

PILOTING A DIGITAL HEALTH RESPIRATORY MONITORING INTERVENTION TO REDUCE DRUG RELATED DEATHS – THE ‘RESCU’ PROJECT

Hnízdilová K¹, Stephens BP², Ahmad F², Sharkey C², Qumsieh J², Henderson B³, Meredith O³, Trueman C³, Caven M¹, Beer LJ¹, Radley A², Dillon JF^{1,2}
¹University of Dundee, ²Ninewells Hospital and Medical School, NHS Tayside, ³PneumoWave Limited

Background:

- In 2020, Scotland experienced 1339 drug-related deaths, the highest number since records began in 1996.
- Most drug related deaths are caused by opioid-induced respiratory depression.
- In 2020, 72% of overdose deaths in Tayside occurred when people used drugs in their own homes.
- Naloxone administration relies on bystander presence, so serving PWUD who use drugs alone is an unmet need.

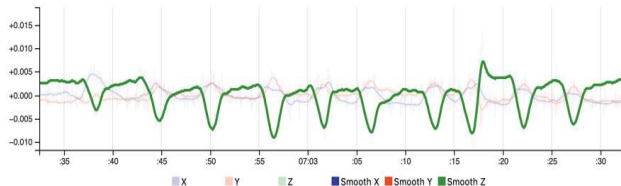
Aims:

RESCU is an ongoing mixed-methods observational cohort study with a planned duration from January 2022 to January 2023 which aims:

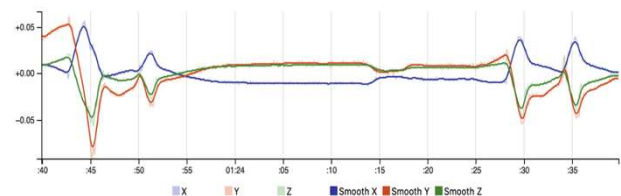
- To investigate the ability of an accelerometer sensor attached to the chest to accurately and reliably capture respiratory patterns of people who use drugs to determine trigger points for an emergency response during an overdose.
- To assess the acceptability of the device to people who use drugs and stakeholder groups from the third sector support groups and first responders to create an intervention pathway.

Results:

During February – September 2022, 62 participants had either completed or partially completed the study protocol. Data was reviewed after running prototype apnoea detection and movement artefact algorithms. 8,612 apnoea episodes of >10s duration were detected at the highest level of probability in 5,988.49 hours of respiratory data.



▲ Figure 1: The chest movement of a participant who did not display a breathing disorder. The participant’s chest movements are consistent with regular breathing. The participant was a 36-year-old male who stated he was homeless and living on the streets. The participant’s drug use questionnaire noted a history of intravenous heroin use.



▲ Figure 2: The respiratory pattern of a participant displaying chest movement consistent with severe apnoea (>30s duration). Participant was a 45-year-old male living in his own home who had been prescribed mirtazapine whose drug diary showed extensive intravenous heroin use in the groin, oral diazepam and pregabalin with occasional smoking of crack cocaine.

DISCLOSURE OF INTEREST:

PneumoWave Limited donated the study equipment; however, the study is investigator initiated and the company has no control over the data. KH is funded by an MRC iCASE studentship. AR is in receipt of research grants from Abbvie, Roche, Camurus, Galapagos and Merck. The remaining authors declare no conflicts of interest.

Acknowledgements:

We would like to thank our participants for giving up their time to contribute to our research.

Methods – Quantitative study



Participants are recruited on a rolling basis from a needle exchange in the city centre of Dundee (planned n=100).



Participants receive a sensor and a gateway device (a “hub”) to passively monitor their respiration when in range of the device.



During the study, participants record their substance use.



Participants are monitored over a period of four weeks, returning to the exchange weekly for data download (a total of 5 visits).

Methods – Qualitative study



Semi-structured interviews and focus groups were conducted with participants who have completed the study protocol (n=20) and stakeholder groups (n=6)



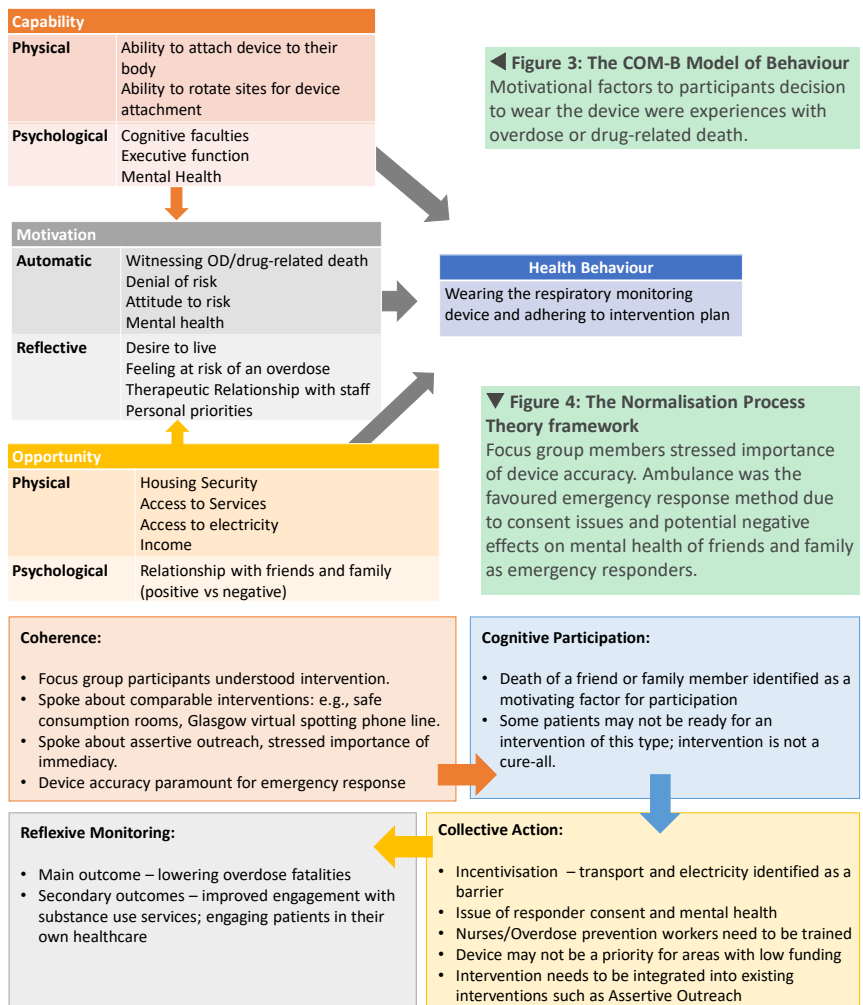
Interviews and focus groups were transcribed verbatim and were analysed using Reflexive Thematic Analysis.



Factors influencing participants' acceptability of the device were mapped onto the COM-B Model of Behaviour



Normalisation Process Theory was used to assess the way the device could be integrated into existing services



Conclusion:

- Current data suggests that the device successfully captures respiratory anomalies.
- Reception of the device by quantitative study participants, first responders and third sector stakeholders were mostly positive, stressing device accuracy and favouring an ambulance response in a real life intervention.
- The future study aim is to identify trigger points for an emergency response.