

Callum Arnold

PHD CANDIDATE

Pennsylvania State University, State College

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Education

PhD Infectious Disease Modelling (Biology)

State College, USA

PENNSYLVANIA STATE UNIVERSITY

Aug 2020 - Jun 2025

- University Graduate Fellowship
- Homer F. Braddock Scholarship in Biology, Chemistry, and Physics (Eberly College of Science)

MSc Global Health Policy

London, UK

LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE

Sep 2017 - Jun 2020

- Distinction
- Board of Examiners' Academic Achievement Award

MChem Chemistry

Oxford, UK

UNIVERSITY OF OXFORD

Sep 2011 - Jun 2015

- Class I in Master's research year (supervisor: Prof R. Paton)

Short Courses

Summer Institute in Statistics and Modeling in Infectious Diseases (SISMID)

Seattle, USA

UNIVERSITY OF WASHINGTON

Jul 2021

- 2 week course on the modelling of infectious disease through a wide variety of statistical techniques
- Awarded SISMID scholarship
- Courses completed: Simulation-Based Inference for Epidemiological Dynamics, Contact Network Epidemiology, MCMC II for Infectious Diseases

Machine Learning A-Z: Hands-On Python & R In Data Science

Online

UDEMY

Jul 2019 - Dec 2019

- Learnt regression and machine learning techniques in Python and R

Network Modelling for Epidemics

Seattle, USA

UNIVERSITY OF WASHINGTON

Aug 2018

- 5-day course on the application of stochastic agent-based network modelling techniques to complex epidemic models, building from deterministic and stochastic compartmental models

Mathematical Modelling of Communicable Diseases (CHL5425H)

Toronto, CAN

UNIVERSITY OF TORONTO

Jan 2018 - Apr 2018

- Audited graduate course on mathematical modelling of infectious diseases (course director: Prof D. Fisman)

Python for Epidemiology

Online

EPI SKILLS

Feb 2018

- Learnt to apply Python modules such as `epipy`, `pandas`, and `seaborn` for epidemiological purposes

Research Experience

Pennsylvania State University

State College, USA

PHD CANDIDATE

Aug 2020 - Jun 2025

- Data4Action: Characterized the heterogeneity of SARS-nCoV-2 seroprevalence among two geographically coincident populations, and identified risk factors for infection among students
- Data4Action: Performed Latent Class Analysis (LCA) on the SARS-nCoV-2 seroprevalence data, to identify the relationship between risk behavior and infection and vaccination rates among student population
- UrgEpi: Examined the role of a new laboratory on the speed of diagnosis and outbreak response decisions for measles in the ex-Katanga region of the Democratic Republic of Congo

Division of Infectious Diseases, The Hospital for Sick Children

Toronto

CLINICAL RESEARCH PROJECT COORDINATOR

Apr 2018 - Dec 2019

- Coordinated a multi-centre observational study into waning immunity in infants to measles, mumps and varicella
- Managed all data produced by the National Microbiology Laboratory and the Nova Scotia Health Authority laboratory for the waning immunity study
- Conducted data analysis on additional research studies within the Infectious Diseases division, and in collaboration with epidemiologists at Public Health Ontario
- Provided statistical expertise to HSC clinician's research

BOTNAR, OUH Trust

Oxford, UK

HONORARY CLINICAL RESEARCHER

Jun 2016 - May 2019

- Primary image analyst of a novel 4-D CT scanning technique for better hip osteoarthritis screening and management
- Contributing researcher in the large longitudinal, cross-sectional FAIM study funded by Arthritis Research UK that aims to determine whether adolescent activity levels affect hip morphology, and assists in early detection of deterioration

John Radcliffe Hospital, OUH Trust

Oxford, UK

HONORARY CLINICAL RESEARCHER

May 2016 - Apr 2017

- Conducted with a Thoracic Consultant a retrospective review of VATS Parathyroidectomies that was presented at the national cardiothoracic conference

University of Oxford

Oxford, UK

MCHEM PROJECT

Sep 2014 - Jun 2015

- Utilised and wrote Python and Bash scripts to extract relevant data from files generated by the computational chemistry software Gaussian
- Employed Natural Bond Orbital analysis and Monte-Carlo conformational searching to highlight a chiral pocket in ammonium thiolate-catalyst pair, validating computed pathways with empirical results

Professional Engagement

PEER REVIEWER

Nov 2021 - Jun 2022


- Peer-reviewed for JAMA Network Open on epidemiological modeling papers

INVITED DISCUSSIONS

Apr 2022

- Invited to speak with Dr. Alex Perkin's (Notre Dame) graduate infectious disease epidemiology course about the Data4Action project and Scientific Reports publication

Skills & Software

 `{tidyverse}` & functional programming with `{purrr}`, analysis pipelines with `{targets}`, `{rlang}` & Non-Standard Evaluation, parameterized reports with `{rmarkdown}` & Quarto, `{deSolve}`

 `{DataFrames}`, `{DifferentialEquations}`, `{Gadfly}`, `{ModelingToolkit}`

Others: Git, REDCap, basic LaTeX, pandoc, Python, STATA, Berkeley Madonna

Other Experience

Pennsylvania State University

State College, USA

TEACHING ASSISTANT

Jan 2022 - May 2022

- Independently taught 50 undergraduate Biology students Bio240W Laboratory (Function and Development of Organisms)
- Created a welcoming environment for my students where they could ask questions and make mistakes, resulting in students asking for assistance with personal research projects
- Worked closely with the senior TA to ensure that the material was at an appropriate level for the students to understand, and provide them with the necessary statistical background

Tortoise Club (Oriol College Boat Club Alumni Society)

Oxford, UK

SECRETARY AND TREASURER

Feb 2016 - Nov 2018

- Lead the structural changes to the club, including introducing a constitution, club protocol, organisation of AGMs, and reconnecting with the 400 disconnected eligible members
- Instrumental in the introduction of women to the club after 30 years of exclusion
- Introduced and lead the initiative to provide the Oriol College Boat Club with long-term financial stability through a Direct Debit scheme that was successful in reaching its first-year fundraising target of 20,000 GBP in annual donations, increasing affordability and accessibility to all students

Greene's Tutorial Company

Oxford, UK

TUTOR

Sep 2015 - Jul 2017

- Tutored GCSE and A-Level students in mathematics and the sciences to assist them in achieving their academic goals for their CIE/Edexcel/AQA exams, and for Oxford University interviews and admission tests

d'Overbroeck's

Oxford, UK

MATHEMATICS TEACHER

Nov 2016 - Jul 2017

- Responsible for the teaching of the A-level maths syllabus, including introductory statistics and mechanics
- Sole teacher, for one term, of a gifted year-8 student covering 1st and 2nd-year University-level maths and statistics
- Assisted in teaching A-level physics students, and helped prepare them for assessed practical exams

Keble College, Oxford

Oxford, UK

ASSISTANT ROWING COACH

Sep 2015 - Jul 2017

- Fostered the ability to empathise and connect with athletes and coaches gaining their trust, resulting in a greater commitment to the changes I enacted, ultimately making these decisions more effective
- Organised athletes' data to ensure useful metrics are produced, allowing constructive analysis of performance via a KPI dashboard that summarised an athlete's physiological profile on one page

Discovery Surf School

Bigbury, UK

SURF INSTRUCTOR

Dec 2010 - Sep 2015

- Lead and organised on-day logistics for work with young adults and children with learning difficulties
- Lead and supervised beginner groups of 90+ students and 10 instructors, ensuring quality in each group

Oriel College Boat Club

Oxford, UK

CAPTAIN OF BOATS

Jul 2014 - Jul 2015

- Engaged with alumni to create an appointed-board governance structure within the alumni society, which would become the platform for the fundraising initiative
- Through routine conversations with the individual crews about their relative strengths and areas for improvement, and a collaborative approach to designing their training programs, each boat outperformed their competition during the racing season, including winning the Summer Vllls regatta, and becoming the first Oxford College to win the Henley Boat Races

Athletic Experience

PERSONAL

- Competed in the 2017 Half-Ironman World Championships after winning my age-group slot at the qualifying race
- Won 'Blades' during both Torpids and Summer Vllls Oxford rowing regattas, and the Henley Boat Races

Publications

JOURNAL ARTICLES

1. Arnold, C. R. K., Srinivasan, S., Rodriguez, S., Rydzak, N., Herzog, C. M., Gontu, A., Bharti, N., Small, M., Rogers, C. J., Schade, M. M., Kuchipudi, S. V., Kapur, V., Read, A. F., & Ferrari, M. J. (2022). A longitudinal study of the impact of university student return to campus on the SARS-CoV-2 seroprevalence among the community members. *Scientific Reports*, 12(1), 8586. <https://doi.org/10.1038/s41598-022-12499-5>
2. Fernquest, S., Palmer, A., Pereira, C., Arnold, C., Hirons, E., Broomfield, J., Newman, S., & Glyn-Jones, S. (2020). The Response of Hip Joint Cartilage to Exercise in Children: An MRI Study Using T2-Mapping. *CARTILAGE*, 1947603520931182. <https://doi.org/10.1177/1947603520931182>
3. Han, M. A., Storman, D., Al-Rammahy, H., Tang, S., Hao, Q., Leung, G., Kandi, M., Moradi, R., Bartoszko, J. J., Arnold, C., Rehman, N., & Guyatt, G. (2020). Impact of maternal reproductive factors on cancer risks of offspring: A systematic review and meta-analysis of cohort studies. *PLOS ONE*, 15(3), e0230721. <https://doi.org/10.1371/journal.pone.0230721>
4. Piché-Renaud, P.-P., Groves, H., Kitano, T., Arnold, C., Thomas, A., Streitenberger, L., Alexander, L., Morris, S. K., & Science, M. (2020). Healthcare workers' perception of a global outbreak of novel coronavirus (COVID-19) and personal protective equipment: Survey of a pediatric tertiary care hospital. *Infection Control & Hospital Epidemiology*, 1-25. <https://doi.org/10.1017/ice.2020.415>
5. Science, M., Savage, R., Severini, A., McLachlan, E., Hughes, S. L., Arnold, C., Richardson, S., Crowcroft, N., Deeks, S., Halperin, S., Brown, K., Hatchette, T., Gubbay, J., Mazzulli, T., & Bolotin, S. (2019). Measles Antibody Levels in Young Infants. *Pediatrics*, e20190630. <https://doi.org/10.1542/peds.2019-0630>
6. Craig, R., Kunkel, E., Crowcroft, N. S., Fitzpatrick, M. C., de Melker, H., Althouse, B. M., Merkel, T., Scarpino, S. V., Koelle, K., Friedman, L., Arnold, C., & Bolotin, S. (2019). Asymptomatic Infection and Transmission of Pertussis in Households: A Systematic Review. *Clinical Infectious Diseases*. <https://doi.org/10.1093/cid/ciz531>

- Fernquest, S., Arnold, C., Palmer, A., Broomfield, J., Denton, J., Taylor, A., & Glyn-Jones, S. (2017). Osseous impingement occurs early in flexion in cam-type femoroacetabular impingement. *The Bone & Joint Journal*, 99-B, 41–48. <https://doi.org/10.1302/0301-620X.99B4.BJJ-2016-1274.R1>

POSTERS

- Arnold, C., Srinivasan, S., Herzog, C. M., Gontu, A., Bharti, N., Small, M., Rogers, C. J., Schade, M. M., Kuchipudi, S. V., Kapur, V., Andrew, R., & Ferrari, M. J. (2021, June 14–17). *SARS-CoV-2 Seroprevalence in a University Community: A Longitudinal Study of the Impact of Student Return to Campus on Infection Risk Among Community Members*. EEID 2021, Montpellier, France. <https://www.eeidconference2021.org/posters-full/>
- Khan, S., Science, M., Tsang, K., Arnold, C., Hawes, J., Lee, K.-S., El Helou, S., Sanchez, P., Mertz, D., Kaufman, D., & Team, G. T. (2019, October 3). *Provider Perspectives on Non-sterile Glove Use in the NICU*. Infectious Diseases Society of America IDWeek, Washington, D.C.
- Science, M., Khan, S., Arnold, C., Bacchini, J., Lee, K.-S., Hawes, J., Sanchez, P., Kaufman, D., & Team, G. T. (2019, October 3). *Parent Perspectives on Infection Prevention and Control in the NICU*. Infectious Diseases Society of America IDWeek, Washington, D.C.
- Timberlake, K., Al-Dubisi, F., Arnold, C., Roofi Badie, S., Friedman, J., & Science, M. (2019, May 30). *Acute Non-Severe Respiratory Syndromes; Benchmarking for Resource Stewardship*. International Pediatric Antimicrobial Stewardship Conference, St Louis, Missouri, USA.
- Al-Dubisi, F., Timberlake, K., Arnold, C., Roofi Badie, S., Friedman, J., & Science, M. (2019, May 29). *Acute Non-Severe Respiratory Syndromes; Benchmarking for Resource Stewardship*. University of Toronto Department of Pediatrics and Faculty of Medicine Research Day, Toronto, Canada.
- Leps, C., Arnold, C., Benipal, S., & Persuad, N. (2019, April 5). *A realist synthesis of food provision and children's health – policy implications and areas of focus*. University of Toronto Department of Family and Community Medicine (DFCM) Conference, Toronto, Canada.
- Garcia-Ascaso, M. T., Timberlake, K., Arnold, C., Ostrow, O., & Science, M. (2019, March 9). *Appropriateness of broad spectrum antibiotics in a Pediatric Emergency Department*. Pediatric Infectious Diseases Society, Memphis, Tennessee.
- Science, M., Timberlake, K., Arnold, C., Fung, J., Moninhas, S., & Read, S. (2018, May 5). *Impact of Mandatory Prior Authorization and Automatic Stop Orders on Prolonged Broad Spectrum Antimicrobial Therapy*. Pediatric Academic Societies Meeting, Toronto, Canada.
- Arnold, C., Mihai, R., Pigott, D., Sadler, G., & Belcher, E. (2017, March 12). *Feasibility of Video-Assisted Thoracoscopic Surgery (VATS) Parathyroidectomy in Management of Intrathoracic Parathyroid Adenoma*. SCTS Annual Meeting and Cardiothoracic Forum, Belfast, Northern Ireland.