

# Robin Blythe

Australian Centre for Health Services Innovation  
Centre for Healthcare Transformation  
School of Public Health and Social Work  
Faculty of Health  
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Australia

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**GitHub:** robinblythe

## Education

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**PhD** in Biostatistics/Clinical Informatics

**March 2024 (expected)**

Australian Centre for Health Services Innovation, Queensland University of Technology

Dissertation title: *Real-time clinical decision support systems for the prevention of deterioration in acute care*

**Masters of Public Health** in Health Policy and Management

**July 2016**

University of California, Los Angeles (UCLA)

**BA** in Economics, **BCom** in International Business

**February 2013**

University of Auckland

## Research experience

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**PhD researcher**

2020 – Present

Australian Centre for Health Services Innovation, Queensland University of Technology

- Investigated factors determining successful implementation of clinical decision support systems for deteriorating patients
- Conducted simulation studies to explore impact of statistical assumptions of clinical prediction models developed and validated in acute inpatient populations
- Applied implementation science frameworks to qualitatively assess preferences and perspectives of nurses and doctors using clinical prediction models in routine care
- Developed and validated a clinical prediction model for within-admission acute care triage and prioritisation

**Health economist**

2016 – 2023

Australian Centre for Health Services Innovation, Queensland University of Technology

- Conducted population-level cost-effectiveness analyses of health policies including cemented fixation of hip arthroplasty, treatment bundles for sepsis, and paediatric sepsis recognition pathways
- Managed, supported, and economically evaluated the Integrated Care Innovation Fund, a \$35m suite of integrated care programs across Queensland, Australia

- Developed and applied multi-criteria decision analysis techniques and visualisations to improve funding decisions at the Royal Brisbane Women's Hospital and Metro North Hospital and Health Service (Brisbane)

### **Research assistant**

2023 – Present

School of Mathematical Sciences, Queensland University of Technology

- Creating health economic simulation models for the Lancet commission on the global burden of anaemia in women of childbearing age; developing equitable, feasible, cost-effective benchmarks for the United Nations Sustainable Development Goals to halve anaemia prevalence by 2030

### **Research fellow**

2022 – Present

Te Rourou Tātaritanga, Victoria University of Wellington

- Investigating methods to make social wellbeing data publicly available while minimising confidentiality and privacy risks; project managing \$3.1m grant from the New Zealand Ministry of Business, Innovation and Employment; organised symposia and conferences hosting international experts in data privacy, epidemiology, and computer science

### **Policy analyst**

2015

Covered California

- Developed a predictive algorithm for documentation status (citizenship/permanent residency) among insured and uninsured populations using the American Community Survey Public Use Microdata Sample; used algorithm in geographical software to obtain population estimates by geographic areas to direct efforts to improve health insurance coverage in undocumented populations

## **Teaching experience**

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| - HLWB504: Health economics and economic evaluation (Guest lecturer) | 2023 |
| Faculty of Health, Victoria University of Wellington                 |      |
| - HLWB504: Health economics and economic evaluation (Guest lecturer) | 2021 |
| Faculty of Health, Victoria University of Wellington                 |      |
| - AusHSI graduate certificate (Guest lecturer)                       | 2018 |
| Queensland University of Technology                                  |      |
| - HLT POL M236: Microeconomic Theory of the Health Sector (TA)       | 2016 |
| Fielding School of Public Health, UCLA                               |      |
| - HLT POL 441: Health Analytics (TA)                                 | 2016 |
| Fielding School of Public Health, UCLA                               |      |
| - HLT POL 286: American Political Institutions & Health Policy (TA)  | 2015 |
| Fielding School of Public Health, UCLA                               |      |

## **Grants, funding and scholarships**

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### **Grants**

- National Health and Medical Research Council      \$1,305,172.60      2022 – 2027  
Resuscitation in Paediatric Septic Shock using Mega-Dose Vitamin C and Hydrocortisone – A Randomised Controlled Multicentre Trial (RESPOND study).  
Associate investigator. Chief investigator: Kristen S Gibbons, PhD

### Research funding

- Medibank Private Limited      \$270,000      2021 – 2024  
Partnering for high value prosthesis selection and better patient outcomes
- Children's Health Queensland      \$19,990.00      2021  
Paediatric Sepsis Bundle Evaluation
- Mater Hospital      \$46,725.00      2020 – 2021  
Refugee health: Policy development support
- Mater Hospital      \$19,775.00      2020  
Refugee Health: Document Audit Analysis Plan
- Department of Health, Australian Government      \$97,591.44      2017 – 2019  
Mackay Health Pathways Evaluation

### Scholarships

- Digital Health Cooperative Research Centre      \$180,000      2020 – 2024  
Graduate scholarship in digital health

## Awards, outreach and appointments

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### Awards

- Venables Award runner-up for predictNMB R package development      2023
- Best student paper award, Centre for Healthcare Transformation      2022  
Application of a Mixed Methods Multi-Criteria Decision Analysis Framework in Integrated Health Care PMID: 35756339
- Honorary induction for academic excellence      2016  
Delta Omega Honorary Society in Public Health

### Appointments

- Guest editor      2021 – 2022  
Journal of Health Organization and Management

### Outreach

- Board member, student representative      2023 – Present  
International Society for Pharmacoeconomics and Outcomes Research, New Zealand chapter
- Member of Australian AI safety working group      2023 – Present
- Member of Queensland AI sepsis working group      2023 – Present

## Skills

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*Software proficiency:* R, RShiny, TreeAge Pro, MS Excel, Stata

*Analytical methods:* Simulation (Markov models, Monte Carlo methods, microsimulation), regression (linear/generalised linear models, mixed-effects, survival analysis, decision trees)

*Project skills:* Working with large datasets; research translation; policy analysis; stakeholder engagement; academic writing; public speaking

## Software and app development

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- predictNMB: An R package that allows the user to perform simulations to estimate the cost-effectiveness and required performance of clinical prediction models and associated healthcare interventions. Available on CRAN: <https://cran.r-project.org/web/packages/predictNMB/>
- ShinyPrior: An RShiny app that uses the method of moments and numerical optimisation to estimate distributions from published evidence. Available at: <https://aushsi.shinyapps.io/ShinyPrior/>
- ShinyEQBayes: An RShiny app that applies Markov Chain Monte Carlo to combine EQ-5D scores with the EQ-VAS. Available at: <https://github.com/robinblythe/ShinyEQBayes>

## Peer-reviewed publications

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### 2023

**Blythe R**, Parsons R, Barnett AG, McPhail SM, White NM. Vital signs-based deterioration prediction model assumptions can lead to losses in prediction performance. *J Clin Epidemiol.* 2023 Jul;159:106-115. doi: 10.1016/j.jclinepi.2023.05.020. Epub 2023 May 26. PMID: 37245699.

- Featured in Editor's Choice July 2023: doi.org/10.1016/j.jclinepi.2023.07.018

Abell B, Naicker S, Rodwell D, Donovan T, Tariq A, Baysari M, **Blythe R**, Parsons R, McPhail SM. Identifying barriers and facilitators to successful implementation of computerized clinical decision support systems in hospitals: a NASSS framework-informed scoping review. *Implement Sci.* 2023 Jul 26;18(1):32. doi: 10.1186/s13012-023-01287-y. PMID: 37495997; PMCID: PMC10373265.

Parsons R, **Blythe R**, Cramb SM, McPhail SM. Integrating economic considerations into cutpoint selection may help align clinical decision support toward value-based healthcare. *J Am Med Inform Assoc.* 2023 May 19;30(6):1103-1113. doi: 10.1093/jamia/ocado42. PMID: 36970849; PMCID: PMC10198528.

White NM, Carter HE, Kularatna S, Borg DN, Brain DC, Tariq A, Abell B, **Blythe R**, McPhail SM. Evaluating the costs and consequences of computerized clinical decision support systems in hospitals: a scoping review and recommendations for future practice. *J Am Med Inform Assoc.* 2023 May 19;30(6):1205-1218. doi: 10.1093/jamia/ocado40. PMID: 36972263; PMCID: PMC10198542.

Parsons R, **Blythe R**, Barnett A, Cramb S, McPhail SM. predictNMB: An R package to estimate if or when a clinical prediction model is worthwhile. *Journal of Open Source Software.* 2023 Apr 5;8(84). doi: 10.21105/joss.05328.

Nickels MR, **Blythe R**, White N, Ali A, Aitken LM, Heyland DK, McPhail SM. Predictors of acute muscle loss in the intensive care unit: A secondary analysis of an in-bed cycling trial for

critically ill patients. *Aust Crit Care*. 2023 Feb 28;S1036-7314(23)00001-2. doi: 10.1016/j.aucc.2022.12.015. Epub ahead of print. PMID: 36863951.

Parsons R, **Blythe R**, Cramb SM, McPhail SM. Inpatient Fall Prediction Models: A Scoping Review. *Gerontology*. 2023;69(1):14-29. doi: 10.1159/000525727. Epub 2022 Aug 17. PMID: 35977533.

## 2022

**Blythe R**, Parsons R, White NM, Cook D, McPhail SM. A scoping review of real-time automated clinical deterioration alerts and evidence of impacts on hospitalised patient outcomes. *BMJ Qual Saf*. 2022 Oct;31(10):725-734. doi: 10.1136/bmjqs-2021-014527. Epub 2022 Jun 22. PMID: 35732487.

- Featured in BMJ Q&S editorial: doi.org/10.1136/bmjqs-2022-014798
- Featured by AHRQ, HIROC, and Australian Commission on Safety and Quality newsletters

**Blythe R**, White N, Kularatna S, McPhail SM, Barnett A. A Bayesian Approach for Incorporating the EQ-5D Visual Analog Scale When Estimating the Health-Related Quality of Life. *Value Health*. 2022 Sep;25(9):1575-1581. doi: 10.1016/j.jval.2022.01.017. Epub 2022 Mar 16. PMID: 35304036.

**Blythe R**, Lister P, Seaton R, Harley A, Schlapbach LJ, McPhail SM, Venkatesh B, Irwin A, Raman S; Queensland State-wide Sepsis Collaborative. Patient and economic impact of implementing a paediatric sepsis pathway in emergency departments in Queensland, Australia. *Sci Rep*. 2022 Jun 16;12(1):10113. doi: 10.1038/s41598-022-14226-6. PMID: 35710798; PMCID: PMC9203710.

**Blythe R**, Carter H, Abell B, Brain D, Dyer C, White N, Kularatna S, McPhail SM. Application of a Mixed Methods Multi-Criteria Decision Analysis Framework in Integrated Health Care. *Int J Integr Care*. 2022 Jun 10;22(2):19. doi: 10.5334/ijic.5997. Erratum in: *Int J Integr Care*. 2022 Jul 08;22(3):2. PMID: 35756339; PMCID: PMC9187248.

## 2021

**Blythe R**, Lee X, Simmons T, Cox J, McLean K, Barfield J, Kularatna S. Economic Analysis of Specialist Referral Patterns in Mackay, Queensland Following HealthPathways Implementation. *J Prim Care Community Health*. 2021 Jan-Dec;12:21501327211041489. doi: 10.1177/21501327211041489. PMID: 34477465; PMCID: PMC8422816.

Tulleners R, **Blythe R**, Dionisio S, Carter H. Resource use and costs associated with epilepsy in the Queensland hospital system: protocol for a population-based data linkage study. *BMJ Open*. 2021 Dec 7;11(12):e050070. doi: 10.1136/bmjopen-2021-050070. PMID: 34876425; PMCID: PMC8655588.

Martin E, Beckmann M, **Blythe R**, Merollini K, Graves N. Adherence to best practice: Preventing surgical site infection following caesarean section in Australia. *Aust N Z J Obstet Gynaecol*. 2021 Oct;61(5):728-734. doi: 10.1111/ajo.13347. Epub 2021 Apr 11. PMID: 33843068.

## 2020

**Blythe R**, O'Gorman PM, Crawford RW, Feenan R, Hatton A, Whitehouse SL, Graves N. Fixation Method for Hip Arthroplasty Stem Following Hip Fracture: A Population-Level

Cost-Effectiveness Analysis. *J Arthroplasty*. 2020 Jun;35(6):1614-1621. doi: 10.1016/j.arth.2020.02.001. Epub 2020 Feb 8. PMID: 32197963.

## 2019

**Blythe R**, Kularatna S, White N, Graves N, Clark K, Middleton H, Grimley R. Fits, faints, falls and funny turns: cost and capacity savings in Queensland from the accelerated transient attack pathway initiative (ATAP). *Age Ageing*. 2019 Sep 1;48(5):745-750. doi: 10.1093/ageing/afzo086. PMID: 31297515.

Lee XJ, **Blythe R**, Choudhury AAK, Simmons T, Graves N, Kularatna S. Review of methods and study designs of evaluations related to clinical pathways. *Aust Health Rev*. 2019 Aug;43(4):448-456. doi: 10.1071/AH17276. PMID: 30089529.

**Blythe R**, Naidoo S, Abbott C, Bryant G, Dines A, Graves N. Development and pilot of a multicriteria decision analysis (MCDA) tool for health services administrators. *BMJ Open*. 2019 Apr 24;9(4):e025752. doi: 10.1136/bmjopen-2018-025752. PMID: 31023757; PMCID: PMC6502058.

## 2018

**Blythe R**, Cook D, Graves N. Scepticaemia: The impact on the health system and patients of delaying new treatments with uncertain evidence; a case study of the sepsis bundle. *F1000Res*. 2018 Apr 26;7:500. doi: 10.12688/f1000research.14619.2. PMID: 29904596; PMCID: PMC5989143.

## Other publications

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**Blythe R**, Naicker S, White N, Donovan R, Scott IA, Mckelliget A, McPhail SM. Clinician preferences for clinical prediction model design in acute care settings: A case study of early warning score implementation. *OSF Preprints*. 2023 Aug. doi: 10.31219/osf.io/87my4

Allen M J, Selim SM, Senanayake S, Brain D, **Blythe R**, Hinchcliff R, McCreanor V, Kularatna S, Elliot L, McPhail SM. A scoping review of factors influencing prosthesis selection for knee and hip arthroplasties: perspectives of surgeons in high income countries. *Research Square*. 2023 Oct. PREPRINT (Version 1). doi: 10.21203/rs.3.rs-3435294/v1

White N, **Blythe R**. ShinyPrior: A tool for estimating probability distributions using published evidence. *OSF Preprints*. 2023 Feb. doi: 10.31219/osf.io/zf62e

Martin E, **Blythe R**, Kularatna S, Carter H. The role of health economics. In Fleming ML, Baldwin L. *Health Promotion in the 21<sup>st</sup> Century: New Approaches to Achieving Health for All*. 2020 Aug. ISBN 9781000257373.

Bhatia D, Peckham A, Allin S, Nolte E, Pourat N, **Blythe R**, Ng R, Marchildon G. Hospitals-As-Hubs: Integrated Care for Patients. *Converge3: Toronto, Canada*. 2019 Aug. Available from: <https://converge3.ca/publication/evidence-hospitals-as-hubs-integratedcare-for-patients>

**Blythe R**, Lee XJ, Kularatna S. HealthPathways: An economic analysis of the impact of primary care pathways in Mackay, Queensland. *Australian Centre for Health Services Innovation*. Available from: <https://www.eprints.qut.edu.au/209661/>

Merlo G, Page K, **Blythe R**. Taking Healthcare Home Forum: Overview of findings and recommendations. *Australian Centre for Health Services Innovation*. 2017 Jul. Available

from: <https://www.aushsi.org.au/oldsite/wp-content/uploads/2017/08/2486-QUT-AusHSI-Healthcare-Home-Forum-NM-FA2.pdf>

## Invited presentations

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**Blythe R.** Prediction does not necessarily equal prevention. Australasian Conference on Information Systems 2023. 5-8 December 2023, Wellington, New Zealand.

## Conference presentations

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**Blythe R.** Oral presentation. Predictive algorithm development: What do clinicians want from clinical prediction models? Health Informatics New Zealand Week 2023, 29-30 November 2023, Hamilton, New Zealand.

**Blythe R.** Oral presentation. predictNMB: An R package for estimating whether a prediction model is worth implementing. Health Informatics New Zealand Week 2023, 29-30 November 2023, Hamilton, New Zealand.

**Blythe R.** Poster. Clinical deterioration risk modelling in acute care: Challenges and consequences. 2023 Annual Research Meeting, 24-27 June 2023, Seattle, Washington, USA

**Blythe R.** Oral presentation. Predictive algorithms in healthcare: Are we overpromising and underdelivering? Impact Makers 2023. 14 July 2023, Brisbane, Queensland, Australia

**Blythe R.** Oral presentation. ShinyPrior: A tool for estimating probability distributions using published evidence. ISPOR AGM 2023. 3 May 2023, Wellington, New Zealand

**Blythe R.** Oral presentation. Multi-criteria decision analysis: Can we use it to evaluate integrated care? 12<sup>th</sup> Health Services Research Conference. 30 November – 2 December 2022, Sydney, New South Wales, Australia.

**Blythe R.** Oral presentation and panellist. Clinical Utility in Decision Support Systems. Australian Digital Health Summit 2022. 17-18 October 2022, Sydney, New South Wales, Australia

Dyer C, White N, **Blythe R**, Carter H, Brain D. Symposium. Disruptive innovations: Success stories from the Integrated Care Innovation Fund. 11<sup>th</sup> Health Services and Policy Research Conference. 4 – 6 December 2019, Auckland, New Zealand

White N, Brain D, Carter H, **Blythe R**, Dyer C. Symposium. From start up to sustainability: Insights from 23 integrated care initiatives. 11<sup>th</sup> Health Services and Policy Research Conference. 4 – 6 December 2019, Auckland, New Zealand

**Blythe R.** Poster. MCDA in health system management. 42<sup>nd</sup> World Hospital Congress. 10 – 12 October 2018, Brisbane, Queensland, Australia.