

Daily Focus and Aims:

The workshop aims to bridge methodological gaps between survival analysis and infectious disease modeling by creating practical pathways for cross-disciplinary learning and application. Each day builds systematically toward this goal:

- **Day 1 - Foundation Setting**

Addresses the goal of making disciplinary (dis)connections explicit

- Establish common vocabulary between SA and IDM communities
- Identify specific methodological gaps and opportunities for knowledge exchange
- Form mixed-discipline working groups and introduce case studies

- **Day 2 - Methodological Exploration**

Creates practical pathways for cross-disciplinary learning through active collaboration

- Apply SA techniques (competing risks, multi-state models, frailty models) to infectious disease problems
- Explore how IDM approaches (mechanistic modeling, data synthesis) can enhance SA
- Begin hands-on analysis of case studies using cross-disciplinary methods

- **Day 3 - Integration and Refinement**

Reveals the realistic potential and boundaries of cross-disciplinary approaches

- Address practical challenges: censoring, time-varying effects, computational efficiency
- Refine analysis strategies based on Day 2 discoveries and limitations

- **Day 4 - Knowledge Transfer Tools**

Produces concrete tools and guidance for the wider research community

- Create practical implementation guides and code examples
- Develop decision frameworks for method selection
- Begin drafting "Ten Simple Rules" for SA-IDM integration

- **Day 5 - Consolidation and Future Directions**

Ensures lasting impact and continued cross-disciplinary collaboration

- Finalize workshop deliverables and community resources
- Identify research gaps requiring new methodology development
- Establish post-workshop collaboration plans and responsibilities

Program

Our agenda is centred around a workshop designed to bridge the gap between the SA and IDM communities. These two disciplines often approach similar problems with different methodological frameworks, creating an opportunity for valuable cross-disciplinary learning and innovation. To facilitate this exchange, participants will work with two case studies (A and B) using simulated data (see *Further details*) in small groups intentionally mixed across expertise areas and career phase. This structure encourages immediate cross-pollination of ideas and methods, allowing participants to learn directly from colleagues with complementary skills. Each day concludes with a full-group session where teams share their progress, insights, and challenges, creating regular opportunities for collective learning and ensuring all participants benefit from the diverse approaches being developed across groups. Following this practical data analysis portion, participants will share their collaborative analytical techniques to create a comprehensive vignette documenting different approaches to the same problem, complete with coding examples. The workshop will conclude with participants collectively developing ten simple rules for effectively using and integrating SA and IDM methods (see workshop outcomes). This progression from hands-on analysis to documentation creation ensures both immediate knowledge transfer during the workshop and lasting impact through accessible resources for the wider scientific community.

We will provide the workshop materials, including some introductory papers, prior to the start of the workshop, so participants can familiarize themselves with the concepts and case studies covered in the workshop.

Further details

Data on a single large-scale population-wide outbreak in a closed population (of 1 million individuals) will be simulated, with available individual-level information on infection status during the time period of the outbreak (yes/no) and (if applicable) individual times of infection, vaccination, and other relevant clinical events associated with infection, such as hospitalization, discharge, and death. The underlying data generation mechanism will be roughly based on the recent SARS-CoV-2 pandemic, and will be based on a structured population, with infections within and between clusters, based on a compartmental SEIRD (susceptible, exposed, infected, recovered, dead) model. Heterogeneity in susceptibility to become infected and in infectiousness upon infection will be added to the model. At some point in calendar time, temporary intervention measures will be implemented, leading to a decrease in the transmission rate (and effective reproduction number), and at some later point in calendar time, a vaccine will become available, the effectiveness of which will depend on subject characteristics and on time since vaccination.

From this simulated and complete population-wide outbreak data we will extract two datasets for use during the workshop that mimic realistic data availability settings. Participants of the workshop do not get to see the underlying complete individual-level dataset until the very end of the workshop. One dataset will be used to focus on understanding the natural course of the infection, in terms of number of infections, reproduction number, (excess) mortality, and number of hospitalizations. The other dataset will focus on information required to estimate vaccine efficacy. Both datasets will record daily number of new infections, hospitalizations, deaths (including cause of death), and vaccinations. The number of new infections will be subject to reporting delays and to underreporting. The first dataset will cover the period before vaccination has become available, while the second dataset will solely cover the period after vaccination has become available, and will include vaccine uptake information, aggregated over subsets in the population.

The aim with respect to the first dataset will be to estimate the reproduction number and the effect of intervention measures, and to predict the future course of the epidemic, possibly under different scenarios. The aim with respect to the second dataset will be to estimate vaccine efficacy, to understand time-dependent effectiveness and possible heterogeneity in vaccine uptake and efficacy.

Workshop flow

Each day is a step organised as a next step from getting to know each other to the planning of future directions

Day 1 - Foundation Setting

Addresses the goal of making disciplinary (dis)connections explicit

- What: establish common vocabulary between SA and IDM communities, and identify specific methodological gaps and opportunities for knowledge exchange
 - How: introductory lectures to both fields, followed by Q&As
- What: start working on case studies, meant to learn from one another by doing
 - How: form four mixed-discipline working groups, introduce two case studies (one per group), discuss first ideas for analysis, and present and discuss with everyone

Day 2 – Case Studies: Methodological Exploration

Creates practical pathways for cross-disciplinary learning through active collaboration

- What: applying both SA techniques (competing risks, multi-state models, frailty models) and IDM approaches (mechanistic modeling, data synthesis) to actual data
 - How: morning group work on case studies to create analysis plans, start implementation, and prepare preliminary findings
- What: feedback and further improvement in analysis plans
 - How: paired groups with same case study present and discuss, groups separate and refine, end with plenary discussion of both case studies

Day 3 – Case Studies: Refinement and Key Learnings

Reveals the realistic potential and boundaries of cross-disciplinary approaches

- What: refine analysis strategies based on Day 2 feedback sessions, and address practical challenges: censoring, time-varying effects, computational efficiency
 - How: open discussion, followed by group work, creating code examples and presentation about final analysis plan
- What: identify key learnings
 - How: group presentations, plenary discussion to summarise experiences

Day 4 - Knowledge Transfer Tools

Produces concrete tools and guidance for the wider research community

- What: create practical implementation guides and code examples
 - How: together select nice SA-IDM integration examples from the case studies, form coding teams that will create vignettes
- What: develop decision framework for method selection, in the form of “Ten Simple Rules for SA-IDM integration”
 - How: form writing team that will work on a document on ‘ten simple rules’ based on experiences with case studies (and own work)

Day 5 - Consolidation and Future Directions

Ensures lasting impact and continued cross-disciplinary collaboration

- What: finalize workshop deliverables and community resources, identify research gaps, and plan further collaborations and responsibilities
 - How: present vignettes, review and finalise ten rules, discuss organisation of creating online resource with 10-rules-document and code examples.

Agenda:

Time	Day 1 Foundation Setting	Day 2 Methodological Exploration	Day 3 Refinement of analysis of case studies	Day 4 Dissemination tools	Day 5 Reflection and next steps
Chair	Liesbeth de Wreede	Don Klinkenberg	Hein Putter	Kylie Ainslie	Steven Abrams
9:00 – 10:00	Arrival of participants/registration	Small group work: • Explore data • Develop analysis plans • Begin implementation	• Open discussion of ideas, challenges, questions	• Introduction to 10 Simple Rules concept - Begin brainstorming 10 simple rules • Form writing/coding teams	• Plenary: Review and finalize 10 simple rules • Presentations of vignettes/ code examples
10:00 - 10:30	•Intro to workshop, including welcome and opening by Lorentz Center •Icebreakers	Morning Break	Morning Break	Morning Break	Morning Break
10:30 - 12:00	• Hein Putter, Intro to SA lecture • Q&A	• Continue analyses • Prepare preliminary findings	• Refine case study analysis plan • Implement analysis plan	• Begin vignette development in mixed groups • Document code examples • Write 10 Simple Rules	• Plenary: Future tasks and responsibilities • Finalize action plans • Assign responsibilities • Closing activity/celebration
12:00 - 14:00	12:00-12:15 Steven Abrams and Hein Putter, Introduction of case studies 12:15-14:00 Lunch	12:00-12:30 Sam Abbott, Case studies illustrating challenges and areas for collaboration 12:30-14:00 Lunch	Lunch	12:00-12:30 Chris Jackson, Case studies illustrating challenges and areas for collaboration 12:30-14:00 Lunch	Lunch
14:00 - 15:30	• Kylie Ainslie, Intro to IDM lecture • Q&A • Divide into small groups to discuss case studies	• Intergroup presentation/discussion: - groups working on the same case study discuss analysis plans	• Continue working on case studies in small group	• Continue vignette development	Symposium <i>Connecting Survival Analysis and Infectious Disease Modelling</i> (Gorlaeus BM.1.33)
15:30 - 16:00	Afternoon Break	Afternoon Break	Afternoon Break	Afternoon Break	
16:00 – 17:00	16:00-16:30 Discussion case study in groups 16:30-17:00 Plenary. Groups present first ideas of how to attack case studies to whole group	Plenary/Wrap-up Discuss 2 case studies with everyone	Plenary/Wrap-up • Groups progress report • Identify key learnings	Plenary/Wrap-up Discuss 10 Simple Rules	Symposium continued
17:00 – 19:00	Welcome Reception		Conference dinner. 17:30 Departure bus from Lorentz Center		Drinks (VRIJ, Zernikedreef 4)

			18:00 Start dinner restaurant Zilt in Katwijk aan Zee 20:30 Return bus		
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