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Antonio Remiro-Azócar, PhD

Statistical Methodology and Innovation Leader

Experience

Industry

Expert in Statistical Methodology, *Novo Nordisk Pharma*, Madrid, Spain. **Apr 2024–**

- Development and implementation of innovative methodology for the enrichment of clinical trials with real-world data sources and for the transportability and generalizability of research data
- Expert statistician for quantitative evidence synthesis, data fusion, HTA and observational science
- Knowledge-sharing, training and mentoring in statistical methodology, in general and in relation to clinical projects
- Cross-functional interactions with upper management and stakeholders to explain the added value generated by new methodologies
- Establishment of external research collaborations and engagement with academia, scientists, regulators and policy-makers
- Representation of Novo Nordisk internationally at relevant cross-industry working groups and conferences
- Driving initiation of industrial master thesis/PhD/post-doc collaborations as well as scientific publications

Honorary Research Fellow, *Department of Statistical Science, University College London*. **Dec 2025–**

- Collaboration on methodological research in statistics, scientific publications and supervision of industrial master thesis/PhD/post-doc projects

Associate Director, Lead Statistician, *Bayer Pharmaceuticals*, United Kingdom. **Oct 2021–Apr 2024**

- Leadership in statistical input to life-cycle management strategies, publication plans, reimbursement requirements, HTA studies and analyses for payers across several therapeutic areas
- Leadership of global cross-functional teams to generate publications, presentations and posters
- Scientific appraisal of non-randomized study proposals and protocols; statistical and methodological consultation to multidisciplinary teams
- Development and implementation of innovative statistical methodology for payer and reimbursement needs
- Oversight of HTA regulations and methodological guidance
- Leadership in scientific strategies for real-world evidence projects and causal inference research initiatives among statisticians and epidemiologists
- Oversight of the accurate and timely delivery of statistical work outsourced to external collaborators such as HEOR providers
- Development of collaborations with academic experts and co-supervision of research projects/partnerships with universities

Therapeutic areas: cardiovascular, women's healthcare, ophthalmology

Statistical Consultant (contract), *Hospital for Sick Children (SickKids)*, Remote. **Sep 2020–Mar 2021**

Development of internal methodological guidance on indirect treatment comparisons for the Canadian Agency for Drugs and Technologies in Health (CADTH). Therapeutic area: oncology.

Statistical Consultant (contract), *ICON plc*, Remote. **Sep 2019–May 2020**

Development of cure survival modelling methodology for immunotherapy trials. Therapeutic area: oncology.

Statistical Consultant (contract), *IQVIA*, London. **Oct 2018–Mar 2020**

Survival analysis, meta-analysis, indirect treatment comparisons, systematic literature reviews, statistical support for submission of evidence dossiers to HTA authorities (NICE and SMC), health economic modelling, mixed models, discrete event simulation, Markov modelling, utility mapping, Bayesian analysis, preparation of conference abstracts and manuscripts for publication of research papers. Therapeutic areas: oncology, hematology, hepatology, neurology, and addiction.

Academia

Graduate Teaching Assistant, *London School of Economics and Political Science*. **Sep 2018–Jun 2021**

Taught modules on "Statistical Models and Data Analysis" and "Applied Regression" to statistics undergraduates

Graduate Teaching Assistant, *University College London*. **Sep 2018–Jun 2019**

Taught "Introductory Statistical Methods and Computing" to life sciences undergraduates. Co-supervisor for MSc research projects. Development of R and Stan programming material for a course in Bayesian methods in health economics.

Research Intern, *Imperial College London*. **Jun 2016–Sep 2016**

Received a NERC grant to mine under-exploited plant information resources at the Royal Botanic Gardens, Kew. Explored global and regional biodiversity patterns using R and developed statistical models to estimate future species discovery rates and biodiversity hotspots.

Research

Publications

- **Remiro-Azócar, A.**, Polavieja, P., Boutmy, E., Ghiretti, A., Husemoen, L. L. N., Rantell, K. R., Vaitsiakhovich, T., Phillippo, D. M., Park, J. J. H., Lynggaard, H., Bauer, R., and Morga A. "Incorporating estimands into meta-analyses of clinical trials". *Under review, Research Synthesis Methods*, 2025. Available at: `https://doi.org/10.48550/arXiv.2510.15762`
- **Remiro-Azócar, A.**, Phillippo, D.M., Welton, N. J., Dias, S., Ades, A. E., Heath, A., and Baio, G. "Marginal and conditional summary measures: transportability and compatibility across studies". *In: Wiley StatsRef: Statistics Reference Online, John Wiley & Sons*, 2025. Available at: `https://doi.org/10.1002/9781118445112.stat08659`
- Campbell, H., **Remiro-Azócar, A.** "Doubly robust augmented weighting estimators for the analysis of externally controlled single-arm trials and unanchored indirect treatment comparisons". *Under review, Research Synthesis Methods*, 2025. Available at: `https://doi.org/10.48550/arXiv.2505.00113`
- Phillippo, D.M., **Remiro-Azócar, A.**, Heath, A., Baio, G., Dias, S., Ades, A. E., and Welton, N. J. "Effect modification and non-collapsibility together may lead to conflicting treatment decisions: A review of marginal and conditional estimands and recommendations for decision-making". *Research Synthesis Methods*, 16(2), 2025. Available at: `https://doi.org/10.1017/rsm.2025.2`
- Phillippo, D.M., Jansen, J.P., **Remiro-Azócar, A.**, and Thom, H.Z. "Population-Adjusted Indirect Comparisons". In: Baio, G., Thom, H.Z., and Pechlivanoglou, P. (Eds.), *R for Health Technology Assessment, Chapman and Hall/CRC*, 2025. Available at: `https://doi.org/10.1201/9781003031819-13`
- Metcalfe, R.K., **Remiro-Azócar, A.**, Vuong, Q., Gorst-Rasmussen, A., Keene, O., Alam, S., and Park, J.J.H. "Estimands and their implications for evidence synthesis for oncology: A simulation study of treatment switching in meta-analysis". *In press, Research Synthesis Methods*, 2025. Available at: `http://doi.org/10.1017/rsm.2025.10039`
- Metcalfe, R.K., Vuong, Q., Yan, R., Gorst-Rasmussen, A., **Remiro-Azócar, A.**, Morga, A., Keene, O., Dron, L., and Park, J.J.H."Treatment switching in evidence synthesis in oncology: A systematic review of current meta-analytical practices". *Under review, Research Synthesis Methods*, 2025.
- **Remiro-Azócar, A.** "Transportability of model-based estimands in evidence synthesis". *Statistics in Medicine*, 43(22), 2024. Available at: `https://doi.org/10.1002/sim.10111`
- **Remiro-Azócar, A.**, Gorst-Rasmussen, A. "Broad versus narrow research questions in evidence synthesis: A parallel to (and plea for) estimands". *Research Synthesis Methods*, 15(5), 2024. Available at: `https://doi.org/10.1002/jrsm.1741`
- **Remiro-Azócar, A.**, Heath, A., and Baio, G. "Model-based standardization using multiple imputation". *BMC Medical Research Methodology*, 24(1), 2024. Available at: `https://doi.org/10.1186/s12874-024-02157-x`
- **Remiro-Azócar, A.**, Heath, A., and Baio, G. "Methodological considerations for novel approaches to covariate-adjusted indirect treatment comparisons". *Research Synthesis Methods*, 14(4), 2023. Available at: `https://doi.org/10.1002/jrsm.1645`
- **Remiro-Azócar, A.**, Heath, A., and Baio, G. "Parametric G-computation for compatible indirect treatment comparisons with limited individual patient data". *Research Synthesis Methods*, 13(6), 2022. Available at: `https://doi.org/abs/10.1002/jrsm.1565`
- **Remiro-Azócar, A.** "Two-stage matching-adjusted indirect comparison". *BMC Medical Research Methodology*, 22(1), 2022. Available at: `https://doi.org/10.1186/s12874-022-01692-9`
- **Remiro-Azócar, A.** "Target estimands for population-adjusted indirect comparisons". *Statistics in Medicine*, 41 (28), 2022. Available at: `https://doi.org/10.1002/sim.9413`
- **Remiro-Azócar, A.** "Some considerations on target estimands for health technology assessment". *Statistics in Medicine*, 41 (28), 2022. Available at: `https://doi.org/10.1002/sim.9566`
- **Remiro-Azócar, A.** "Population-Adjusted Indirect Treatment Comparisons with Limited Access to Patient-Level Data". *Doctoral thesis, University College London*, 2022. Available at: `https://discovery.ucl.ac.uk/id/eprint/10144848/`
- **Remiro-Azócar, A.**, Heath, A., and Baio, G. "Methods for population adjustment with limited access to individual patient data: A review and simulation study". *Research Synthesis Methods*, 12(6), 2021. Available at: `https://doi.org/10.1002/jrsm.1511`
- **Remiro-Azócar, A.**, Heath, A., and Baio, G. "Effect modification in anchored indirect treatment comparison: Comments on "Matching-adjusted indirect comparisons: Application to time-to-event data"". *Statistics in Medicine*, 41(8), 2022. Available at: `https://doi.org/10.1002/sim.9286`
- **Remiro-Azócar, A.**, Heath, A., and Baio, G. "Conflating marginal and conditional treatment effects: Comments on "Assessing the performance of population adjustment methods for anchored indirect comparisons: A simulation study"". *Statistics in Medicine*, 40(11), 2021. Available at: `https://doi.org/10.1002/sim.8857`

- van Oostrum, I., Ouwens, M., **Remiro-Azócar, A.**, Baio, G. Postma, M., Buskens, E., and Heeg, B. "Comparison of Parametric Survival Extrapolation Approaches Incorporating General Population Mortality for Adequate Health Technology Assessment of New Oncology Drugs". *Value in Health*, 24 (9), 2021. Available at: `https://doi.org/10.1016/j.jval.2021.03.008`
- **Remiro-Azócar, A.**, Heath, A., and Baio, G. "Marginalization of Regression-Adjusted Treatment Effects in Indirect Comparisons with Limited Patient-Level Data". Working Paper, 2020. Available at: `https://doi.org/10.48550/arXiv.2008.05951`

Poster presentations

- Metcalfe, R. K., Alam, S., **Remiro-Azócar, A.**, and Park J. J. H. "The Effects of Pooling Treatment Effects Targeting Treatment Policy and Hypothetical Estimands With Rank-Preserving Structural Failure Time Model in Oncology Aggregate-Level Meta-Analyses". ISPOR Europe 2025
- Morga, A., **Remiro-Azócar, A.**, Rantell, K. R., Ghiretti, A., Vaitsiakhovich, T., Boutmy, E., Husemoen, L., Kleinjung, F., Rosettani, B., and Polavieja, P. "Can Estimands Support Aligned Evidence Generation for EU HTA? Reflections on Their Role in Joint Clinical Assessments, PICO alignment, and Beyond". ISPOR Europe 2025 (Top 5% Finalist ISPOR Europe 2025 Research Presentation Awards)
- Vuong, Q., Metcalfe, R., **Remiro-Azócar, A.**, Gorst-Rasmussen, A., Keene, O., Park, J. J. H. "The Importance of Specifying the Estimand in Meta-Analyses in the Presence of Treatment Switching". ISPOR 2025
- Husemoen, L., Morga, A., **Remiro-Azócar, A.**,…,Polavieja, P."The ICH E9(R1) Estimands Framework in the context of Real-World Data and Observational Studies". DSFE 30-Year Anniversary Meeting 2024
- Husemoen, L., Morga, A., **Remiro-Azócar, A.**,…,Polavieja, P."The ICH E9(R1) Estimands Framework in the context of Real-World Data and Observational Studies". ISPE Annual Meeting 2024
- Metcalfe, R., Gorst-Rasmussen, A., Morga, A., **Remiro-Azócar, A.**, Keene, O., Park, J. J. H. "Treatment Switching in Evidence Synthesis in Oncology: A Comprehensive Review of Current Meta-Analytical Practices". ISPOR Europe 2024
- Metcalfe, R., Gorst-Rasmussen, A., Morga, A., **Remiro-Azócar, A.**, Park, J. J. H. "Estimands and Strategies for Handling Treatment Switching as an Intercurrent Event in Evidence Synthesis of Randomized Clinical Trials in Oncology". ISPOR 2024
- Morga, A., Gorst-Rasmussen, A., Polavieja, P., **Remiro-Azócar, A.**, …, Rosettani, B. "Estimands in Health Technology Assessments: Methodological Considerations and Recommendations". ISPOR Europe 2023
- Paly, V. F., Mohr, P., Larkin, J., Middleton, M., Youn, J., **Remiro-Azócar, A.**, …, Kurt, M. "Assessing the impact of modeling non–disease-related mortality on long-term survivorship rates in previously untreated advanced melanoma: a case study from CheckMate 067". ISPOR 2021.
- Mohr, P., Larkin, J., Paly, V. F., **Remiro-Azócar, A.**, …, Middleton, M. "Estimating long-term survivorship in patients with advanced melanoma treated with immune-checkpoint inhibitors: Analyses from the phase III CheckMate 067 trial". ESMO Virtual Congress 2020.
- **Remiro-Azócar, A.**, Heath, A., and Baio, G. "Predictive-Adjusted Indirect Comparison (PAIC): A Novel Method for Population-Adjusted Indirect Comparison". ISPOR Europe 2019.

Invited presentations

- Joint Initiative for Causal Inference (Center for Targeted Machine Learning and Causal Inference, UC Berkeley) Seminar on "Data Fusion for Indirect Treatment Comparisons in Health Technology Assessment". December 2025.
- Seventh Seattle Symposium in Biostatistics (University of Washington) panel discussion on "Data fusion in causal inference". November 2025.
- Daiichi Sankyo invited talk on "PICOs, estimands and target trials in evidence synthesis". November 2025.
- ISPOR Europe 2025 issue panel on "What Is Your Estimand? Navigating Conditional and Marginal Effects in Cost-Effectiveness Modeling", Glasgow, United Kingdom. November 2025.
- ISPOR Europe 2025 workshop on "Transferring Evidence Across Europe a Herculean Task? The Opportunities and Challenges of Transportability Analyses in the Context of European Union Joint Clinical Assessments", Glasgow, United Kingdom. November 2025.
- 10th EFSPI Regulatory Statistics Workshop presentation on "From Trials to Target Populations: Extending Evidence for Decision-Making" and panel discussion on generalizability and transportability. Basel, Switzerland. September 2025.
- 46th Conference of the International Society for Clinical Biostatistics Invited Session and panel discussion on "When worlds collide: Common methodological themes in meta-analysis, causal inference, and hybrid trial design"; chair of session on meta-analysis, and panel discussant for symposium on "Causal Inference for Improved Clinical Collaborations". Basel, Switzerland. August 2025.
- ASA BIOP Webinar on "A common framework for externally controlled single-arm trials and unanchored comparisons: entropy balancing and augmented weighting estimators". June 2025.
- PSI RWD SIG and Historical Data SIG Webinar on "Methods and tools integrating clinical trial evidence with historical or real-world data, Bayesian borrowing, and causal inference". May 2025.

- 9th EFSPI Regulatory Statistics Workshop presentation on "Considerations for Methodological Innovation for Indirect Treatment Comparisons in EU HTA" and panel discussion on innovative statistical methodology for EU HTA. Basel, Switzerland. September 2024.
- Joint IISA-HTAi DCIG webinar on "Health Technology Assessments and the Role of Statisticians". July 2024.
- ISPOR 2024 Breakout Session on "Advanced methods for matching-adjusted indirect comparison (MAIC)", Atlanta, United States. May 2024.
- PSI/EFSPI HTA ESIG Webinar on "Indirect treatment comparisons: Choosing the right tool for the job". February 2024.
- PSI/EFSPI HTA ESIG Webinar on "Estimands, PICOs and Co. - Are we losing or gaining in translation?". December 2023.
- ISPOR 2023 Spotlight Session on "Apples and oranges in the context of anchored indirect treatment comparisons – Is there more to it than effect modifiers?", Boston, United States. May 2023.
- R for Health Technology Assessment (R-HTA) Workshop on "Marginalization of regression-adjusted treatment effects". July 2021.
- UCL Priment Clinical Trials Unit Statistical Seminar. November 2020.
- UCL Statistics for Health Economic Evaluation Seminar. June 2020.
- Health Economics Study Group Winter Meeting, Newcastle, UK. January 2020.
- Spanish Health Economics Association Conference, Albacete, Spain. June 2019.

Education

PhD Statistical Science, *University College London*. **2018–2022**

Based at the Statistics for Health Economic Evaluation Group, a research group in the Department of Statistical Science, under the supervision of Gianluca Baio and Anna Heath (University of Toronto). Thesis on indirect treatment comparisons in the absence of head-to-head trials, adjusting for differences in covariate distributions across studies and overcoming limited access to patient-level data.

MRes Financial Computing, *University College London*, *Distinction*. **2017–2018**

Full 4-year (1+3) MRes+PhD scholarship (700 applicants for 15 positions) from the EPSRC Centre for Doctoral Training in Financial Computing and Analytics, a joint collaboration between UCL, LSE and Imperial College London. PhD-level courses in computational statistics. Advanced programming and software development modules in Python and C++.

MSc Machine Learning, *University College London*, *Merit*. **2016–2017**

Dissertation on the hierarchical Bayesian modelling of decision-making tasks based at the Gatsby Computational Neuroscience Unit under the supervision of Oliver J Robinson and Peter Dayan. Deep and reinforcement learning courses taught by Google DeepMind.

BSc (Hons) Mathematics and Physics, *University of Bath*, *2:1*. **2013–2016**

Activities

- Associate Editor, Research Synthesis Methods (from April 2025)
- Lecturer, Summer School in Bayesian Methods in Health Economics, University College London, 2025
- Scientific Organizing Committee, 46th Conference of the International Society for Clinical Biostatistics, 2025
- Scientific Organizing Committee, 8th International Symposium on Biopharmaceutical Statistics, 2026
- Statisticians in the Pharmaceutical Industry (PSI). Special interest groups: HTA, RWD, Causal inference
- American Statistical Association Biopharmaceutical Section. Scientific working groups: HTA
- EFSPI/EFPIA Estimand Implementation Working Group. Estimands in late phase sub-team.

Computing

R, Stan/BUGS/JAGS, SAS (working knowledge), Git, Excel, VBA

Languages

Spanish: Native; **English**: Fully bilingual; **French**: Intermediate.