

RESEARCH BRIEF: ALCOHOL DIAGNOSTIC VALIDATION FOR INJURY-RELATED TRAUMA (AVIRT)

A catalyst for improving health practice and policy in South Africa

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INTRODUCTION

Alcohol consumption is a key driver of the burden of injury and violence in South Africa (SA). Alcohol-related injuries place a significant burden on emergency healthcare services, particularly on weekends and at night. Knowing a patient's alcohol level when they arrive at the emergency room is essential for accurate diagnosis, as alcohol can hide or mimic other conditions. It may also help ensure proper treatment, improve patient safety by allowing early management of alcohol withdrawal and plan discharge and follow-up care. On another level, it can be useful in determining the burden of alcohol harm on the health care system and the impact of upstream policy interventions.

However, routine testing and screening for alcohol consumption are lacking in SA emergency rooms (ERs). Reasons include the substantial delay between a patient being injured and treated and a lack of appropriate alcohol diagnostic tools in ER settings.

In this research brief

We summarize our provisional findings of the Alcohol Diagnostic Validation for Injury-Related Trauma (AVIRT) study conducted between April 2022 and March 2025. The study assessed the suitability of various alcohol diagnostic tools for improving health practice and policy in an ER setting in SA's Western Cape Province.

STUDY METHODS

We conducted focus group discussions (FGDs) with healthcare staff, academics and policymakers to understand the type of alcohol-related information that would be most useful, and tested diagnostic tools for alcohol data collection in an ER setting. Finally, we engaged with healthcare staff, again through FGDs, around the potential use and feasibility of alcohol screening tools in clinical management and implementation. A summary of the methods used across the AVIRT study, conducted between April 2022 – March 2025 is illustrated in Box 1. Ethical approval (EC005-2/2022) was obtained from the SAMRC's ethics committee.

Box 1: Summary of AVIRT study research Objectives and Methods

AVIRT Study Research Plan

	Objective	Methods
Prioritization of methods for assessing alcohol	To determine what type of alcohol information will be useful for different stakeholders in the trauma and injury prevention sectors	<ul style="list-style-type: none">Conducted 5 Virtual Focus Group Discussions (FGDs).Participants: 23 experts across four groups:<ul style="list-style-type: none">Clinicians (n=9); Academics (n=4)Hospital & operational staff (n=6)Policymakers (n=4)Data analyzed thematically using Nvivo 12.
Validation of alcohol diagnostics	To validate the efficacy of selected alcohol diagnostic tools in a public hospital trauma unit for clinical practice, and monitoring the impact of alcohol policy reforms	<ul style="list-style-type: none">Cross-sectional study; Mitchell's Plain District Hospital ER; Injured patients; 3 months' weekend night duty data collection (Fri-Mon, 7pm to 7am)Required sample: 396; Realized sample: 595 eligibleInclusion criteria: adults 18 years; injured <8 hours priorExclusions: cognitively impaired patientsAnalysis using STATA version 17: Lineal weighted Kappa, Robust linear regression, for BAC vs Active breathalyzer.
Community engagement and capacity development	To assess the utility of the recommended method, requirements for implementation and its role in health care provision	<ul style="list-style-type: none">4 FGDs conducted with 15 senior hospital management staff, operational managers, ER doctors, nurses and administrators.Qualitative data was managed using NVivo 15.The Braun and Clarke technique was used to analyze the data thematically.

Alcohol-Related Injuries: Challenges and Policy Needs in Trauma Care

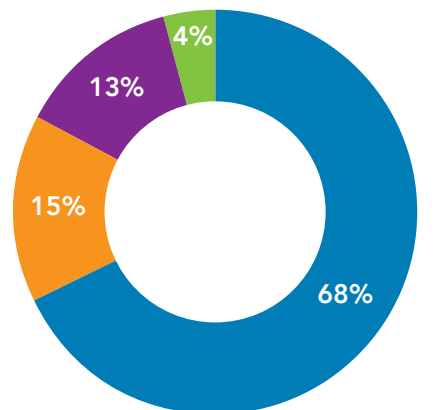
- Stakeholders in the trauma and injury prevention sectors find it crucial to understand the burden of alcohol-related injuries, as there is a high incidence of such cases in ERs. Alcohol contributes significantly to both intentional injuries and unintentional injuries. This situation places a strain on hospital resources due to extended patient stays, complex management, and increased staff burnout.
- However, current alcohol assessment practices in ERs are inconsistent and informal, with breathalyzer and blood tests not routinely used due to time, cost, and legal concerns. Clinicians often rely on behavioural indicators rather than formal testing.
- While stakeholders acknowledge that knowing a patient's blood alcohol level may not significantly change acute clinical management, it could be valuable for long-term patient care and public health strategies.
- They support alcohol screening but highlight challenges such as ethical concerns around consent from intoxicated patients, costs of alcohol testing in under-resourced hospitals, and the potential for stigma, particularly in cases of gender-based violence and other types of violence.

This sub-study on "Prioritization of methods for assessing alcohol" emphasized the need to implement sentinel sites for alcohol testing to gather representative data, provide healthcare workers with the necessary tools and protocols for effective alcohol assessment, and use alcohol-related injury data to inform broader public health interventions and policy reforms. However, further research is recommended to validate cost-effective and feasible diagnostic tools for emergency room settings.

How useful are the standard methods for measuring alcohol-relatedness of injuries in the ER setting?

Of the 847 patients seen in the ER, 595 fit the study criteria for inclusion, and 469 (79%) consented to participating in the study. Patients were screened for the presence of alcohol using four different methods 1) a blood sample, 2) clinical assessment, 3) active breathalyzer and 4) passive breathalyzer (see Box 2).

Preliminary findings indicate that nearly three-quarters of patients admitted to the ER were male and the average age was 37 years. Most injuries were violence-related (68%) – Figure 1, and stabbings were the most common mechanism of injury. The 5 leading injury mechanisms contributed to 80% of all injuries.



■ Violence ■ Road traffic ■ Unintentional ■ Self harm

Figure 1: Patient injury characteristics, N=469

- Males: **74%** | Females: **26%**
- Mean age: **37 years**
- Leading injury mechanisms (**80% of total**):
 - Stab/cut: **45%**
 - Blunt object: **16%**
 - Pedestrian: **7%**
 - Passenger: **6%**
 - Gunshot: **6%**
- **60%** had a BAC higher than the legal driving limit for alcohol (<0.05g/100ml)

Box 2: Alcohol diagnostic screening tool measures

1.

Venous blood sample: Enzyme Immunoassay used to test for ethanol (in g/100ml); and not gas chromatography, as the referenced gold standard (Jones, 2019) for Blood Alcohol Concentration (BAC) testing

2.

Clinical assessment: Measures severity of impairment of **speech, motor coordination, attention, behavioural disturbances**, etc. through use of a Likert scale using ICD-10, Y91 codes (WHO, 2019)

3.

Active breathalyzer/evidential breath alcohol testing: **Digital** measurement of **Breath Alcohol (BrAC)** mg/l in exhaled breath through a mouthpiece of a Dräger breathalyzer (2005).

4.

Passive breathalyzer testing: Exhaled breath to indicate the presence or absence of breath alcohol as a **positive or negative reading**.

■ Unintentional (N=127) ■ Intentional (N=323)

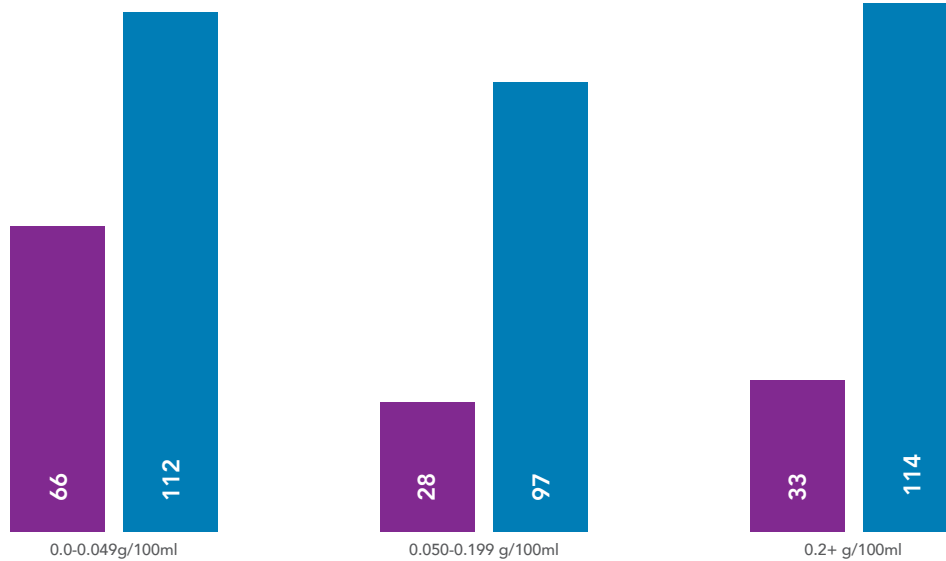


Figure 2: Blood Alcohol Concentration by Injury Intent, N=450*

* The number of patients, from which a blood sample could be withdrawn.

- Intentional injuries (violence and self-harm), with either a BAC level of 0.0 – 0.049g/100ml (legal BAC limit), or with very severe blood alcohol intoxication of 0.2+ g/100ml, were relatively equal (Figure 2).
- In comparison to unintentional (other injuries and transport), there were 3.5 times more intentional injuries, with BAC levels of 0.05-0.199 g/100ml and levels of 0.2 g/100ml or higher.

Passive vs Active Breathalyzer test

A passive test was successfully completed for 463 (98.7%) patients, while for the active breathalyzer, 391 (83.4%) completed the test (most of the 78 missing cases were due to non-cooperation). 371 patients successfully completed both the passive and active tests (Table 1).

When comparing the passive breathalyzer (with no mouthpiece attached) vs the active breathalyzer test, there was near perfect agreement between the two methods administered for testing. The passive breathalyzer also had near perfect agreement to the BAC test for alcohol, while further validation of the active breathalyzer vs the BAC enzyme immunoassay test results are underway.

Table 1: Passive vs Active Breathalyzer testing, N=371

Passive breathalyzer	Active breathalyzer		Total
	Zero alcohol	Positive** (0.05+ g/100ml)	
No alcohol	136	9	145
Yes (positive)	16	210	226
Total	152	219	371

Lineal weighted Kappa: 0.86 -near perfect agreement (Cohen, 1968)

** Positive excludes 4 cases who consented, but were within the legal BAC limit of 0.001-0.049g/100ml.

Preliminary results from this sub-study suggest that even resource-poor settings can reliably implement passive breathalyzer testing, with BAC testing being the optimal method. Alcohol diagnostics can be useful in advocating for alcohol policy reform and monitoring its impact. It is recommended that the government consider establishing a surveillance system for periodic testing at sentinel sites.

How best can we implement the use of alcohol diagnostic tools in an emergency healthcare setting in SA?

Experiences of health workers and managers who were on duty while the fieldwork nurses tested the alcohol diagnostic tools are shared in Table 2. They shared views around the potential in clinical management, and implementation in hospitals more broadly.

Table 2: Experiences of healthworkers and managers who tested the alcohol diagnostic tool

Participants' views on role in clinical management

Some felt use of the alcohol diagnostic tools would not impact on their clinical management

Other supported its use in:

- health education (e.g., understanding alcohol harms)
- medical treatment in complex cases (e.g., correct medication dosing, differentiating between drunkenness and head injury)
- providing information for onward referrals
- managing aggressive intoxicated patients by providing proof of alcohol use.

Participants' views on implementation

The majority agreed on the need to integrate alcohol testing with triage processes (e.g. through national triage guidelines)

Some raised concerns:

- additional time and resource burden of this extra test
- need to have a tool that is easy to use and affordable (finger prick testing suggested as appropriate)
- feasible for district hospitals for surveillance, but not feasible in constrained tertiary/provincial hospitals

Example Illustrative quote

'But for certain patients, like some of the trauma patients come and they are bleeding profusely and you can smell that they probably had a few to drink, so under those circumstances you probably would want a good idea how much they've had and how much there is still left in the body'

[Participant 10, FGD 3 participant - nurse]

Example Illustrative quote

'I think we are all going to agree on this... that we do the tests when the patient arrives...if there was maybe a device that we could use, where they aren't blowing into something or actually drawing blood but it was a device similar to the one that we use to check their blood sugar levels. Then that way they will probably feel more comfortable doing it, as opposed to being singled out at a later stage.'

Participant 4, FGD 2 - nurse]

Participants had mixed views on the role of alcohol screening tools in clinical management. Some felt the tool would not impact their practice, while others supported its use for health education, medical treatment in complex cases, providing information for referrals, and managing aggressive intoxicated patients. For implementation, most participants agreed on

integrating alcohol testing with triage processes but raised concerns about the additional time and resource burden. They emphasized the need for an easy-to-use and affordable tool, suggesting finger-prick testing as appropriate. While feasible for district hospitals, they noted it might not be practical in constrained tertiary or provincial hospitals.

CONCLUSION

Alcohol-related injuries significantly burden healthcare services, and routine alcohol assessment can aid in long-term patient care and public health policies. Implementing feasible, ethical, and cost-effective screening strategies is crucial for improving injury surveillance and prevention efforts. Recommendations for future research and policy include testing user-friendly tools at sentinel sites, such as finger-prick

tests, to provide evidence for their validity and utility (Prinsloo et al, 2023). Additionally, assessing the feasibility of implementing alcohol testing in district and provincial hospitals is essential. Developing policy and guidelines for standardizing alcohol testing in triage is also recommended, focusing on its usefulness in medical treatment, facilitating onward referrals for repeat patients with high alcohol use, and promoting health education to encourage the reduction of alcohol intake.

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