

Drug residue analysis of discarded paraphernalia: 12-month spatio-temporal patterns from South Australia

Brock Peake¹ Emma L. Keller¹, Emma Barber¹, Bradley S. Simpson¹, Marie Longo², Stephen Trobbiani^{3,4}, Jason M. White¹, and Cobus Gerber^{1*}

¹*School of Pharmacy and Medical Science, College of Health, Adelaide University,* ²*Drug and Alcohol Services South Australia, SA Health, Adelaide, Australia,* ³*Forensic Science SA, GPO Box 2790, Adelaide, Australia,* ⁴*College of Science and Engineering, Flinders University of South Australia.*

Presenter's email: brock.peake@adelaide.edu.au

Introduction: Residue analysis of discarded paraphernalia from people who inject drugs provides a novel and unobtrusive approach to investigate drug use behaviours. This method enables anonymous sampling without influencing behaviour or relying on voluntary drug checking. Paraphernalia were collected from six sites across South Australia over a 12-month period. Analysis targeted both conventional drugs and novel psychoactive substances, generating insights into evolving drug use trends and the emergence of new substances.

Methods: Sharps disposal bins located at local clinics operating needle exchange programs were collected from six metropolitan sites across South Australia by a service provider and returned to a central location over a 12-month period in 2025. A total of 900 items were retrieved, including syringes, bags, drug storage vials/containers, and filters. Samples were rinsed with methanol and analysed by LC–MS/MS, with detections confirmed against authentic reference materials.

Results: Of the samples 900 analysed, a total total 17 different drugs were detected. A high proportion of samples contained methamphetamine (65%) and/or heroin (58%), while other commonly detected substances included cocaine (35%). Most of the items analysed contained two or more substances (70%). Across all samples, 15 different nitazenes were detected representing an overall detection frequency of 10%. Temporal trends demonstrated a general upward trend in detections of methamphetamine, heroin and cocaine over the sampling period.

Discussions and Conclusions: This study provides analytical confirmation of injected substances, complementing self-reported data and population-level monitoring. Residue analysis also reveals temporal and spatial trends, enabling the early identification of emerging substances and changes in drug use. These findings demonstrate the value of drug paraphernalia analysis for strengthening harm reduction strategies and informing targeted public health responses.

Implications on communities, practice, policy and/or First Nations communities:

The findings support early detection of emerging drugs to inform harm reduction and public health policy.

Disclosure of Interest Statement: *BP received funding from Drug and Alcohol Services South Australia for this study*