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Principal
Investigator:

Professor Noel
McCarthy

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Website address:

[http://
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Project report

The CDCE² team has just completed a Food Standards Agency funded collaborative project with PHE identifying lessons on how to improve use of pathogen genomics and routine data sources in the investigation of (potentially) foodborne outbreaks. This work “Exploring the joint analysis of routine data and pathogen genomic datasets in the investigation of outbreaks of GI infection.” reviewed outbreaks investigated by PHE, the FSA and other partners. The work developed with collaborators across the NIHR HPRU in GI infections had extensive FSA funded input from across PHE as well as academic collaborations with Oxford and Liverpool. Among the findings identified by reviewing reports and an expert workshop [photographs on the right] were: (i) the effectiveness of investigating small outbreaks by integrating pathogen genome data in surveillance and outbreak investigation, including demonstration of the potential for increased accuracy and efficiency in analytical epidemiological studies; (ii) gaps in basic epidemiological information that are being identified in the investigation of identified genomic clusters; (iii) the capacity of available routine data sources to provide alternatives to control exposure data – especially for rare exposures; (iv) the lack of data describing the distribution of populations of important human pathogens in the food chain and environment; and (v) the increasing frequency of food chain investigations in outbreaks of foodborne disease. Further work on these last two findings includes a systematic literature review and the development of a protocol for taking an analytical study approach to food chain investigations respectively. A copy of the full draft report submitted to the FSA is available from eileen.taylor@warwick.ac.uk



Dr Hendramoorthy Maheswaran was recently awarded his PhD by Warwick Medical School. In his PhD he investigated the cost-effectiveness of HIV self-testing (HIVST) in Malawi, and was funded through a Wellcome Trust research training fellowship. HIVST offers an approach, especially amongst men, to increasing uptake of HIV testing and timely entry into HIV care services in sub-Saharan Africa. The research undertaken in the PhD found implementing HIVST, in countries like Malawi, to be cost-effective. Research outputs from his PhD and through collaborations have been published in BMC Medicine, PLOS Medicine and JAMA, and have informed the most recent WHO HIV testing guidelines. He continues to be involved in HIVST research and is part of a UNITAID funded research consortium examining scale-up of HIVST in resource-constrained settings. His work forms part of a growing collaboration between the medical school and the Malawi-Liverpool Wellcome Trust Clinical Research Programme. He is planning to apply for a Wellcome Trust carer development fellowship in the coming year.



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CDCE² publications over the past year

Publications by CDCE² staff have covered the areas of evidence synthesis, (1-3) the application of pathogen genome sequencing in outbreaks (4, 5), the genomics of the foodborne bacterial pathogen *Campylobacter* (5-8), testing for HIV (9, 10), communicable disease surveillance (7, 11), immunisation (12-15) and one on nutrition (16).

Evidence synthesis work describing the burden of, and risk factors for, community onset sepsis was undertaken to support Public Health England (PHE) in advising the Department of Health on community facing information interventions for sepsis (1, 3). A commentary "How to conduct systematic reviews more expeditiously?" in response to an increasing literature that is grouped under "rapid reviews" was intended to bring clarity to the different motivations driving a move toward less onerous systematic review methods (2). This commentary was among the 10 most influential papers in 2015 in the journal (Systematic reviews) as assessed by the journal using Altmetric.

Collaborative work with PHE colleagues on the **use of pathogen genome sequencing in outbreak investigation** included one invasive group A streptococcus (iGAS) and one milk-borne outbreak.

The iGAS outbreak across two nursing homes described approaches to develop a small bespoke reference population for outbreaks when larger reference populations are not available, and the use of two independent analytical approaches to allow robust inference when there is no standard accepted approach (4). The study of a milk-borne outbreak of *Campylobacter* identified the potential for this to be an unidentified source of substantial sporadic disease alongside a rare cause of identified outbreaks (5). Other work on pathogen genetics included mapping the genetic diversity of *Campylobacter* across commercial production of poultry in England (8) and a more in depth study on the dynamics of transmission of this pathogen in a single flock (6).

Published work on **testing for HIV** infection focussed on self-testing in Malawi considering both clinical care (10) and health economic (9) aspects of this

approach. This work was part of clinical lecturer Hendy Maheswaran's PhD project described more fully overleaf in this issue.

Disease **surveillance** papers included genomic surveillance, estimating the burden of human *Campylobacter* infection coming from wild birds (7), and estimation of the bias in GI surveillance data due to differential investigation and reporting of infections (11). Published work on **immunisation** included evaluations of: (i) the impact of guidance on the immunisation of chemotherapy patients (15), (ii) the impact of a community immunisation advice line (14), and (iii) hospital based targeted staff pertussis immunisation programmes (12) as well as one paper reporting the findings from long term follow up of a vaccine trial (13).

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Collaborations: The group is continuing research across evidence synthesis, public health applications of pathogen genomics, HIV testing, epidemiological method development, and immunisation. We are open to collaborations in these areas and other aspects of evidence and epidemiology for communicable disease control. Please contact Noel McCarthy (n.d.mccarthy@warwick.ac.uk) if this is of interest.