

05 The epidemiology of COVID-19 and addiction

Catherine Comiskey

In the early stages of a new epidemic, where no vaccine is available, all persons are susceptible. As the epidemic progresses and the number of infectious individuals increases, the number of susceptible individuals will decrease. However, when an epidemic can produce both asymptomatic and symptomatic cases, the identification of the numbers infected becomes more challenging. But without good estimates on the number of infected, it is difficult to take decisions on when a community has reached its critical threshold point and when policy makers and planners can advise on school openings, safety for nursing homes and protection of vulnerable communities.

The research from my group in the Trinity School of Nursing and Midwifery has focused on adapting and developing models to estimate this hidden prevalence. Mathematical and statistical models of back-calculation have been used successfully both internationally and in Ireland to produce estimates of the scale of a hidden infected population within HIV/AIDS, heroin use and more recently bio-terrorism, where the comparatively short incubation periods are particularly applicable to COVID-19.

Working with observed symptomatic cases and the known incubation period, these models predict through the incubation period distribution, the total numbers of infected and asymptomatic cases these observed cases arose from.

Using back-calculation methods with reporting delays, age structure and a range of models for the observable cases, our work provides crucial estimates for planners on the scale of the asymptomatic COVID-19 population within Ireland, across the three waves of the epidemic. To date we have found that on average there are twice as many people infected than was previously thought. We have published these results both as open access online articles with our funder the Health Research Board and in internationally peer reviewed publications.

Enhancing addiction services: the HAT Recovery Model – The research from my team also uses modelling approaches to enhance service delivery among people who use drugs and are in receipt of treatment. We are collaborating with nurses who work in addiction services and we have developed, implemented and evaluated the Healthy Addiction Treatment (HAT) Recovery Model.

The current model of nursing within international addiction services has been described as task orientated and reactive with little or no scope for innovation. Our research identified that a nursing model must address client needs, be adaptable with time, measurable, implementable and must be cognisant of the person, their clinic and their community.

The HAT Recovery Model refocuses services on client's needs and eradicates entrenched practices, and

uses a brief intervention approach to target a single measurable behavioural change outcome. It also recognises that many people who use substances have experienced past traumas. Our model has changed the way that nursing services for people who use drugs and alcohol are delivered. Early results from our evaluation of the HAT model implementation has demonstrated that treatment outcomes are improved for people in treatment and this new innovative practice has been welcomed by the addiction nursing profession. We are now developing a free Massive Open Online Course to share the HAT model findings with international healthcare and nursing practitioners.



Catherine Comiskey received her BA (Mod) in Mathematics and Philosophy from Trinity and MSc and PhD in epidemic modelling from Dublin City University. She joined Trinity as a Professor in Healthcare Statistics in 2008 and was elected a Fellow in 2020. In recognition of her work she was elected as the Chair of the Scientific Committee of the European Monitoring Centre for Drugs and Drug Addiction. In 2020 she was appointed as a consultant to the United Nations. She continues to focus her research on making a difference in addiction services. **Contact:** ccomiske@tcd.ie

BELOW – The Healthy Addiction Treatment (HAT) Recovery Model for Addiction Nursing. The individual client is at the centre, change is measured at the population level. The greatest need is the target outcome for the nurse led innovation.

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