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An audit of stimulant use amongst pre-hospital emergency medical services personnel in Gauteng

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AN AUDIT OF STIMULANT USE AMONGST PRE-HOSPITAL EMERGENCY MEDICAL SERVICES PERSONNEL IN GAUTENG

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A Research Report submitted to the Faculty of Health of the University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Science in Emergency Medicine

Johannesburg, 2021

DECLARATION

I, Ljuba-Ruth van Rooyen, hereby declare that this research report is my own work and has not been submitted or presented for any other degree or professional qualification at this or any other Institute. This research was undertaken in the Division of Emergency Medicine, University of the Witwatersrand, Johannesburg.

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SUBMISSION FORMAT OF THIS RESEARCH REPORT

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ABBREVIATIONS AND DEFINITIONS

CME: Continuous Medical Education. Events hosted to discuss relevant medical topics and update healthcare personnel on the latest finding or changes.

EMS personnel: Emergency Medical Services personnel which includes the following categories – Basic Life Support, Intermediate Life Support, Emergency Care Technician, Critical Care Assistant, Advanced Life Support, DipEMC, National Diploma in Emergency Medical Care, Emergency Care Practitioner

MDMA: 3,4 Methylenedioxymethamphetamine

PHEM: Pre-hospital Emergency Medicine – Emergency medical care of patients prior to arrival at a hospital or healthcare facility.

PTSD: Post Traumatic Stress Disorder

QR: Quick Response

RDA: Recommended Daily Allowance

Stimulants: Refers to any substance used to increase cognitive and/or physical functionality. These may include but are not limited to caffeine, energy drinks/ enhancers, prescription drugs, illicit drugs and over the counter energy boosters

MANUSCRIPT

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The author hereby certifies that this submission is not under publication consideration elsewhere and that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

AUTHOR CONTRIBUTIONS

LVR: primary author and was responsible for the study design, data collection, data analysis, interpretation of results, manuscript write-up, revision, and approval of the final manuscript.

RG & AL: assisted with the study design, interpretation of the results, revision of the manuscript and approval of the final manuscript.

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ABSTRACT

Background: Emergency Medical Service (EMS) personnel are exposed to high levels of psychological, physical, and emotional stressors. There has been an increase in stimulant use among healthcare professionals. There is a paucity of data pertaining to the use of stimulant products among EMS personnel in South Africa. We aimed to determine the prevalence and other aspects pertaining to the use of stimulant products among EMS personnel in the Gauteng province of South Africa.

Methods: A prospective cross-sectional study using a questionnaire-based model was used to survey EMS personnel in Gauteng.

Results: Of the total 315 respondents that completed the questionnaire, 310 (98.4%) reported use of stimulant products, 295 (93.7%) consumed tea/coffee, 187 (59.4%) consumed commercial energy drinks, 60 (19.0%) used caffeinated energy enhancing tablets, 14 (4.4%) used non-caffeinated prescription stimulant medications, 50 (15.9%) used illicit drugs, 134 (42.5%) exceeded the recommended daily allowance of caffeine, 201 (63.8%) exceeded the recommended daily allowance of sugar, 231 (73.3%) experienced difficulty remaining awake during shift, 148 (47.8%) used stimulants off-shift, 71 (22.5%) experienced insomnia. Common reasons for use of stimulants was enjoyment (n=218, 69.2%), to stay awake (n=125, 39.7%) and improvement of physical and mental performance (n=94, 29.8%).

Conclusion: The high prevalence of stimulant use amongst respondents is a cause for concern. Strategies to address this should be aimed at promoting awareness and education, improving working conditions, enhancing support structures, and regulating the stimulant content of commercial products.

Key words: Stimulant use; caffeine; energy drinks; substance abuse; illicit drugs; EMS; shift work; prehospital; psychostimulants

INTRODUCTION

Stimulants such as caffeine, nicotine, methylphenidate, cocaine and methamphetamines are a class of drugs that have the ability to stimulate the central nervous system and thereby enhance cognitive and/or physical functionality.[1–3] Due to its dominant psychotropic properties that include mood enhancement, increased perception and cognition, these have also been described as "psychostimulants".[3]

It is estimated that approximately 85% of adults in the United States of America (USA) consume caffeine daily, with coffee being the most commonly consumed caffeinated beverage.[2] In 2006, a global increase in energy drink sales and consumption was noted, with approximately 500 new energy drinks being released into the market.[1] The consumption of coffee and energy drinks in South Africa is on the increase as the country adapts to growing trends worldwide.[4]

The estimated amount of caffeine per serving in commonly consumed products varies considerably with energy drinks (71-422mg) and over the counter stimulant medication (32-200mg) having the highest content followed by coffee (40-108mg), sodas (25-55mg) and tea (9-50mg). Caffeine consumed in doses between 85-200mg may decrease fatigue and increase alertness, however, the downside of caffeine consumption to combat fatigue is that once arousal from caffeine's effect becomes too high, individual performance decreases significantly.[2] Excessive use of caffeine exceeding 200mg per serving or 400mg per day may result in caffeine toxicity, which manifests with tremors, insomnia, seizures, hypokalaemia and other effects due to hyperstimulation of the cardiovascular, gastrointestinal and central nervous systems.[1,5,6] Other studies have also linked the consumption of energy

products to changes in blood pressure, sudden cardiac death, elevated creatinine, increase in platelet aggregation and endothelial dysfunction.[6–8]

In addition to caffeine, energy drinks and other stimulant-containing products contain large amounts of sugar,[5,6] with some energy drink brands containing as much as 20 teaspoons of sugar per 500ml.[4] The high sugar content far exceeds the World Health Organization's (WHO) recommended daily allowance (RDA) of 6-12 teaspoons of sugar per day for adults [9]. These high quantities of sugar increases the risk of developing lifestyle related diseases such as diabetes mellitus, renal insufficiency, obesity and dental decay.[5,10] Some products also contain a cocktail of other physical and mental enhancers such as guarana, taurine, ginseng and other herbs which may also potentiate the adverse health effects of excessive caffeine consumption.[11]

Prolonged and excessive use of stimulants may pose a health risk, and impact negatively on patient management and care.[12] There has been an increase in stimulant and illicit drug use within the medical fraternity.[13] The use of caffeine and other stimulant products amongst healthcare professionals to combat fatigue and maintain physical and cognitive function whilst on duty has been well documented.[2,14] In addition, the use of prescription stimulant medications such as methylphenidate, pemoline and modafinil that mimic the effects of caffeine, are on the increase among medical practitioners and medical students.[12,15] Stimulant use among EMS, military and other shift workers has been shown to be much higher than the general population.[10] In South Africa, there is no legislation pertaining to the maximum amount of caffeine that is allowed in stimulant energy drinks, only that the products must have a warning when the amount is over 150mg per litre.[4]

Emergency Medical Service (EMS) personnel are regularly faced with high levels of psychological, physical and emotional stressors in their work and personal lives.[16] Ongoing exposure to these stressors may exacerbate health ailments, predispose to substance abuse and impair work performance, thereby impacting patient care.[17,18] There is a paucity of data pertaining to the use of stimulant products among EMS personnel in South Africa. We hypothesized that there is a high prevalence of stimulants use among EMS personnel in South Africa. Hence, in this study we aimed to determine the prevalence and other aspects pertaining to the use of stimulant products among EMS personnel in the Gauteng province of South Africa.

METHODOLOGY

This was a prospective questionnaire based cross-sectional study conducted between 01 May to 16 October 2019. The study population comprised EMS personnel employed at one of 7 EMS providers within two metropolitan municipalities in Gauteng. Permission to conduct the study was obtained from each of the service providers, while ethics clearance was obtained from the University of Witwatersrand Human Research Ethics Committee (certificate M181116).

Data was collected by the primary investigator who attended continuous medical education (CME) events as well as approached potential participants at the various operation bases. To ensure that all shifts were adequately represented, data collection was conducted during both day and night shifts. Potential participants were first given a study information sheet that outlined the study aim and objectives and thereafter a quick response (QR) link to the online questionnaire. Study consent was automatically assumed when participant's chose to complete the survey.

The questionnaire included questions pertaining to gender, experience, qualifications, difficulty staying awake during shift, insomnia, aspects pertaining to stimulant consumption including the quantity of various stimulant products consumed, use of illicit drugs, reasons for stimulant consumption and increasing frequency of stimulant consumption. Data pertaining to the quantity of stimulant consumption was used to calculate the percentage of RDA for caffeine and sugar.

Data was electronically captured into a data collection sheet that was created in the RedCap system.[19] Captured Data was thereafter exported to Microsoft® Excel® (Microsoft 365, Version 16.0.13029.20232) for further analysis. Relevant data was tabulated and described using frequency and percentage.

RESULTS

Out of the total of 501 EMS personnel that were approached, 315 completed the questionnaire, giving a response rate of 62.9%. Table 1 describes the various characteristics of study participants including perceptions relating stimulant use. Of note, most participants were male (n=226, 71.1%), had >10 years of EMS experience (n=125, 39.7%) and had an advanced level qualification (n=133, 42.2%).

More than half the number of participants (n=187, 59.4%) reported the consumption of caffeinated commercial energy drinks, while approximately one-fifth (n=60, 19.0%) reported consumption of caffeinated energy enhancing tablets. Monster was the most commonly consumed caffeinated commercial energy drink (n=111, 35.2%). Among the 50 (15.9%) participants that reported the use of illicit substances, marijuana was the most commonly used

substance (n=43, 13.7%). The recommended daily allowance of caffeine and sugar was exceeded by 134 (42.5%) and 210 (63.8%) participants, respectively.

Table 1. Characteristics and perceptions of study participants

Characteristics	**n, %**
Male	226 (71.7)
Experience	
≤5 years	104 (33.0)
6 – 10 years	86 (27.3)
>10 years	125 (39.7)
Qualifications	
Basic level qualification	76 (24.1)
Intermediate level qualification	106 (33.7)
[a] Advanced level qualification	133 (42.2)
Consumption of stimulant containing products	310 (98.4)
Caffeinated beverages (tea/ coffee)	295 (93.7)
[b] Caffeinated commercial energy drinks	187 (59.4)
[c] Caffeinated energy enhancing tablets	60 (19.0)
[d] Non-caffeinated prescription stimulant medications	14 (4.4)
[e] Use of illicit drugs	50 (15.9)
Exceeded recommended daily allowance of caffeine	134 (42.5)
Exceeded recommended daily allowance of sugar	201 (63.8)
Difficulty staying awake during shift	231 (73.3)
Use of stimulants off shift	148 (47.8)
Experiences insomnia	71 (22.5)
Perceived that insomnia was secondary to stimulant use	33 (10.5)
Perceived that stimulant use among EMS personnel is a problem	252 (80.0)
Unaware that some regularly consumed products contain stimulants	87 (27.6)
Required hospital admission due to excessive stimulant use	5 (1.6)
Experiences withdrawal symptoms if adequate amount of stimulant not consumed	97 (30.8)
Perceived higher risk of health complications from excessive stimulant use	298 (94.6)

[a] Emergency Care Technician, Critical Care Assistant, Advanced Life Support, DipEMC, National Diploma in Emergency Medical Care, Emergency Care Practitioner
[b] Monster®, Redbull®, Rockstar®, Dragon®, Mofire®, Wicked®, Switch®, Play®
[c] Regmakers®, Bioplus®, Stay Awake®, Macnabs®, Preworkout, Berocca®, Rapid Energy®
[d] Methylphenidate (Ritilan®, Concerta®), Modafinil®
[e] Marijuana, cocaine, amphetamines, methamphetamines, methcathinone (cat), 3,4Methylenedioxymethamphetamine (MDMA)

Almost three-quarter of participants (n=231, 73.3%) reported experiencing difficulty remaining awake during their shift, while 252 (80.0%) perceived that stimulant use among

EMS personnel was a problem and 87 (27.6%) were unaware that regularly consumed products contained stimulants.

Almost a third of participants (n=97, 30.8%) reported experiencing withdrawal symptoms if adequate amounts of stimulant was not consumed. Overall, most subject (n=298, 94.6%) perceived a higher risk of developing health complication due to excessive stimulant use.

Table 2 describes the reasons for stimulant consumption as well as reasons for the increasing frequency of stimulant consumption over time. Enjoyment (n=218, 69.2%) and to stay awake or alert (n=125, 39.7%) were reported as the most common reasons for stimulant consumption. Among the 111 (35.2%) participants that reported an increase in the frequency of stimulant consumption over time, to combat stress (n=85, 76.6%) and an increase in the intensity of work (n=54, 48.6%) were reported as the most common reasons.

Table 2. Reasons for stimulant consumption and increasing frequency of stimulant consumption

	n, %
Reasons for stimulant consumption?	
Enjoyment	218 (69.2)
To stay awake/ alert	125 (39.7)
To improve physical or mental performance	94 (29.8)
Cannot function without it	52 (16.5)
Not sure why	25 (7.9)
Because everyone does it	14 (4.4)
Increased frequency of stimulant consumption over time	111 (35.2)
Reasons for increased frequency of stimulant consumption?	
To combat stress	85 (76.6)
When the intensity of my work is increased	54 (48.6)
To stay awake or alert	51 (45.9)
My shifts are too long	31 (27.9)
I work too many shifts	29 (26.1)
There is no trigger for my increased consumption	13 (11.7)

DISCUSSION

Although studies have reported on caffeine and other stimulant use among healthcare workers in general,[20–22] there is a paucity of data pertaining to stimulant use among EMS personnel.[10,23] Similar to other healthcare professionals,[24–26] EMS personnel are also susceptible to stimulant and drug use as a result of exposure to various work-related stressors.[27,28]

Although previous studies have not specifically quantified stimulant and sugar consumption among EMS workers, consumption in this study was excessive with the RDA for caffeine (400mg per day)[29] and sugar (6-12 teaspoons per day)[4,9] being exceeded by 42.5% and 63.8% of study participants respectively. The high rates of consumption of these products among study respondents is of concern and calls for strategies to increase awareness, improved working conditions and limit use of stimulant and sugar containing products.

In a study that investigated predictors of stimulant use among 107 physicians in Nigeria, 92.5% of respondents were male, 27.1% had >10 years of experience, 89% reported use of stimulants, 26% used stimulants at home, 83% consumed coffee, 35.1% consumed caffeinated energy drinks and 54.5% consumed kola nut (an edible caffeine containing nut that is native to tropical rainforests in Africa). Among the reasons given, 55% used stimulants to keep alert, 50% to stay awake, 42% for pleasure and 37% to cope with stress.[24] Similarly, in a survey that investigated the use of neurocognitive enhancement substances among 716 EMS personnel in San Diego, 86% of respondents were male, 69% reported daily use, 63% consumed marketed energy drinks, 31% consumed tea or coffee, 8% used prescription psychostimulant medications, and 72% used several products in combination. Additionally, 52% of respondents reported the presence of side-effects while 3% required medical attention

secondary to use of these substances. The most cited reasons for use of these substances were to stay awake and to increase energy for recreational activities, while 61% believe that their job performance benefited.[30] Comparatively, in the current study, 71.7% of respondents were male, 39.7% had >10 years of experience, 98.4% used stimulant containing products, 47.8% used stimulants off shift, 93.7% consumed tea or coffee, 59.4% consumed caffeinated commercial energy drinks, 4.4% used non-caffeinated prescription stimulant medications, 15.9% used illicit drugs, 69.2% used stimulants for enjoyment, 39.7% used stimulants to stay awake and 29.8% used stimulants to improve their physical or mental performance.

EMS personnel have been shown to have high rates of depression, post-traumatic stress disorder (PTSD) and sleep disturbances, all of which have been associated with substance abuse.[27,31] Similar to a study that investigated substance use among 206 healthcare workers in 15 health facilities in Kenya, where illicit stimulant consumption rates for marijuana and sedatives together were 9.3%, cocaine 8.8%, amphetamine-like stimulants 6.4% and hallucinogens 5.4%,[25] marijuana was consumed by 13.7%, cocaine by 2.5% and methamphetamines and amphetamines by 1% of respondents in this study. In contrast, none of the respondents in the above study that was conducted in Nigeria, used illicit drugs. The authors of that study attributed the positive finding to the local presence of cultural stigmatization.[24]

Prescription stimulant medications such as methylphenidate and modafinil are frequently used by healthcare personnel to improve concentration, memory, wakefulness, motivation, energy, performance and mood.[12] Compared to a study conducted at a medical centre in the USA, where over 50% of healthcare workers tested positive on urine drug screening for prescription stimulant medications used to treat attention deficit hyperactivity disorder,[32]

only 4.4% of respondents in this study reported the use of prescription stimulant medications such as methylphenidate and modafinil. Since access to methylphenidate in South Africa is more restricted (schedule 6 drug)[33] compared to that in the USA (schedule 2 drug),[34] this is a likely reason for the big difference between the two studies.

As a result of long working hours, high workload and physical and mental demands, the prevalence of sleep disorders is high among EMS personnel.[16] Physical and mental fatigue has been shown to affect 50% of EMS personnel in the USA,[35] whilst excessive daytime sleepiness was experienced by 39.2% of EMS personnel in a study conducted in Taiwan.[36] Comparatively, in this study, difficulty staying awake during shift was reported by 73.3% of respondents, insomnia was reported by 22.5% and 10.5% perceived that their insomnia was secondary to stimulant use. Similarly, a study investigating energy drink consumption among medical students and junior doctors in Malta reported that 31.9% of respondents experience insomnia after consuming energy drinks.[37]

Limitations of this study are that this was a regional study conducted in the Gauteng province of South Africa; hence, our findings may not be representative of other regions where work stresses, cultural differences and accessibility to various products may differ. Furthermore, other limitations that pertain to questionnaire-based studies in general, including recall bias and selective non-disclosure are also applicable to this study.

CONCLUSION

This study demonstrates that the prevalence of stimulant use amongst EMS personnel in the Gauteng Province of South Africa is a cause for concern. Strategies that may be useful in curbing the excessive use of stimulants products among EMS and other healthcare personnel

should be aimed at promoting awareness and education, improving working conditions, enhancing support structures, and regulating the stimulant content of commercial products.

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RESEARCH PROTOCOL

Stimulant use amongst Pre-hospital Emergency Care personnel in the Gauteng Province of South Africa

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INTRODUCTION

Emergency Medical Services (EMS) personnel form part of a dynamic medical system. These individuals are faced with physical, psychological and emotional stressors daily.[1] It is well documented that healthcare personnel and shift workers consume stimulants to stay awake, as well as to maintain physical and cognitive function whilst on duty.[2–4] This is likely the case amongst pre-hospital emergency medical services personnel in South Africa, however there is little research supporting this in this setting.

For the purpose of this study stimulants will refer to any substance used to increase cognitive and/or physical functionality.[3,5] These may include but are not limited to caffeine, energy drinks/enhancers, prescription drugs, illicit drugs and over the counter energy boosters.

Stimulants such as caffeine or energy products are generally perceived as safe when used in moderate amounts.[5] However, numerous studies report that the use of stimulants as well as dependence on them are on the increase.[6]

Caffeine is the most widely consumed stimulant in the world.[6] It is estimated that approximately 85% of adults in the United States of America (USA) consume caffeine on a daily basis.[3] According to research, moderate use of caffeine can be defined as 300mg or 4mg/kg per day.[3,5] Stimulants such as methylphenidate, modafinil and other medications mimic the effects of caffeine and are often used in its place.[7] The estimated amount of caffeine per serving in common drinks is as follows: tea – 9-50mg, sodas – 25-55mg, coffee – 40-108mg, over the counter stimulant medication – 32-200mg and energy drinks – 71-422mg.[3] The energy drink, Monster® contains approximately 160mg of caffeine per can, which is almost half the RDA for caffeine consumption per 24 hours.[8] Hence, consuming more than 2 cans per day, which may be in addition to caffeine that is consumed other products increases the likelihood of adverse health effects. In Australia, consumers are recommended not to consume than a can per day.[9]

Stimulants are known to improve cognitive function, physical performance and combat fatigue during shift work.[3,10] However, higher doses of stimulants may negatively affect mood, overall performance and pose health risks.[3] The use of caffeine among EMS, military and other shift workers is much higher than the general populations, who on average consume two cups/180mg of coffee per day.[10] The downside to consuming caffeine to combat sleep is that once arousal from caffeine's effect becomes too high, individual performance decreases significantly.[3] Reports have shown that when caffeine is ingested in doses of equal to and over 200mg/kg, caffeine toxicity can occur.[5,6] This may manifest with features of hyperstimulation of the cardiovascular system, gastrointestinal system and the central nervous system.[5]

The consumption of energy drinks within the South African population is on the increase.[11] Anecdotally, it is common to see EMS personnel drinking more than one stimulant drink per day. These products have recently been made available in supersized or larger volume containers.[5] In addition to caffeine, energy drinks and other stimulant products may also contain large amounts of sugar,[6] thereby increasing the risk of diabetes mellitus, obesity and dental decay.[10,11] Some energy drink brands can contain as much as 20 teaspoons of sugar per 500ml, with the high sugar content far exceeding the World Health Organization's (WHO) recommended daily allowance of 6-12 teaspoons of sugar per day for adults.[11] Some products also contain a cocktail of other physical and mental enhancers such as guarana, taurine, ginseng and other herbs.[12]

In South Africa, there is no legislation pertaining to the maximum amount of caffeine that is allowed in stimulant energy drinks, only that the products must have a warning when the amount is over 150mg per litre.[11] The increased consumption of energy drinks has been associated with an increase in health risks and poses the question of whether or not these substances are safe to consume.[13] There is very little literature to support the safety and suitability of energy drinks.[6]

A study published in 2013 that analysed 2.3 million calls made to the US National Poison Data System (NPDS) over a period of one year, reported that 4854 calls were energy product related with varying degrees of emergencies.[13] Energy product consumption has been anecdotally linked to sudden cardiac death.[14] A direct link between the consumption of caffeine and changes in blood pressure has been demonstrated after energy drink consumption.[6,14,15] There was a significant increase in platelet aggregation with a decrease in endothelial function one hour after consumption of energy drinks.[14] Increased daily intake of

energy drinks over a period of three weeks has been associate with an increase in creatinine levels.[6]

There is an increase in the use of prescribed stimulant medications by South African medical practitioners and students.[7,16] These stimulants, namely methylphenidate, pemoline, modafinil and Adderall have similar mood enhancing and energy boosting qualities as caffeinated stimulants.[7] Similar to other stimulants such as caffeine and energy products, these are consumed by doctors and other persons working long hours to combat fatigue.[17] Prolonged use may pose a health risk to these individuals, as well as being a risk to patient care.[7] Stimulant type illicit drugs that are widely abused include cocaine, amphetamines, and methamphetamines. In the USA, these substances are used by approximately 1.6 million people who are older than 12 years. Addiction, dependence, tolerance and social problems, are the major issues associated with the use of these substances.[18]

There is very little data on the extent of stimulant use within the South African prehospital setting. There are no studies highlighting the risk-versus-benefit ratio of stimulant consumption, or the effects on patient safety amongst EMS personnel.[10] The health risks and implications of excessive stimulant use in the pre-hospital setting in South Africa, are not well researched, nor understood.[3,19]

STUDY AIM AND OBJECTIVES

Study aim

The aim of this study is to investigate aspects pertaining to stimulant use amongst EMS personnel in Gauteng, South Africa. This will target both the private and public healthcare groups.

Study objectives

1. To determine the prevalence of stimulant use.
2. To determine the most commonly consumed stimulant substances.
3. To determine quantities, reasons for use and patterns of use of stimulant substances.
4. To determine whether stimulant use had caused various health related effects such as withdrawal symptoms, hospital admission and insomnia).
5. To determine the perceptions of EMS personnel regarding stimulant substances.

METHODOLOGY

Study Design

Cross-sectional, questionnaire-based study

Study Site

The study will be conducted at EMS services based in Gauteng

Study population

EMS personnel employed at the various EMS services in Gauteng

Inclusion criteria

All EMS personnel employed at EMS service in Gauteng, irrespective of their qualifications.

Exclusion criteria

Students, other healthcare professionals and observers that may be present on shift but are not employed by the EMS service

Sample size estimation

Statistics from the Health Professions Council of South Africa (HPCSA) indicated that there are approximately 70 000 registered EMS personnel in South Africa. As calculated using the HPCSA Iregister data base, a total of 4 654 personnel are currently registered in Gauteng. In

order to obtain a confidence interval of 95%, with a margin of error of 5%, a sample size of 304 participants will be required.

Data Collection

- After ethics approval and the necessary permissions from the respective EMS service providers have been obtained (appendix C), the primary investigator will arrange with the participating EMS service providers to attend continuous medical education (CME) events (approximately 3-4 events are hosted every month across Gauteng) to recruit study participants. At these events, the primary investigator will ask permission from the chairperson of the event to allow for an approximately 10-minute slot for potential participants to complete the questionnaire.
- In addition, the primary investigator will also approach the relevant base managers for permission to administer study questionnaires to EMS staff on duty.
- After briefly describing the study aim and objectives, the primary investigator will initially hand out a study information sheet (appendix D) outlining the study aim and objectives.
- Thereafter, personnel willing to participate will be handed a form that includes a quick response (QR) link to the online questionnaire (appendix E).
- Consent for study participation was assumed when participants opened the link and thereafter completed the online questionnaire. Anonymity was maintained as the online questionnaire was not traceable back to the participants once open or completed
- Participants will then be given the opportunity to complete the questionnaire on their personal devices without coercion from the researcher.

- In addition to being mentioned in the study information sheet, the primary investigator will also verbally emphasize to all participants that anonymity will be maintained throughout the study, and that no electronic data can be traced back to individuals once the QR linked online questionnaire is submitted and closed.

DATA ANALYSIS

Data collection is estimated to take six months. All data recorded will be entered into an electronic data spread sheet for analysis (Microsoft® Excel®). Data collected will be predominantly tabulated and described using frequencies and percentages.

ETHICAL CONSIDERATIONS

Ethics clearance will be obtained from the Human Research Ethics Committee (HREC) of the Faculty of Health Sciences at the University of Witwatersrand. Permission to conduct the research will be obtained from the relevant EMS service providers. As stated above, consent will be assumed once participants have scanned the QR link on their own devices and decided to complete the online questionnaire. Each participant will be allocated a participant number to ensure anonymity, i.e., PN 1 etc. Participants will be able to withdraw from the study at any point without recourse. All data collected will be electronically captured and stored in a password-protected file, only accessible to the researchers.

TIMING

May – October 2018	Protocol preparation
November 2018 – June 2019	Protocol and ethics submission and approval
July – December 2019	Data collection
January – October 2020	Data analysis and writing of manuscript
November 2020	Examination and publication

FUNDING

The research will be self-funded with an estimated cost as follows:

Printing and stationery	5000-00
Petrol and travel	5000-00
TOTAL	**10000-00**

STUDY LIMITATIONS/ POTENTIAL PROBLEMS

- The limitations of this study are limited. Since the study will be conducted within Gauteng, results may not represent the EMS population working outside of Gauteng. Also, some EMS personnel may choose not to participate in the study and incomplete questionnaires are other possible study limitations.
- Another limitation may be that participants may not truthfully disclose all information pertaining to stimulant use and prescribed medication.
- Access to counselling has also been made available in the information sheet (appendix D), for potential participants that may realize during the study that they may require help for substance use.

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APPENDIX A – DATA COLLECTION SHEET
Please indicate the appropriate response with an X and elaborate where appropriate.

1) What is your gender?
Male / Female

2) How long have you been qualified in the field of prehospital medical services?
<1 year / 1 – 5 years / 6 – 10 years / >10 years

3) What are your qualifications? (please indicate all the qualifications that you have achieved)
BLS – Basic Life Support / ILS – Intermediate Life Support /
ALS – Advanced life Support / CCA – Critical Care Assistant /
N-DIP – National Diploma in Emergency Medical Care / ETC – Emergency Care Technician / ECP – Emergency Care Practitioner /
Other (please specify): _____

4) Do you work shift work?
Yes / No
If you answered No, please specify working hours: _____

5) Have you ever struggled to stay awake whilst on shift?
Yes / No / Not that I am aware

6) Do you think there is a stimulant use problem amongst pre-hospital Emergency Medical Services Personnel?
Yes / No

7) Are you informed about the ingredients in the products listed in question 9 below?
Yes, fully/ No, not at all / Unsure / I know about some of the ingredients

BY DEFINITION, A STIMULANT IS ANY SUBSTANCE THAT IS USED TO INCREASE MENTAL AND/ OR PHYSICAL FUNCTIONALITY

8) Please complete the table below
(Please utilize appendix B to complete this question for volume/ dose of each product as well as contents of each.)

	Do you consume this product (Y/N)?	**How often do you consume this product? (indicate with X)**					**When do you consume this product? (indicate with X)**			**How much do you consume? (e.g. 2 cups per day, 3 cans per week etc.)**
		Volume/ Dose	**dly**	**≥4× per wk**	**1-3× per wk**	**Occas-ionally**	**Day-shift**	**Night-shift**	**Off-shift**	
Energy drinks:										
Red bull ®										
Monster ®										
Rockstar ®										
Other (please specify): _____										
Caffeinated beverages:										
Coffee										
Tea										
	Cont.									
	Do you consume this product (Y/N)?	**How often do you consume this product? (indicate with X)**					**When do you consume this product? (indicate with X)**			**How much do you consume? (e.g. 2 cups per day, 3 cans per week etc.)**
		Volume/ Dose	**dly**	**≥4× per wk**	**1-3× per wk**	**Occas-ionally**	**Day-shift**	**Night-shift**	**Off-shift**	
Energy enhancing tablets or powders:										
Regmakers ®										
Bioplus ®										
Stay Awake ®										
Other (please specify): _____										
Prescription or over the counter medications:										

Methylphenidate (Ritalin)										
Modafinil										
Pimoline										
Adderall										
Other (please specify): _____										
Illicit drugs:										
Cocaine										
Amphetamines (e.g. speed)										
Methamphetamines										
Other (please specify): _____ _____										

If you have answered yes to any substance in the table above, please answer questions 9-15 below. If you answered no, then please proceed to questions 14.

9) Why do you consume these substances?
To stay awake or alert / to improve my physical or mental performance / I feel that I have an addiction towards it / Because everyone does it / I cannot function without it / Because I enjoy it / I am not sure why /
Other (please specify): _____

10) Does your frequency of consumption ever increase?
Yes / No / Unsure / I prefer not to answer
If yes, please indicate the possible reasons. You may select more than one:
My shifts are too long/ I work too many shifts / to stay awake or alert / I am experiencing more stress than normal / when the intensity of my work is increased / to cope with my work stress / there is no trigger for my increased consumption / my consumption frequency remains the same regardless of shift or work stress
Other (please specify): _____

11) Have you ever experienced withdrawal symptoms from not consuming your daily intake of any substance listed in the table above?
Yes / No / Unsure / I prefer not to answer
If yes, please indicate which substances: _____
If Yes, do you ever experience any of the following symptoms if you do not consume the substance?
Palpitations / Light-headedness / Chest pain / Shakes / Agitation / None of the above
Other (please specify): _____

12) Have you ever been admitted to hospital because of too much use of any of the substances in the table above?
Yes / No

13) Do you require sleeping agents to sleep?
Yes / No

If yes, do you think your inability to sleep is related to the amount of stimulants you consume?
Yes / No / Unsure

14) Do you think EMS personnel who consume excessive amounts of stimulants are at higher risk of health complication?
Not at all likely / Not so likely / Somewhat likely / Very likely / Extremely likely

15) If you feel that you would like to elaborate on the answers provided in one of the above questions, please do so below or feel free to include any other related comments.

_____
_____
_____

Thank you for your participation in this questionnaire

APPENDIX B – Nutritional information leaflet

Various forms of stimulants	**Volumes**	**Average Contents**
Red bull ®	*250ml / 355ml / 473ml*	*Caffeine/Taurine/B-group vitamins/Water/Sugar*
Monster ®	*250ml/355ml/473ml/ 710ml/950ml 8oz/ 12oz/ 16oz/ 24oz/ 32oz*	*Glucose/taurine/Caffeine/l-Carnitine/carbonated water, natural flavours, sucrose, citric acid, Panax ginseng root extract, sodium citrate, inositol, colour added, benzoic acid, sorbic acid, sucralose, guarana seed, cyanocobalamin, niacinamide, glucuronolactone, maltodextrin, sodium chloride, riboflavin and pyridoxine hydrochloride*
Rockstar ®	*473ml/ 710ml 16oz/ 24oz*	*Carbonated water, high fructose corn syrup, dextrose, citric acid, taurine, natural and artificial flavours, guarana seed extract, ascorbic acid, caramel colour, sodium benzoate (preservative), potassium sorbate (preservative), caffeine, niacinamide, inositol, l-carnitine, milk thistle extract, ginkgo biloba leaf extract, calcium pantothenate, Siberian ginseng root extract, cyanocobalamin, riboflavin, pyridoxine hydrochloride*
NOS ®	*473ml/ 650ml 16oz/ 22oz*	*Carbonated Water, High Fructose Corn Syrup, Citric Acid, Taurine (1000mg), Sodium Citrate, Natural Passionfruit Flavour With Other Natural Flavours, D-Ribose, L-Carnitine, Caffeine, Sodium Hexametaphosphate, Pectin, Ascorbic Acid (Vitamin C), Inositol, Gum Arabic, Monopotassium Phosphate, Sodium Benzoate, Potassium Sorbate, Ester Gum, Panax Ginseng Root Extract, Calcium Disodium Salt of EDTA (protects freshness), Sucralose, Pyridoxine Hydrochloride (Vitamin B6), Beta-Carotene (Colour), Folic Acid, Cyanocobalamin (Vitamin B12)*
Coffee (90mg/1 cup)	*1cup/ 250ml*	*Caffeine/ antioxidants/ diterpenes*
Tea (1cup)	*1cup/ 250ml*	*Theanine/ caffeine*
Regmakers ®	*tablets*	*150mg caffeine*
Bioplus ®	*Sachet / Tablet*	*Each 10 ml sachet contains 90mg caffeine, 5,33 mg thiamine HCl (Vitamin B1), 5,02 Riboflavin (Vitamin B2), 14 mg Nicotinamide (Vitamin B3), 3 mg Pyridoxine HCl (Vitamin B6), 4mg Cyanocobalamin (Vitamin B12), 3.66 mg d-Pantothenol, 60 mg Calcium Citrate and 300 mg Calcium Gluconate*
Stay Awake ®	*tablet*	*200mg caffeine*
No Doz ®	*tablet*	*200mg Caffeine*
Methylphenidate (Ritalin) 10-20mg tablets	*5mg tab/10mg tab/20mg tab*	*Methylphenidate Hydrochloride/ lactose/magnesium stearate/polyethylene glycol/ starch/sucrose/talc/tragacanth*
Modafinil	100mg tab/ 200mg tab	Modaffinil, croscarmellose sodium, lactose monohydrate, magnesium stearate, microcrystalline cellulose, povidone, and pregelatinized starch

Pimoline	*18.75mg/37.5mg/75mg tablets*	*Pimoline, corn starch, FD&C Yellow No. 6, gelatine, lactose, magnesium hydroxide, polyethylene glycol and talc.*
Adderall	*5mg/ 7.5mg / 10mg/ 12.5mg/ 15mg/ 20mg/ 30mg tablets*	*dextroamphetamine saccharate, amphetamine aspartate, dextroamphetamine sulfate and amphetamine sulfate*
Cocaine	*Crystalline powder grams*	*Benzoylmethylecgonine, cocaine hydrochloride, mixture of various 'cutters' from talc, lidocaine, baking soda, corn starch*
Amphetamines (e.g. speed)	Tablet, powders	Amphetamines
Methamphetamines	Tablet, crystals	pseudoephedrine

APPENDIX C – LETTER REQUESTING STUDY PERMISSION FROM EMS SERVICE PROVIDER

Dear service provider (name of organization):_____
My name is Ljuba-Ruth van Rooyen and I am enrolled in the Master of Science in Medicine (Emergency Medicine) program at the University of Witwatersrand. As a requirement for the degree, I am required to do a research project. The title of my study is: ***An audit of stimulant use amongst pre-hospital emergency medical services personnel in Gauteng***

In this study we want to learn about stimulant use amongst prehospital emergency medical services (EMS) personnel in Gauteng. It is well documented that many EMS personnel and shift workers consume stimulants to stay awake as well as maintain physical and mental function whilst on duty. This has not been well researched in South Africa. Therefore, this research aims to investigate the extent of stimulant use and its potential health effects amongst pre-hospital EMS personnel in Gauteng.

Your service is invited to participate in the study as one of the EMS providers in Gauteng. If your service consents to participating in the study, the researcher will approach potential participants employed in your service. Participants will be asked to complete a questionnaire. Information forms along with the QR link to an online questionnaire will then be handed to participants. Participants will then be allowed to complete the questionnaire, either on their personal devices at their own leisure or a device which will be available. Anonymity will be maintained throughout the study as no electronic data will be traceable back to the participant. The questionnaire should take approximately 10 minutes to complete.

There are no consequences to individuals who do not wish to participate in this study, nor an obligation for those who do participate. Participants will be allowed to withdraw from the study at any point, until submission of the questionnaire. The study will be subject to clearance from the Human Research Ethics Committee of the University of Witwatersrand. Should you have any queries please contact the chair of the committee; Prof Clement Penny – Telephone number: 011 717 2301/ clement.penny@wits.ac.za.

If you have any questions or queries pertaining to this study, please feel free to contact me on telephone no. 072 509 3526 or email me at ljuba.vrooyen@gmail.com. Alternatively, you may contact any of the study supervisors: 1) Dr Radha Gihwala on telephone no. 082 784 4888 or by e-mail at radhagihwala@gmail.com or 2) Prof Abdullah Laher on telephone no. 084 840 2508 or by e-mail at abdullahlaher@msn.com.

I have read the above information and understand what is required for participation in this study. I understand that data supplied may be published and **I give consent / do not give consent** as a representative of _____ (service provider name) for the study to be conducted within the service.

Name of service provider representative: _____
Signature of service representative: _____
Date: _____
Researcher signature: _____
Date: _____

APPENDIX D: PARTICIPANT INFORMATION SHEET

An audit of stimulant use amongst pre-hospital emergency medical services personnel in Gauteng

Introduction
I, Ljuba-Ruth van Rooyen, am conducting a research project on stimulant use in the prehospital emergency medical care setting, as partial fulfilment of my Master of Science degree in emergency medicine. Research is a process used to obtain new knowledge. In this study we want to learn about stimulant use amongst prehospital emergency medical services (EMS) personnel in Gauteng. By definition, a stimulant is any substance that is used to increase mental and/or physical functionality. EMS personnel are faced with physical, psychological, and emotional stressors daily. It is well documented that many medical personnel and shift workers consume stimulants to stay awake as well as to maintain physical and mental function whilst on duty. This has not been well researched in South Africa. Therefore, this research aims to investigate the extent of stimulant use and its potential health effects amongst EMS personnel in Gauteng.

Invitation to Participate
We are inviting you to take part in this research study.

What is involved in the study?
1. Once you have agreed to participate in the study and to complete the study questionnaire, you will be handed a form that includes a quick response (QR) link to the online questionnaire.
2. You can ether use your mobile device or the available tablet device to scan the QR code and complete the questionnaire.
3. By submitting the questionnaire, consent for study participation will be automatically implied.
3. Anonymity will be maintained throughout as none of your responses will be traceable back to you.
4. This questionnaire should take approximately 10 minutes of your time to complete and may be completed at your convenience.

Risks associated with participating in this study
There may be a risk of triggering the potential need for support or counselling. Should you require substance use support of any kind, please feel free to contact any of the following:

- SA National Council on Alcoholism and Drug Dependence
  086 117 3422/ 011 673 0400
- Lifeline
  086 132 2322/ 011 728 1347

Benefits associated with participating in this study
There is no direct benefit to consenting individuals who participate in this study. Information obtained in this study may be beneficial to future practitioners and may highlight the dangers associated with stimulant consumption.

Participation is voluntary
Refusal to participate will involve no penalty, discrimination, or loss of any benefits. You may discontinue participation at any time without recourse. There is no requirement to provide a reason if you decide to withdraw from this study.

Reimbursements
There is no financial benefits, cost or loss associated with your participation in this study.

Confidentiality
Data collected will be handled with the strictest confidentiality. Data will only be available to the Principal Investigator (PI) and Supervisors. All data collected during the study will be securely stored for six years.

Contact details of researcher
If you have any questions or queries pertaining to this study, please feel free to contact me on telephone no. 072 509 3526 or email me at ljuba.vrooyen@gmail.com. Alternatively, you may contact any of the study supervisors: 1) Dr Radha Gihwala on telephone no. 082 784 4888 or by e-mail at radhagihwala@gmail.com or 2) Prof Abdullah Laher on telephone no. 084 840 2508 or by e-mail at abdullahlaher@msn.com.

Contact details of HREC administrator and chair
This study has been approved by the Human Research Ethics Committee of the University of the Witwatersrand, Johannesburg. A principal function of this committee is to safeguard the rights and dignity of all human subjects participating in research as well as to maintain the integrity of research studies. If you have any concerns over the manner in which this study is being conducted, please contact the chairperson of the committee, Professor Clement Penny, on telephone no. 011 717 2301 or by e-mail at clement.penny@wits.ac.za. The telephone numbers for the Committee secretariat are 011 717 2700/ 011 717 1234.

Thank you for reading this Study Information Sheet.

Date: _____
Sincerely Yours,
Ljuba-Ruth Van Rooyen

APPENDIX E: QR Code

To access the online questionnaire in your web browser, please use your mobile device or the available tablet device to scan the QR code below.



ETHICS CLEARANCE CERTIFICATE

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

R14/49 Ms L-R van Rooyen

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M181116

NAME: (Principal Investigator)	Ms L-R van Rooyen
DEPARTMENT:	School of Clinical Medicine Department of Medicine Division of Emergency Medicine Medical School University
PROJECT TITLE:	An audit of stimulant use amongst pre-hospital emergency medical services personnel in Gauteng
DATE CONSIDERED:	30/11/2018
DECISION:	Approved unconditionally
CONDITIONS:	This clearance applies to research on employees of LifeMed, CoJEMS, ER24, Netcare, Emerg-G-Med and Hatzolah Netcare and Emer-G-Med added on 27/05/2019
SUPERVISOR:	Drs A Laher and Dr R Gihwala
APPROVED BY:	Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	28/03/2019

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

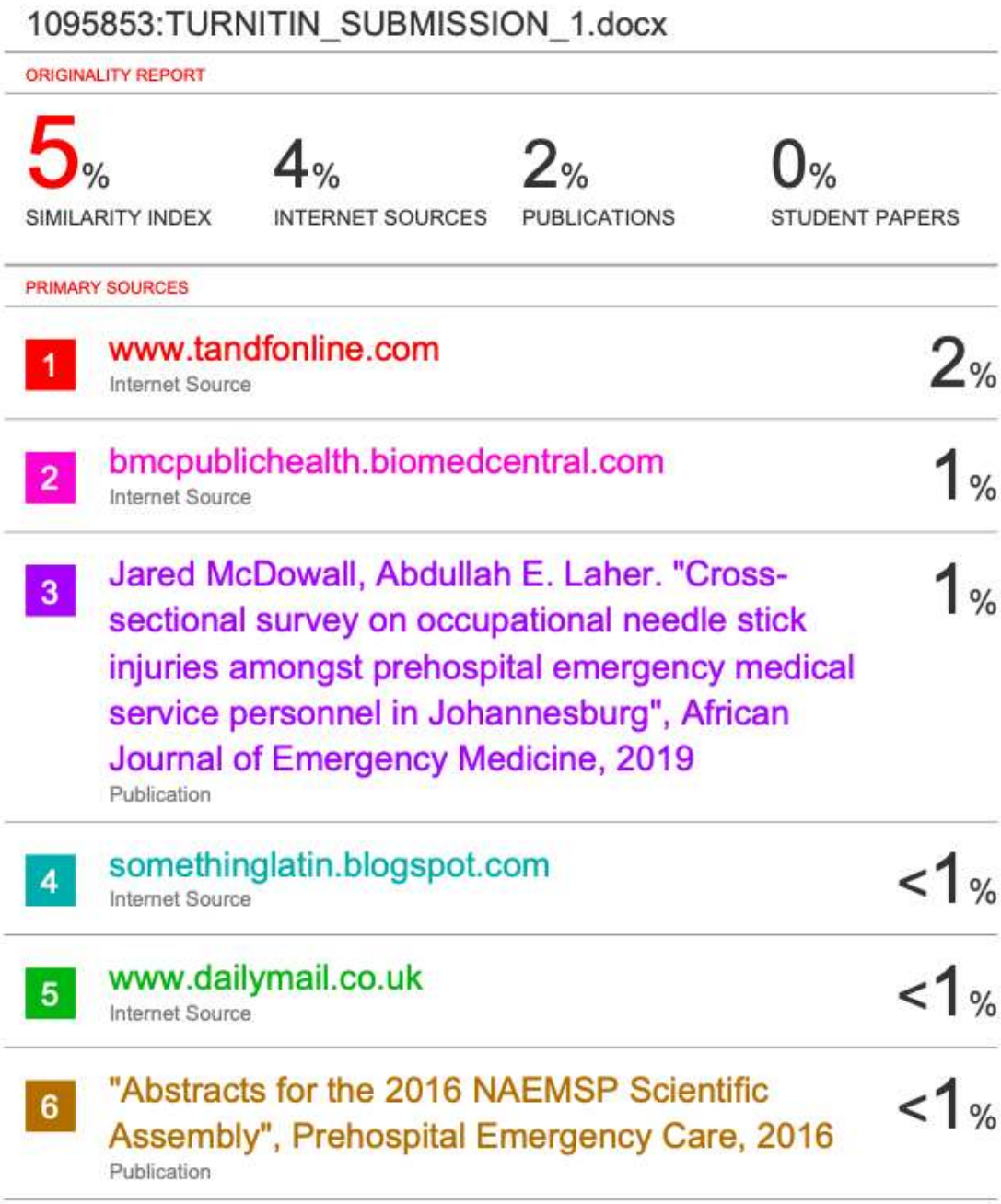
DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary on the 3rd Floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.
I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to submit details to the Committee. **I agree to submit a yearly progress report**. When a funder requires annual re-certification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in **November** and will therefore reports and re-certification will be due early in the month of **November** each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature _____ Date _____

PLEASE QUOTE THE CLEARANCE CERTIFICATE NUMBER IN ALL ENQUIRIES

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