi Akinlolu, Charles Britton, Shaima Chbib, Fasika Estefanos, Frances Eslabra, Ieva Jakaityte, Pavel Loginovic; Grace Maani, Tom Owen, Sana Poormohammadreza, Bodrun Nahar Sheikh, Siddharth Shukla, Joshua Tyrrell



Team Exeter University at the Centre for Student Life.

During your presentation, all of the team members were very actively involved - how did you delegate responsibilities and manage to come together as a team to incorporate different ideas to tackle such a multi-faceted problem?

Riyea Akhtar: To ensure a comprehensive approach in addressing the multi-faceted challenge, our team strategically convened in person initially to collectively define objectives and outline a holistic solution framework. We then divided into groups according to our individual skills and strengths. One group focused on the data aspects and the other delved into epidemiological considerations. Throughout the project, whether virtually or in person, we reviewed our individual research findings and collaboratively shaped our presentation. This process not only facilitated an exploration of the problem but also ensured that all concerns were addressed.

What was your favourite part of compiling the presentation?

Bodrun Nahar Sheikh: One of the most rewarding aspects of compiling the orientation for the Hackathon was the teamwork and spirit of our team. As a big group from Exeter University, we had students with previous degrees and different backgrounds. We utilised each other's expertise in different areas to formulate a comprehensive strategy for the Nipah virus outbreak. We had a number of group meetings, in person and online, and these sessions were filled with dynamic discussions and everyone's input was valued. Another aspect was that the research process allowed us to learn more about various topics of public health, epidemiology and medical ethics, fostering both individual learning and teamwork.

What have you learnt most from the process of completing this challenge?

Shaima Chbib: During this process, we collectively learned about teamwork, and taking a One Health, holistic approach towards this complex, multi-factorial issue. It was interesting to observe this issue through other peoples' perspectives based on their experience and area of expertise.

It was interesting to explore alternative solutions, both short-term and long-term when dealing with this outbreak. With our diverse group, we benefited from each members' different strengths, and made our discussions fruitful, insightful and made it a great opportunity for all of us to learn from one another. It was also a great opportunity to learn research techniques and presentation skills.

I really enjoyed this experience and am very grateful to have such an excellent team.



What does winning mean for you and do you have any plans to take this research further?

Obatobi Akinlolu: Well, it was a close call. When we won, it was a relief to feel that all our hard work had paid off and the challenges we faced were all worth it. It was exciting to see the power of teamwork as well as how a common interest can bring people together.

I'm not sure about the rest of my group but attending the conference really helped me see real and practical ways to get involved in research and help make a difference in areas I am passionate about. I am actively seeking and creating opportunities for myself and I've been inspired to reach out to academics that may be able to help me. I am really looking forward to my future career in academia.

Thank you INSPIRE!

Team Plymouth: Umme Alam, Sachi Baviskar, Joya Dutta, Zara Hirji, Rishika Segireddy, Christine Tse



Firstly, I would like to thank you for such an engaging presentation, it was informative and entertaining! How did you as a team find the process of exploring the One Health concept considering how vast it is?

Rishika Segireddy: In our initial planning stages, we prioritised mitigating the human outbreak, with a small focus on zoonotic surveillance. When we came across the concept of One Health during our research, the interconnectedness of humans, animals and the environment, particularly in the context of zoonotic outbreaks, fascinated us greatly. Despite our time constraints in exploring this vast concept, we wanted to include some facets of this approach in our plan. Thinking about the environment, we recognised how loss of biodiversity can increase zoonotic spillover risk¹ and wanted to move away from damaging practices like fruit tree deforestation. By adjusting our strategy to minimise environmental impact, we aimed at developing a sustainable and transferable plan in case of future outbreaks.

Christine Tse: As a group, I believe we worked very well together despite the geographical differences of different members being in Plymouth, Torbay and Taunton. It was quite difficult to ensure everyone was on the same page but using a shared Notion allowed everyone to understand what had already been happening. When exploring the case and the health concept, we had to break it up into smaller chunks to evenly distribute between members of the team. We had to delegate tasks surrounding the different domains (planning, epidemiology, global health, stakeholders etc) which made it vastly easier to tackle. This way we could assign each section to different members and explore in greater detail without it being too overwhelming for everyone to investigate everything.

Zara Hirji: The complexity and vastness of the topic was something that I think we all noticed right away. Although it could be overwhelming to consider as a whole, our main priorities were to explore our own curiosities surrounding the topic to start with. I think it helped that we all felt comfortable questioning one another and not dismissing any uncertainties. This meant brainstorming, mind mapping and assigning further research to different groups in our team. In the end I think we found that, instead of trying to dismiss the vastness and complexity of the topic, our approach needed to both acknowledge this and use it to our advantage. It gave us more of an insight into how such a theoretical project may actually translate in the real world. This is how we settled on a One Health approach.

What was something you learned about big data when completing this challenge?

Sachi Baviskar: Using big data has helped us understand the complexity of formulating government-informed interventions

for the Nipah outbreak. While big data has been a crucial element in predictive modeling, vaccine rollout strategies and identifying susceptible populations, we've learnt that the inferences we can draw from it are not fully black and white. There are multiple considerations to make regarding the applicability of the data we are using. The role of big data in our strategy extends beyond simply objective measures but also helped us acknowledge the various cultural nuances of the outbreak. This allowed for a more holistic consideration of the implications of our chosen plan of action. For example, communication tools were something we looked at in-depth to enhance public awareness and compliance.

Rishika Segireddy: Looking at big data regarding public health interventions used in previous outbreaks, we realised how successful infographics have been at spreading awareness to large groups of people from varying backgrounds. Making it a key component of our plan, we were able to consider how determinants such as differing sociocultural norms, literacy rates, health beliefs that prevail in a country could be addressed with tailored and evidence-based interventions.

Another big issue we chose to focus on was epidemiological surveillance. Looking at how data was used in previous Nipah virus endemics and the recent COVID-19 pandemic to monitor disease burden and allocate resources efficiently had informed our response strategy in this challenge. This included common approaches such as case-based surveillance for mortality reduction and population-based surveillance for disease control.²

Joya Dutta: An angle of big data that I feel we barely covered in our plan was AI. This was very interesting to me as some of the other groups partaking in the challenge had a great emphasis within this. It makes sense, as AI is something so up and coming within healthcare and the world in general. Truthfully, it was something we glossed over as it felt way outside our scope of understanding and felt like a bit of a mystery. Hearing about all the potential behind utilising AI in the health challenge was amazing, the novel approaches heard were fascinating. One example was using an AI-supported social media screening system to help target transmission and surveillance. I was also amazed by some of the actual data systems and statistical tools that other groups had investigated, it was very inspiring to see the interests and hard work that people put into learning about health challenges and targeting a virus epidemic, exploring in depth epidemiological and statistical measures that are mainly used by specialists.

You mentioned self-disseminating vaccines as a key idea. Please could you explain a little bit more about this novel approach and how you came up with exploring this idea?

Zara Hirji: Self-disseminating vaccines are a more proactive prevention method for reducing the spread of zoonotic diseases by targeting the spillover of zoonotic diseases from animal vectors to humans. High risk for spillover pathogens may be identified targeted within their animal reservoir before a human outbreak even begins to emerge via the use of an animal vaccination.³ In the case of our presentation we thought theoretically of a Nipah virus vaccine to give to the pig and bat vectors rather than sole reliance on human vaccination. A couple of challenges to vaccinating animal populations is firstly the potential high turnover of those animal reservoirs and secondly inaccessible animal populations. Self-disseminating vaccines overcome these challenges as they are actually capable of transferring from one animal to another without needing to vaccinate the entire population.^{3,4} This also improves the possibility of eradication of the pathogen before it even reaches and causes harm to human populations is much greater than through human vaccinations.

We enjoyed researching into different primary prevention tactics which included the concept of self-disseminating vaccines. We then explored it further with our collaborators who had more expertise

in the area and so were able to direct us towards further reading in this interesting topic, which we knew little about to begin with, and helped us to apply it better to the case of our own project.

Joya Dutta: We were lucky to have discovered a Plymouth university researcher, Michael Jarvis, and his work that has revolutionised disseminating vaccines in general.⁵ This made a big difference for our plan and the outcomes suggested for the Nipah virus outbreak.

Umme Alam: The concept of self-disseminating vaccines is a fascinating and innovative approach that aligns well with the One Health framework. We wanted to implement this approach throughout our presentation, and exploring self-disseminating vaccines allowed us to do just that. Since Nipah virus is zoonotic, targeting the wildlife reservoir with a self-disseminating vaccine can help break the cycle of transmission and reduce the risk of spillover into human populations. The novelty of this approach lies in its ability to address infectious diseases at their source, taking advantage of natural ecological processes to achieve widespread vaccination. It's a collaborative and interdisciplinary approach that requires expertise in virology, ecology and public health.

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The evening concluded with an open discussion and panel where students had the opportunity to ask questions on how to be more involved with research and the ways to take any research they had conducted further. This was a great opportunity to hear what the different panel leads had to say in response to the questions as everyone had different expertise.



Following this, there was a tribute to INSPIRE Lead for Exeter Professor **Jo Tarr**, who sadly passed away in Summer 2023. All attendees were able to take some time to discuss her wonderful accomplishments and her contributions to both Exeter University and INSPIRE, allowing her colleagues to share some anecdotes about their time with her. In attendance were Professor Tarr's parents, brother and partner who presented the prizes to the winning students in honour of **Professor Tarr**.

The conference was extremely valuable to undergraduate students, introducing them to a variety of professions within the three healthcare fields introduced – medicine, dentistry and veterinary science. It also helped provide insight into the different topics of research that are being undertaken by students – giving a motivational and impressive undertone to the whole event. From the Hackathon presentations, it was clear to see that the students were able to come together and collaborate on perhaps unfamiliar territory regarding subjects outside of their merit, such as more computational approaches, to present a comprehensive answer to the challenge they were faced with. Based off the answers to my questions, it is clear to see the sheer effort that the students have put into this challenge and for this, I commend them. The skills that can be picked up from attending conferences such as this one and participating in events such as 'Hackathons' that stretch you outside of your comfort zone have great implications for future careers that these students might venture into, such as exercising the ability to think on the spot, present in front of large audiences, research and learn skills outside your scope and most importantly, the need to participate as a team.

I would like to extend my gratitude to everyone for their time in answering my interview questions and thank the participants of the conference for their presentations from which I learned a lot. I would also like to thank the INSPIRE leads for coordinating such a successful event.

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