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| **Host department:** |
| **Nottingham** |
| **Title:** |
| **Enhancing the effectiveness of vaccines** |
| **Proposed supervisory team:** |
| Professor Kavita Vedhara (University of Nottingham)  Professor Lucy Fairclough (University of Nottingham)  Dr Kieran Ayling (University of Nottingham)  Dr Simon Royal (University of Nottingham Health Service)  Professor Jonathan Van Tam (University of Nottingham) |
| **Project description:** |
| **Background:** Vaccines play a critical role in reducing the risk of disease amongst the public. However, with all vaccines, there is variability in the effectiveness and durability of protection. Previous research has shown that a range of emotional and lifestyle factors (e.g., positive and negative mood, physical activity etc.) alter vaccine effectiveness, and interventions which target these factors can enhance vaccine success. The proposed project would build on an existing programme of work looking at the benefits of positive mood for vaccine effectiveness. The aims would be to: 1. Adapt an existing brief single session positive mood intervention to permit delivery of multiple sessions in the 2 weeks post-vaccination  2. Identify the optimal ‘intervention dose’ associated with vaccine effectiveness  3. The cellular and humoral immune mechanisms mediating this effect  4. Conduct a qualitative study to determine the barriers and facilitators to implementing the intervention in routine care.  **Methods:**  Aim 1: Our existing brief, single session, positive intervention has been shown to be effective in enhancing positive mood at the time of vaccination and feasible to deliver in primary care. Working with the target patient group, the applicant will co-create a version of the intervention that permits exposure to positive mood inducing material for up to 14 days post-vaccination.  Aim 2: Patients being targeted for vaccination (depending on timing of the project this may focus on influenza or COVID-19 vaccines) will be recruited from primary care to participate in a pilot trial. They will be randomly allocated to receive no intervention; intervention on the day of vaccine only; intervention for up to 7 days post-vaccine or intervention for up to 14 days post-vaccination. Antibodies to the vaccine antigens will be measured at 4 weeks and 6 months post-vaccine to assess intervention effects on vaccine responses and durability of protection.  Aim 3: A random sub-sample of patients in the pilot trial will be invited to have blood samples collected throughout the 14 day follow-up period to explore potential cellular and humoral mechanisms.  Aim 4: Interviews will be conducted with patients and health care professionals involved in the pilot trial to identify barriers and facilitators to implementing the intervention in routine care.  **Potential impact:**  Study findings will identify the ‘intervention dose’ at which vaccine effectiveness is optimized and will inform the design of a future large scale trial. The research has the potential to provide a feasible and cost-effective way to enhance vaccine effectiveness in the community and thus protecting both the public and the NHS from the burden of vaccine preventable disease. |
| **Training plan:** |
| **Formal training:**  The successful candidate would benefit from the formal training programme available for PhD candidates at the University of Nottingham. In addition, formal training will be sought in the following areas dependent on existing skills and expertise:  Qualitative methods  Clinical trial methods  PPIE  Introductory and advanced statistics  **Informal training:**  In addition, the successful candidate will benefit from informal training through the named supervisory team in particular behavioural science, clinical immunology, laboratory methods, public health and statistics. |

**PPIE:**

A PPIE group will be established early in the programme to ensure appropriate and effective PPIE throughout the research life cycle. This will include, but not be limited to, interviews and focus groups to permit co-creation of the intervention; informing methods for pilot trial and topic guides for interviews.