## Personal details and summary

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I am a clinically qualified (veterinarian) mid-career medical science researcher with expertise across a broad range of infectious disease research areas spanning virology, microbiology, genomics and bioinformatics, epidemiology, and public health. I have an established international profile as a leader in microbial genomic epidemiology and antimicrobial resistance, significant research outputs in leading medical journals, and have secured funding from multiple relevant funders (Wellcome, MRC, NIHR, AMS, BMGF). I have a firm grasp of the research landscape and experience with science implementation across different settings; including veterinary and public health, high- and lower-and-middle- income countries, and specific science policy experience.

## Employment record

Clinical Veterinarian 2006 – 2008
Emergency and Critical Care and Companion Animal work

Cambridge Infectious Diseases Consortium Junior Research Fellow 2008 – 2010
Competitive fellowship
University of Cambridge

Wellcome Trust Clinical Research Training Fellow 2010 – 2013
Personal Doctoral Fellowship
University of Cambridge

Postdoctoral Research Fellow 2013 – 2016
Wellcome Trust Sanger Institute **maternity leave Jul 2015 – Apr 2016*

Wellcome Trust Clinical Research Career Development Fellow 2016 – 2019
Tenure Track Fellow
Personal Postdoctoral Fellowship
University of Liverpool **maternity leave Jan 2018 – Oct 2018*

Wellcome Trust Clinical Research Career Development Fellow 2019 –
Honorary Senior Lecturer
University of Liverpool

Expert Science Cell Adviser (Secondee) Mar – Aug 2020
SAGE COVID19 response team
Government Office for Science

## Education

Bachelor of Veterinary Science (Honours) 2003 – 2006
University of Melbourne, Australia

Doctorate of Philosophy 2008 – 2012
University of Cambridge, United Kingdom

University of Liverpool, United Kingdom 2013 – 2016
Certificate of Professional Studies in Learning and Teaching in Higher Education

London School of Hygiene and Tropical Medicine, United Kingdom 2019 –
Masters of Science, Epidemiology (Ongoing)

Leadership and development training (various) 2016 – 2020
Aurora: women leaders in Higher Education, EMBO Laboratory Management for Group Leaders, SUSTAIN (Academy of Medical Sciences)

**Relevant Professional Registrations/Memberships**

Royal College of Veterinary Surgeons, Master 2013 –
Advance HE (formerly Higher Education Academy), Fellow 2019 –
Microbiology Society, Member and Journal Editor 2009 –
Society for Applied Microbiology, Member 2016 –

**Principal investigator awards/Fellowships**

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| Medical Research Council New Investigator Research Grant<br>*Informing shigellosis treatment and management through pathogen genomics* | £313,610 | 2018 – |
| Academy of Medical Sciences Springboard award<br>*Multi-species models of antimicrobial resistance emergence and persistence developed from real world epidemics* | £99,734 | 2017 – |
| Wellcome Trust Clinical Career Development Fellowship<br>*Mathematical modelling frameworks for incorporating bacterial genomics into antimicrobial stewardship* | £305,729 | 2014 – |
| Wellcome Trust Clinical Research Training Fellowship<br>*Evolutionary and transmission dynamics of henipavirus infection in the African straw-coloured fruit bat* | £263,000 | 2010-2013 |

**Co-investigator awards**

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|---|---|---|
| Bill and Melinda Gates Foundation<br>*International surveillance study for Shigella (Malawi site)* | £TBD | 2020 – |
| National Institute for Health Research<br>Health Protection Research Unit<br>Gastrointestinal Diseases (2) | £3,700,000 | 2020 – |
| Biotechnology and Biological Sciences Research Council<br>*High quality long read sequencing from low input DNA*<br>Purchase of PacBio Sequel II | £418,686 | 2020 – |
| ESRC Newton fund<br>*The chicken or the egg: dissemination of antimicrobial resistance in poultry in India* | £1,864,850 | 2018 – |

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| GCRF: NIB Data and Resources<br>*Transmission of Salmonella in Africa* | £195,190 | 2018-2020 |
| Competitive internal awards<br>*Including studentships and various flexible funding opportunities* | £359,971 | 2016 – |

**Leadership roles**

*Principal investigator* 2016 –
I lead an applied microbial genomics research group comprised of two postdoctoral research associates and three PhD students.

*Publication reviewer* 2010 –
Nature Communications, Science Advances, Nature Microbiology, Genome Medicine, PLoS Genetics, Nature Ecology and Evolution, Microbial Genomics, Molecular Ecology, Journal of Medical Microbiology, BMC Infectious Diseases, mBio and others

*Grant reviewer* 2018 –
Wellcome Trust, French National Research Agency, Leverhulme Trust, Scottish Chief Scientist Office, Clare College Cambridge, I unfortunately dad to decline requests from BBSRC and MRC while seconded during 2020

*Research degree examiner* 2017 –
Doctorates of Philosophy (Universities of Edinburgh and Liverpool)
Masters of Philosophy (Universities of Cambridge and York)

*Research theme lead and steering committee member* 2020 –
Predict and prevent theme lead NIHR HPRU in GI disease

*Member representing HPRUs* 2020
NIHR Academy Local Authority Advisory Task and Finish Group

*Editor, Microbial Genomics* 2019 –
Field leading Microbiology Society journal (Highest IF at the Society)

*Organiser and chair, Genome Science Conference* 2016 –
This is a UK-led international conference that attracts ~250 delegates per year, organising committee member and microbial genomics session organiser and chair

*Microbiology Society annual conference* 2017
Session chair

*Other internal leadership roles at University of Liverpool*

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|---|---|
| Institutional Fellowship applications committee, Member | 2020 – |
| Centre for Genomics Research, Affiliate | 2019 – |
| Institutional Public Engagement committee, Theme Representative | 2016 – 2020 |
| Organised and hosted EMBO Lab Management training course | 2019/2020 |
| EPSRC Liverpool Centre for Mathematics in Healthcare, Affiliate | 2016 – |

**Impact and knowledge exchange**

*Invited speaking engagements* 2016 –
National: Universities of Surrey, Sheffield, Cambridge, Oxford, LSHTM; British Society for

Microbial Technology, Microbiology Society (2), Genome Science, Wellcome Trust Advanced Courses (4), National Collection of Type Cultures Centenary Celebration, Applied Bioinformatics and Public Health Microbiology
International: University of Maryland, Baltimore (2); Harvard University Microbial Sciences Initiative; Doherty Institute/University of Melbourne Australia. Conferences: American Society for Microbiology Next Generation Sequencing Meeting, Washington, DC, USA (opening plenary); Society for Molecular Biology and Evolution, Kyoto, Japan; Gordon Research Conference, Microbial Population Biology.

*Science advisory roles during the COVID-19 pandemic* 2020 –
During a five-month secondment as an External Science Cell Advisor to the Scientific Advisory Group for Emergencies (SAGE) COVID-19 response team in the Government Office for Science I provided scientific support to the response team and prepared advisory notes, including one considered at SAGE and one which directly influenced DHSC policy. Simultaneously, in my capacity as an independent academic, I was one of a dozen leading infectious disease scientists identified through the Microbiology Society that formed a COVID-19 Scientific Expert Panel Advisory Group to consult with Deloitte and the Office for Life Sciences on developing various aspects of testing infrastructure.

*Public health management of shigellosis* 2013 –
Working with an international team of Public Health collaborators, I identified a new antimicrobial resistance threat driving the global emergence of sexually transmissible shigellosis. This was discovered through genomic studies as phenotypic testing was not yet in place. The study manifest as a Lancet Infectious Diseases paper and has contributed to updating treatment recommendations. We have continued our work on sexually transmissible shigellosis developing new mechanisms for detecting sexually transmissible outbreaks, and identifying further drivers of disease, and characterising a new, chronic course of infection.

*Extensive public/media engagement around historical Shigella* 2014 –
Working with the National Collection of Type Cultures I work with historical enteric pathogens to elucidate their evolution, create public resources, and a commemorative WWI study. This work has led to several publications and attracted much attention in popular science, being covered in print/online news media (e.g. New York Times, New Scientist, Telegraph), radio (BBC Cambridgeshire, the World Service, NPR) and television (ITV and BBC East) interviews and 'The Tangled Tree' by David Quammen. Sanger in house press video.

*Working toward a shigellosis vaccine* 2013 –
Building on my postdoctoral experience in a combined industry academic STOPENTERICS consortium, my current work will contribute to the management of shigellosis through vaccination. Through my MRC-NIRG I work with field epidemiologists and vaccine developers at the University of Maryland, Baltimore, to build genomic insights into vaccination planning. Furthermore, I have recently secured a role in the Malawi arm of the international *Shigella* surveillance study initiative from the Bill and Melinda Gates foundation, building on preliminary studies of *Shigella* genomics in the country.

*Whole genome sequencing for microbial surveillance in Latin America* 2013 – 2016
During my postdoctoral work, I was involved in a program of collaborative research and training to bring whole genome sequencing to the Latin America and Caribbean PulseNet epidemiological surveillance network. As well as delivering an exemplar study, I contributed to design, development, and delivery of multiple training courses across the region and trained visiting scientists. This is captured in a collaborative publication and as a case study in the WHO's Global Antimicrobial Resistance and Use Surveillance System Whole Genome Sequencing for surveillance of antimicrobial resistance.

*Surveillance of bat-derived zoonotic viruses* 2009 – 2013

My doctoral work was on the emergence of zoonotic viruses from African fruit bats. Working between the Veterinary Health Agency in Ghana, the Australian Animal Health Laboratories in Australia, and institutes in the UK (Veterinary Laboratories Agency and Institute for Zoology) I developed tests later adopted as the national diagnostic test, transferred diagnostic PCR and serological testing for henipaviruses to the UK, and developed research capacity in Ghana through training and infrastructure development. I also engaged the public through Ghanaian national television and participated in the Royal Society Summer Science Exhibition.

**Teaching**

2014 –Teach on various undergraduate and postgraduate modules and have experience in coursework design and delivery at UoL and with Wellcome Trust Advanced Courses.

**Highlight publications**

Full: 62 papers, 1545 citations, h-index 21, >200 co-authors on 6 continents

Bengtsson, R.J. … Bennett, R.J., **Baker, K.S.** (preprint) Accessory genome dynamics and structural variations of *Shigella* from persistent infection doi.org/10.1101/2020.09.28.316513

Pulford, C.V., … **Baker, K.S.,** Hinton, J.C.D. (2020, in press) The stepwise evolution of *Salmonella* Typhimurium responsible for bloodstream infection in Africa. *Nature Microbiology*

Barr, J… **Baker**, **K.S.**, Cunningham, A.A., Wood, J.L.N., Middleton, D., Wang L.F. (2018). Animal infection studies of recently discovered bat paramyxoviruses. *Scientific Reports*, 8.

**Baker, K.S.** (2020) Microbe hunting in the modern era: reflecting on a decade of genomic epidemiology. *Current Biology.* 30:19 PR1124 – 1130.

Mayers, C, **Baker, K.S.** (3rd June, 2020) Impact of false-positives and false-negatives in the UK's COVID-19 testing programme. *Advice note considered by SAGE*.

Bardsley, M., Jenkins, C., … **Baker, K.S.**, Foster, K., Hughes, G., Dallman, T.J. (2020) Persistent transmission of shigellosis in England is associated with a recently emerged multidrug-resistant strain of *Shigella sonnei*. *Journal of Clinical Microbiology*

Bennett, R. J., & **Baker, K.S.** (2019). Looking backward to move forward: The utility of sequencing historical bacterial genomes. *Journal of Clinical Microbiology.* 57(8). doi:10.1128/JCM.00100-19.

**Baker, K.S.** … Jenkins, C., Thomson. N.R. (2018) Horizontal antimicrobial resistance transfer drives epidemics of multiple *Shigella* species. *Nature Communications.*

**Baker, K.S …**Hughes, G., Jenkins, C., Thomson. N.R. (2018) Genomic epidemiology *Shigella* in the United Kingdom shows transmission of pathogen sublineages and determinants of antimicrobial resistance. *Nature Scientific Reports*. May 9(8):7389.

**Baker, K.S.,** Dallman, T.J., Thomson, N.R., Jenkins, C. (2018) An outbreak of a rare STEC serotype (O117:H7) among men who have sex with men. *Microbial Genomics.* Jul; 4(7)

Peel, A.J., **Baker, K.S.,** Hayman, D.T.S., Broder, C.C., Cunningham, A.A., Fooks, A.R., Garnier, R., Wood, J.L.N., Restif, O. (2018) Support for viral persistence in bats from age-specific serology and models of maternal immunity. *Nature Scientific Reports*. 8:1, 3859.

Suárez-Esquivel, M, **Baker, K.S.**, … Moreno, E., Guzmán-Verri, C. (2017) Brucella genetic variability in wildlife marine mammal populations relates to host preference and ocean distribution. *Genome Biology and Evolution.* (9:7) 1901 – 1912.

**Baker, K.S.**^, Campos, J., … Thomson, N.R.^ ^joint corresponding (2017) Whole genome sequencing of *Shigella sonnei* through PulseNet Latin America and Caribbean: advancing global surveillance of foodborne illnesses. *Clinical Microbiology and Infection*. Nov; 23(11)

**Baker, K.S.**, Dallman, T., Behar, A., … Jenkins, C., Cohen, D., Thomson, N.R. (2016) Travel- and community- based transmission of multidrug-resistant *Shigella sonnei* lineage among international Orthodox Jewish communities. *Emerging Infectious Diseases*. (9)

**Baker, K.S.,** Burnett, E., … Russell, J., Parkhill, J. (2015) The Murray collection of pre-antibiotic era *Enterobacteriacae*: a unique research resource. *Genome Medicine*. 7 (1), 1-7

**Baker, K.S.,** … Jenkins, C., Thomson, N.R. (2015) Intercontinental dissemination of azithromycin-resistant shigellosis through sexual transmission: a cross sectional study. *The Lancet Infectious Diseases*. Aug; 15 (8): 913 – 21.

Rowe, W. **Baker, K.S.,** … Maskell, D., Pearce, G. (2015) Search Engine for Antimicrobial Resistance: a cloud compatible pipeline and web interface for rapidly detecting antimicrobial resistance genes directly from sequence data. *PLoS One*. 10 (7) e0133492

Rossi, O.*, **Baker, K.S.*,** Phalipon, A. … Thomson, N.R. (2015) Draft genomes of Shigella strains used by the STOPENTERICS consortium. *Gut pathogens*. 7 (1), 1

Wand, M.E., **Baker, K.S.,** … Sutton, J.M. (2015) Characterisation of pre-antibiotic era *Klebsiella pneumoniae* isolates with respect to antibiotic/disinfectant susceptibility and virulence in *Galleria mellonella*. *Antimicrobial Agents and Chemotherapy*. (4) 20

Connor, T.*, **Baker, K.S.*** … Thomson, N.R. (2015) Species-wide whole genome sequencing reveals historical global spread and recent local persistence in *Shigella flexneri*. *eLife*. 4 e07335

**Baker, K.S.**, Mather, A.E. … Thomson, N.R. (2014) The extant World War 1 dysentery bacillus NCTC1: a genomic analysis. *The Lancet.* 384 (9955), 1691 – 1697

**Baker, K.S.** … Wood, J.L.N., (2014) Viral antibody dynamics in a chiropteran host, *Journal of Animal Ecology***,** Volume 83, Issue 2, pages 415–428**.**

Peel, A.J., Sargan, D., **Baker, K.S.**, … Wood, J.L.N, Cunningham, A.A. (2013) Continent-wide panmixia of an African fruit bat facilitates transmission of potentially-zoonotic viruses, *Nature Communications*, 4, Article number: 2770.

**Baker, K.S.** … Murcia, P.R. (2013) Metagenomic study of the viruses of African straw-colored fruit bats: detection of a chiropteran poxvirus and isolation of a novel adenovirus, *Virology*.

**Baker, K.S.** … Wang, L.F. (2013) Novel potentially-zoonotic paramyxoviruses from the African straw-colored fruit bat, Eidolon helvum. *Journal of Virology.* (Cover). 87(3):1348.

Wood, J.L., … **Baker, K.S.** ... Field, H.E. & Cunningham, A.A. (2012) A framework for the study of zoonotic disease emergence and its drivers: spillover of bat pathogens as a case study. *Philosophical transactions of the Royal Society of London. Series B.* 367, 2881-2892.

**Baker, K.S.**, … Cunningham, A.A. (2012) Co-circulation of diverse paramyxoviruses in an urban African fruit bat population. *Journal of General Virology,* 93, 850-856.