Infectious disease modelling meeting
Summary report

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Introduction

In April 2025, a one-day meeting on infectious disease modelling in Aotearoa New Zealand was hosted by Michael Plank at the University of Canterbury. The meeting brought together researchers and practitioners with an interest in infectious disease modelling and related areas from across Aotearoa.

The aims of the event were to:
1. Provide updates on current or research projects on infectious disease modelling
2. Develop a list of priorities for future disease modelling work in Aotearoa New Zealand
3. Network to explore future opportunities for research and/or implementation

Invitations to attend were sent to individuals known to be working on infectious disease modelling, but attendance was also open to others who were not on the initial contact list. The meeting drew over 20 attendees with broad perspectives and expertise in infectious disease modelling, from students and early-career researchers to research leaders. The participants were from a range of sectors, including universities, Crown Research Institutes, central Government agencies, and private companies.

Meeting Format

The day began with a series of short (3 minute), 'lightning-style' presentations by attendees on infectious disease modelling projects and related work conducted by themselves and others in their research groups.

The short talks were followed by a series of five full-length (25 minutes, including discussion time) presentations. Talk topics reflected the diversity of research expertise of the attendees, including human and wildlife diseases, modelling techniques, visualisation and surveillance, and real and synthetic population data sources.

Short Talks

- *Making modelling equitable: current contributions from the iNZight Analytics team.* Andrew Sporle.
- *Invasive pneumococcal disease in New Zealand: impact of a changing childhood vaccine schedule.* Andy Anglemyer.
- *Synthetic populations & interaction networks and their structure.* Emily Harvey.
- *Modelling at the Public Health Agency.* Fiona Callaghan.
- *The spatial possum model.* Giorgia Vattiato.
- *Wastewater as a rich source of DNA/RNA for community infectious disease surveillance and modelling.* Jo Chapman.
- *Estimating case ascertainment by combining wastewater and case data.* Leighton Watson.

Short Talks, cont.

- *Modelling the effect of rabbit haemorrhagic disease virus (RHDV) on wild rabbit populations.* Mandy Barron.
- *Priorities for models, data and engagement for infectious disease dynamics in Aotearoa.* Michael Plank.
- *Maintaining core capabilities between pandemics: modelling.* Nigel French.
- *Cost-benefit analyses for infectious disease policy decisions.* Shaun Hendy.
- *Simulation modelling for bovine tuberculosis surveillance in livestock.* Simon Howard.
- *Acute respiratory illness in Aotearoa: using an individual based network model to investigate health inequities.* Zoë Kumbaroff.

Full Presentations

- *Infectious disease modelling at ESR.* Alvaro Orsi.
- *Phylodynamics to understand and control outbreaks.* David Welch.
- *Scaling models into decision support tools—case studies from human, animal and environmental health.* Nick Snellgrove.
- *Modelling for wildlife disease management.* Rachelle Binny.
- *Ethnicity stratification of infectious disease transmission dynamics.* Vincent Lomas.

Following the talks, a breakout session took place for attendees to discuss pressing issues and needs for infectious disease modelling in Aotearoa New Zealand. Three groups were formed to discuss data, models, and engagement, in response to the ideas prompt shown in Figure 1. The day concluded with the sharing of thoughts and ideas generated during the breakout session, and future directions for infectious disease modelling activities and networking.
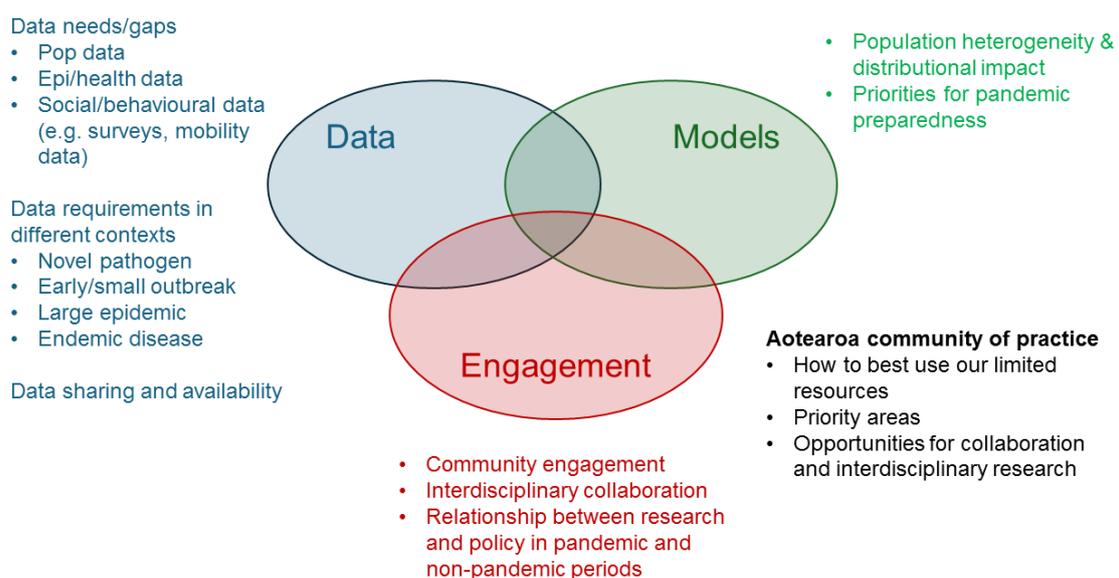

Figure 1. Prompt for breakout discussions around the three themes of data, models and engagement.

Summary of breakout session

A wide range of needs and gaps in infectious disease modelling in Aotearoa New Zealand were identified across the groups, with some common points made between discussion topics. Participants noted a need for greater communication and collaboration between research groups. The benefits of this were noted to include better knowledge and understanding of available data sources, greater interdisciplinary knowledge being transferred between groups, and safeguarding of project knowledge within research groups in case of staff turnover. Greater interdisciplinary collaboration could assist in identifying new data sources and adapting models to better reflect population heterogeneity and key subpopulations, such as Māori. A possible Central Body or Scientific Advisory Network were suggested as possible ways to facilitate this. Streamlining of processes was also seen as vital. This was considered in relation to having timely access to relevant data when needed as well as having higher quality data collections. Relatedly, a move away from 'reactive' modelling to 'proactive' modelling was highlighted. This might involve preparation of more easily reproducible, adaptable and updatable models before future pandemics arise, rather than building highly complex models during the pandemic. In general, there was a view that different approaches to modelling and research are needed during 'peace time' and 'pandemic time'.

A full list of the key points from each discussion theme is provided below:

Data

- Need for a central body that coordinates, collates and leads data needs &priorities.
    - Prepares strategies for certain what-if scenarios to identify current data gaps.
- Synthetic populations needed to model what if scenarios.
- Inventory needed of what data we have and don't have.
- Improved data quality needed, consistency in coding, not omitting important values.
    - More data is needed, and getting data out of the IDI is difficult.
- Exploration of more datasets that could provide different information, including culturally specific data (e.g., Te Kupenga) could be useful.
- Need to ensure consistency, quality, completeness in denominator population data
    - Need to know size of the population, sub-populations (e.g. ethnic groups).
- A shift is needed away from reactive modelling work to proactive approaches.
- Better systems for collection of quality, consistent, and required data (less reliance on proxy indicators), especially in early-stage outbreaks, are needed.

Models

Prioritise equity:
- Create models that account for population heterogeneity and inequities and focus on groups of interest (i.e., ethnicity-stratified models, socioeconomic-stratified models).
- Need to know how policy changes would affect groups not directly targeted (i.e., how do socioeconomic focused prevention measures affect disease spread in Māori population).
    - There is a legal and constitutional requirement to consider how these changes affect Māori in New Zealand (Te Tiriti).

Pandemic preparedness

- Outside of epidemics, models need to provide value elsewhere, e.g. modelling of endemic disease.
- Need to know the questions we want the models to answer in advance - scenarios, policy questions, interventions.
- Large complex models could be run outside of pandemics and then simplifications of these models made (to answer key questions).
    - This would mean there are available models when new pandemics hit that can be updated rapidly, instead of needing to update more complex models that cannot keep up with the changing circumstances during a pandemic.
- Tying into the previous point, there is benefit in having models with different assumptions and knowing how changing those assumptions would change the model, enabling models to better transition to modelling another disease.
- We do not know when the next pandemic will hit or what it will be, so keeping models maintained and flexible is important.

Engagement

- Policy relationships:
    - There is a need to ensure continuity of enduring professional relationships including stakeholders.
    - Knowledge can be lost due to staff turnover/limited knowledge of data/projects - so ensuring more than one person at an organisation/CRI has knowledge of projects, capabilities and research objectives would be useful. Mentoring and shadowing of roles can be helpful here.
    - Sabbaticals/secondments between groups and agencies can help transfer interdisciplinary knowledge and build understanding of priorities in different areas and sectors, particularly during 'peacetime'.
- It is important to consider differences in approach in between pandemic and non-pandemic periods.
- The government science advisor network is pivotal in connecting researchers and policymakers and facilitating knowledge transfer.
- Interdisciplinary engagement between researchers in different fields is reasonably well established. Community engagement is an area for focus going forward.
- There is a need for improved communication about the value and interpretation of infectious disease modelling, including through science communication, mainstream media and social media.

Meeting conclusion

There was an acknowledged need for greater communication between research groups engaged in infectious disease modelling. An immediate outcome of the meeting was the creation of a Slack group open to researchers and those interested in infectious disease modelling in New Zealand. The intention was to facilitate greater communication and information sharing about seminars, research projects, and job listings, for example. The group may also be used to suggest and plan future events and activities.

Attendees felt the meeting was very useful and were keen for similar meetings/discussions to be held in the future. The networking and collaboration benefits of an in-person meeting were recognised, but the combination of costs, availability and carbon impact are challenges for such in-person events. Online events would be a worthwhile alternative, with these being more frequent and of a short duration to facilitate participation.

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