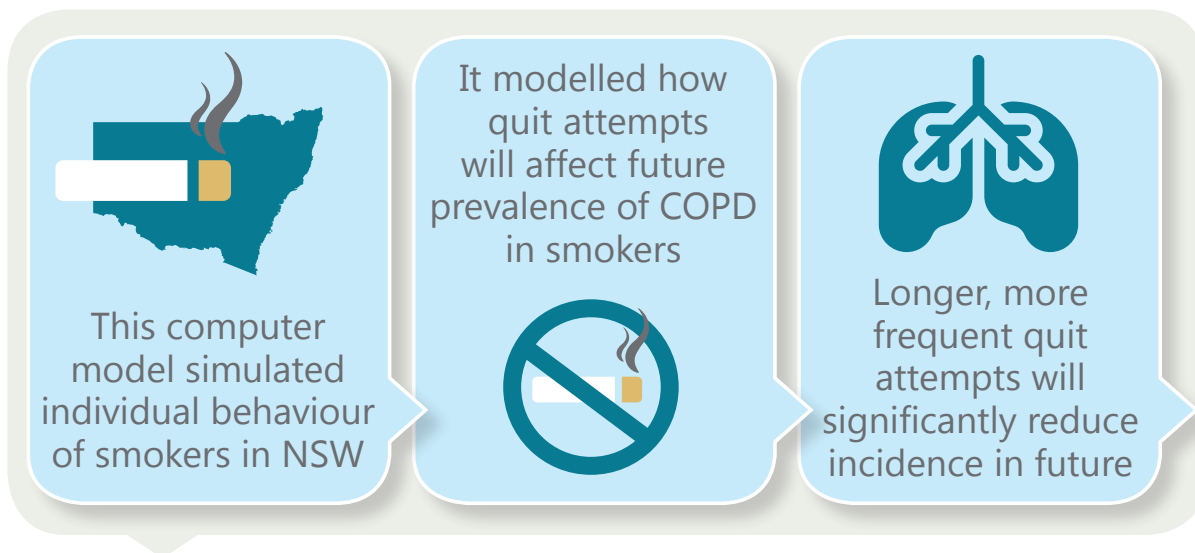




Modelling the effects of quitting smoking on COPD



Key messages

- Chronic obstructive pulmonary disease (COPD) has a significant impact on mortality, the health system and quality of life, and is estimated to cost Australia more than \$7.7 billion per year.
- The probability of developing COPD is directly linked to amount of tobacco smoked over a lifetime.
- Smoking rates have declined in Australia in recent years, but we do not know how this will impact the COPD burden in future.
- Dynamic simulation modelling is a useful 'what-if' tool that enables testing of the likely impact of a range of possible scenarios over time.
- This project was the first in Australia to develop a dynamic simulation model to forecast the population health implications of smoking behaviour on COPD over the next 50 years.
- We found that longer and more frequent quit attempts will lead to less COPD among smokers in future. Any intervention that supports this would have significant benefits, and much greater than has been shown in the literature previously.
- These findings suggest that identifying smokers who are likely to quit for longer and providing them with targeted support has the potential to substantially reduce the burden of COPD in NSW.

The project: Impacts of smoking on COPD in NSW

Project lead: Dr Ante Prodan

Project start: April 2016 **Project end:** April 2018

Why is this issue important?

Chronic obstructive pulmonary disease (COPD) has been estimated to affect 7.5% of Australians over 40 and 29.2% of those over 75.¹ In NSW, there are more than 2500 deaths each year attributed to COPD² and more than 20,000 hospitalisations.³

Symptoms get worse over time, including shortness of breath, excessive sputum, a persistent cough, reduced mobility and acute attacks. This leads to progressive loss in productivity and quality of life, and increased use of the health system. COPD is estimated to cost Australia more than \$7.7 billion per year.⁴

Addressing smoking is the key to preventing COPD. The more people smoke, the higher their chance of developing COPD. We know from previous studies that the frequency and duration of quit attempts reduces the risk of developing COPD.⁵

Smoking rates have steadily declined in Australia since the early 1990s, but previously we did not know how this would impact the burden of COPD in future decades. COPD is a complex problem because lung function declines with age, meaning there may potentially be more people with the condition as the population ages.^{6,7}

Forecasting the future burden of COPD in smokers will help decision makers better understand how to allocate resources and how to target interventions to support smokers to quit.

What did we do?

We brought together multiple data sources to develop an agent-based model that simulated the behaviour of individual smokers in the real world.

Taking into account individual characteristics, local context and the broader economic and policy environment, the model forecast how adults' smoking behaviour would impact COPD in NSW over the next 50 years.

Unlike previous studies, the model measured how COPD risk was affected by how much people smoke and the length and frequency of their quit attempts. It calculated smoking harms daily, meaning it could predict in more detail the long-term benefits of cutting down or quitting for relatively short periods of time.

Calculations were based on recent literature that shows how smokers who attempt to quit tend to overestimate how much they smoke. They may not report how much they smoke, may not count short attempts to quit, forget quit attempts, or may not acknowledge short periods of not smoking (for example, when they cannot afford to smoke).

We investigated these biases and tested the model findings against self-report data collected by the 45 and Up Study.

What did we find?

- In the next 50 years, quit attempts will significantly reduce the incidence and prevalence of COPD in NSW.
- Identifying and helping smokers who are likely to quit for longer has the potential to substantially reduce the burden of COPD in NSW.
- There will be more COPD as the population ages, but this will be offset by the decline in COPD rates as people stop smoking.
- Cutting down or quitting, even for a relatively short time but frequently, has a significant effect on COPD risk over time.
- Any intervention that increases frequency and duration of quit attempts has the potential to lead to significant reductions in the prevalence of COPD.



Every quit attempt counts. Reducing the amount you smoke leads to health benefits, and over time these can be significant."

Dr Ante Prodan

What did we produce?

- An agent-based model of effects of smoking on COPD in NSW.

Why does it matter?

This project is the first to demonstrate the effects of the dynamic nature of smoking behaviour over time on COPD.

This project shows the importance of supporting smokers to quit for longer and more often. Helping smokers to gradually increase the frequency and duration of quit attempts will lead to positive health outcomes, beyond those illustrated previously in the literature. It is particularly important to identify smokers who are motivated and attempting to quit, and provide support to help them stop smoking for longer.

The project also highlights the value of dynamic simulation models as an additional tool for a deeper understanding of the impacts of changes over time in smoking behaviour on COPD and its implications for strategic planning to reduce smoking-related harms in NSW.

Next steps

A valuable next step would be to model the cost benefits of supporting smokers to increase the frequency and duration of quit attempts. It would also be beneficial to consider the impact of illegally produced tobacco use on COPD, which is increasing in NSW.

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Findings brief: Modelling the effects of quitting
smoking on COPD

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