I completed Masters (2010) and PhD (2017) degrees studying Maternal and Fetal Health, exploring the role of protein glycosylation in the placenta of mothers with pre-existing diabetes. The projects consisted of laboratory work, including mass spectrometry and analysis of large proteomic datasets. Whilst completing my PhD I started a Research Associate position (2016) in the Division of Informatics Imaging and Data Sciences at The University of Manchester, within the <u>Connected Health Cities</u> (CHC) research team. I have since trained as a Medical Epidemiologist, conducting research on large electronic patient health records, refining my skills in data analytics, statistical modelling, computer coding and software development.

The overarching objective of the CHC programme is to unite health data using advanced technology to improve health services for patients across the north of England. The research is underpinned by the Learning Health System (LHS) methodology; where we harness rapidly developing opportunities presented by informatics to learn from every patient, analyse the data collected and feed actionable insights back into the health system to drive improvement in care.

My research as part of a clinical pathway in Primary Care (BRIT: Building Rapid Interventions to reduce antimicrobial resistance & over-prescribing of antibiotics) focuses on deciphering the challenges we face with antimicrobial resistance (AMR) through a better understanding of antibiotic utility in the UK. AMR, a priority research area for the World Health Organisation (WHO) and the UK government, is one of the largest public health challenges of our time, causing over 700,000 deaths annually.¹ Extensive use of antibiotics in medicine (as well as agriculture) leads to rapid development of AMR, which, along with the slow development of new compounds to treat infection, poses a catastrophic threat for human health. Approximately 80% of all antibiotics in the UK are prescribed in primary care and there is substantive evidence that current prescribing is suboptimal.² My analysis, using national databases of anonymised primary electronic patient health records from UK general practices has shown significant variability in the prescribing of antibiotics. Although patient characteristics account for some of the variability observed, prescribing habits between practices remained altered. For example, some practices prescribed antibiotics to patients with an upper respiratory tract infection just 10% of the time, whilst other practices were prescribing antibiotics for the same condition 80% of the time. My work has demonstrated that prescribing guidelines have little impact on antibiotic prescribing rates, even though reviewed and updated annually, and a substantial proportion of prescriptions still deviate from the recommended antibiotic.3-5

Effective dissemination of evidence is important in bridging the gap between research, the health care professionals and policy development.⁶ As part of BRIT I have contributed to the development and implementation of two web-based dashboards: 1) A holistic national dashboard, showing antibiotic prescribing utility in primary care (https://www.britanalytics.uk/) and 2) Practice-specific dashboards, where actionable insights from the analysis of fortnightly prescribing data is fed back to practitioners to facilitate the optimisation of antibiotic prescribing. For the practice-specific dashboard (currently active in more than 30 practices) the web-based infrastructure allows the secure transfer of data from participating practices (via the HSCN) to a data safe haven for analysis. Fortnightly results are feedback through the system to practices delivering actionable information that are tailored to individual practices, integrated with results from the national analysis. Frequent review of practice-specific insights has instigating behavioural change and improved clinical care. BRIT is delivering research that is relevant, effective and having a real impact in clinical care and public health transformation. Future work includes a formal evaluation of the impact the BRIT dashboard has on antibiotic prescribing, clinical care and public health, as well as supporting a full scale roll out across the UK, of which discussions are currently ongoing with Public Health England to support this incentive.

For more information on the GP dashboard please visit: <u>https://vimeo.com/299314047/c49e227bbe</u>

Example screenshots of national dashboard:

Screenshot of national dashboard on antibiotic prescribing variability:

National Antibiotic Prescribing



Screenshot of national dashboard show antibiotics that deviate from recommended guidelines:

Antibiotic Prescriptions that Deviate from Guidelines



My research outputs from this project:

- Antibiotic choice in UK general practice: rates and drivers of potentially inappropriate antibiotic prescribing. M Nowakowska, D Ashcroft, A White, W Welfare, T van Staa, V Palin (2019). https://doi.org/10.1093/jac/dkz345
- Antibiotic prescribing for common infections in UK general practice: variability and drivers.
 V Palin, A Molter, M Belmonte, D Ashcroft, A White, W Welfare, TP van Staa (2019). https://doi.org/10.1093/jac/dkz163
- Relationship between prescribing of antibiotics and other medicines in primary care: a crosssectional study. Y Li, A Mölter, V Palin, M Belmonte, M Sperrin, DM Ashcroft, A White, W Welfare, TP van Staa (2018). DOI: https://doi.org/10.3399/bjgp18X700457
- Antibiotic prescribing patterns in general medical practices in England: Does area matter? A Mölter, M Belmonte, V Palin, C Mistry, M Sperrin, A White, W Welfare, TP van Staa (2018). https://doi.org/10.1016/j.healthplace.2018.07.004
- The effectiveness of frequent antibiotic prescribing in reducing the risk of infection-related hospitalisations: results from two large population-based cohorts in primary care, TP van Staa, V Palin, W Welfare, T Felton, P Dark, D Ashcroft (2019). In Review
- Do systemic antibiotics affect the effectiveness of chemotherapy for malignant cancers? A cohort study based on CPRD and Cancer Registry data. E Domzaridou, T van Staa. D Ashcroft, W Welfare, V Palin. In Review
- Building the learning healthcare system to feedback data analytics and support decision making by clinicians and policy makers: an exemplar of optimising antibiotic prescribing in UK primary care. E Tempest, V Palin, C Mistry, M Belmonte, Z Kapacee, E Griffiths, M Crotty, B Green, P Couch, F Jury, B Brown, J Tsang, TP van Staa. In Review
- 8. Infection-related hospitalisations after common infections are associated with the level of new antibiotic prescribing in primary care: retrospective cohort study using linked electronic health records. B Van Bodergraven, M Belmonte, **V Palin**, C Mistry, A White, W Welfare, D Ashcroft, TP van Staa. In Review
- 9. Are shorter courses of antibiotics an effective strategy to reduce infection-related complications in primary cares? **V Palin**, C Mistry, W welfare D Ashcroft, TP van Staa. In Preparation

References:

1: O'Neill J on behalf of the Review on Antimicrobial Resistance. Tackling drug resistant-infection globally: final report and recommendations. https://amr-review.org/sites/default/files/160518_Final paper_with cover.pdf.

2: PHE. English Surveillance Programme for Antimicrobial Utilisation and Resistance (ESPAUR). 2018

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/759975/ESPAUR_201 8_report.pdf.

3: Palin V et al. Antibiotic prescribing for common infections in UK general practice: variability and drivers. J Antimicrob Chemother 2019; DOI: 10.1093/jac/dkz163

4: Mölter A et al. Antibiotic prescribing patterns in general medical practices in England: Does area matter? Health Place 2018; DOI: 10.1016/j.healthplace.2018.07.004

5: Nowakowska M et al. Antibiotic choice in UK general practice: rates and drivers of potentially inappropriate antibiotic prescribing . J Antimicrob Chemother 2019; DOI: 10.1093/jac/dkz345

6: Tripathy JP et al. Ten tips to improve the visibility and dissemination of research for policy makers and practitioners. Public Heal action 2017; DOI:10.5588/pha.16.0090