

ALCOHOL AND THE CLINICAL EXAMINATION:

The facility

The examination ought to be done in a facility, which is fully and purposefully equipped. The police charge office, or any other location in a police station is not recommended to substitute the examination facility.

The facility should at least be equipped with the following:

1. Good lighting
2. Examination couch
3. Baumanometer
4. Patella Hammer
5. Ear, nose and throat examination set
6. Scale for weighing the subject. (Important for the Widmark formula)
7. Table and two chairs (for the doctor and the subject)
8. Pair of scissors. (To cut the sealing rope on the alcohol kit)
9. Acetone for cleaning the blood-sampling site. (Alcohol swabs are not allowed)
10. GW 7/54 forms available
11. Carbon paper
12. Cotton swabs for haemostatic purposes
13. Black ballpoint type of pen
14. Elastoplast
15. Alcohol Kits. (To be supplied by SAPS)
16. A tape-recorder may come in handy especially if it is a rowdy subject. (Warn the subject that his or her voice and exclamations will be recorded) It is however not essential.

Completing of the proforma GW 7/54:

Name of the police station:
 Crime Register number:
 District Surgeon reference Number:

Personal information

Name.....
 Age.....
 Gender.....
 Occupation.....

Particulars of the incident

Date, Time and Place of incident.....

(This is important if a back calculation is to be made by applying the Widmark formula)

Place of examination..... Time when examination commenced.....
 Time completed..... Date of examination

(This is again important to determine the time lapse between the incident and the time of blood sampling. Widmark)

Language used.....

Interpreter.....

Has the nature of the examination been explained to the abovementioned.....

Specimens for investigation

Blood/Urine collected time..... Date and sealed with official seal number..... With the following identification marks

(In the latter space the CR number is to be filled in. The sealing of the Alcohol kit in the presence of the subject and the Police Officer by the doctor/nurse is important for the chain of custody. Note it is not the function of the police officer to secure the sample, because he/she did not collect it. The blood alcohol forms part of the evidentiary procedures by the medical examiner)

The specimen was handed to: Rank..... No..... NameSkin was cleansed with

(It is vital that no alcohol swabs are used for this purpose. Theoretically it may have an effect on the end result of the alcohol analysis. Acetone is to be used and if not available, water is used.

The alcohol receptive contains: -Potassium Fluoride-preservative that will inhibit enzymatic action (Fermentation)- 100mg
- Sodium-oxalate = anti coagulant - 22mg

Although it irritates Law Enforcement as well as the judiciary, it is recommended that a second sample be collected at least half an hour later. (The average time of the examination period.) The irritation is settled in the fact that these two analytical results always differ. This will enable the examiner to determine whether the subject was in the waxing or waning phase of his/her alcohol curve. This will rule out or confirm allegations that alcohol was consumed after arrest. A further benefit is the determination of the elimination rate of that person at the time of the incident. The Widmark formula applies only to the waning phase of the Alcohol Curve and eliminates guesswork to a large extent. As soon as this aspect has been clarified with LE and the prosecutor, irritation levels will subside.

Of essence is the Mellanby effect where the effect of alcohol on the CNS is more pronounced during the rising of the BAC compared to the subsiding phase.

Nature of analysis required: Alcohol- Glucose- Barbiturates- Other

Medical history

Illnesses: Epilepsy- Diabetes mellitus- Hypertension- Other

(Why are these important? The abovementioned conditions can mimic intoxication and confuse the examiner. If epilepsy: ask for the name of the medication and do blood levels there-of.

Diabetes: It will be good practice to do at least a urinalysis in the rooms to confirm this allegation. The same principle applies to the Hypertension cases. Furthermore, if these conditions are present, never allow the person to be detained. It is good practice to ask

the police officer to collect the subject's medication at home and refer the case to hospital for observation.)

Medication taken during the past 24 hours: YES/NO

(This aspect opens the arena for the defence and lots of questions arise around this. The rule of thumb is: If medication per se has a suppressive effect on the Central Nervous System, alcohol will enhance the effect. Before a court hearing it is recommended that the doctor do research and at least find out what the direct effects and the half-life of the medication in question is. Most authoritative books like the MDR will have comments on the effects of alcohol in combination with the specific medication.

Sometimes the allegation is made that the subject took a bottle of coughing medication. How will it affect the blood alcohol level? Most cough mixtures contain 10% and less alcohol. This means that if a person with an average body mass of 70 kilograms took 500ml of cough mixture, the total alcohol consumed will be in the order of 50ml. If these factors are substituted in the Widmark formula: $A=P+C+R+10$ the following result is reached:

$$(50+0,79)=70+C+0.7+10$$

$$39,5g=C+490$$

$$C=39,5 \text{ DIV } 490$$

$$C=0,08 \text{ g/dl}$$

Two tablespoons will have a volume of about 50 ml and the alcohol content will be 5ml(3,95g). The difference created will be in the order of 0,008 per prescribed will have almost no effect on the blood alcohol concentration. It has to be taken in "bottle quantities" to make a difference)

Old injuries, illnesses or operations.

Limb injuries

Lower Limb injuries are important because the examiner will later in the examination determine the gait and ability to turn around.

Upper Limb injuries

A person with paralysis or other neurological defects will not be able to perform coordination tests and can be labelled as "disco ordinate"

Central Nervous System

Previous brain injuries will have an effect on coordination, walking abilities, intelligence, nystagmus, memory, behaviour etc. A post epileptic stupor is one of the conditions, which are often confused with intoxication

Gastro-intestinal tractus

Short circuit operations like Billroth, Gastro-jejunostomies, Roux and Y -anastomosis; Whipple's Triade etc will influence the alcohol digestion. With the absence of a functional pylorus, alcohol will move without any restriction directly into the small intestine. Diffusion in the small intestine is fast and effective. The alcohol curve of this subject will differ from the non short-circuited one in the sense that peak levels are reached much earlier than expected. In these cases it will be difficult or even impossible to apply the Widmark formula for the purpose of back calculations. The result of your back calculation will therefore not be a true reflection of the intoxication level during the incident.

The eyes

Accommodation, vision may be impaired

Ears

Ear conditions may be responsible for balance incapacibilities

Common colds and flu

This is another great catcher

These are only a few, the important ones, and the list can be extended.

Voluntary statement as to the consumption of alcohol/drugs consumed during the past 24 hours

Type of liquor/quantity.

First drink at.

Last drink at.

Last meal.am/pm

Type.

(The experience is that this information is without exception always correct. The average person will provide you with information as far as quantities are concerned which two or three divided. Time of drinking and type of liquor may be correct. What is the use of this information? It will give the examiner a baseline to depart from as far as time is concerned. Time is of essence in alcohol arithmetic's.)

CLINICAL EXAMINATION

Mass.....estimated/weighed.

BP.....

Temperature.....

Body Mass is essential for the Widmark formula. Blood pressure will confirm or rule out previous allegations and temperature readings may reveal pyrexia.

Pulse Rate.....Normal/strong/weak

Two factors will increase the pulse rate namely:

- a) Alcohol increases the pulse rate marginally
- b) Secondly it has to be appreciated that the subject will try to outperform him/herself during the examination and additional adrenaline is responsible for tachycardia.

Condition of clothing

Signs of shock.

Condition of the heart.

Condition of the lungs

Condition of the limbs

Condition of the abdomen

(These are self-explanatory)

NAME

Injuries and loss of consciousness

(Injuries could have been sustained in a motor vehicle accident or as a result of resistance to arrest. Careful documentation of these injuries needs to be done. Compare the characteristics of the wounds with the allegations made by the subject. Wound identification is important as well as the time element attached to it.)

Face -Normal
 -Flushed
 -Pale

Alcohol is known for its vaso-dilatationary effect and redness of the face is indicative of this effect. Do not confuse this with sunburn, pyrexia and other conditions.

Smell of alcohol -Strong
 -Moderate
 -Faint
 -None

Alcohol is an almost odourless, colourless liquid. What do we really smell? The odour, which is detected, is the most of the time aromatic substances in the specific liquor or the metabolites of alcohol.

This aspect of the observation is very much debatable. The smell is dependent on the capabilities of the examiner and smell acuity differs from person to person.

Furthermore, the smell of alcohol is an indication of the fact that alcohol was consumed during the period before the examination, but gives no indication of the intoxication levels. Certain liquors like Vodka has a lesser odour than that of Sorghum Beer for instance.

Conjunctivae -Normal
 -Congested

Alcohol is known for its vaso-dilation and this is clearly visible in the eyes. A warning hint is that other conditions, diseases can irritate the conjunctival vessels as well:

- Pyrexia
- Allergic conjunctivitis
- Bechet syndrome
- Sleepless night
- Swimming pool chlorine or pH imbalance
- Etc

No reaction:

- Severe intoxication
- The patient is dead!

Nystagmus:

- Course
- Fine
- Absent
- Continuous

Test: The head is held in the neutral position. The subject is asked to follow with the eyes of an object held about 30-40 cm in front of him/her. The object is moved from side to side to a maximum angle of about 45°. If the object is moved to a more acute angle, the muscles of eye movement will be stressed and nystagmus can be elicited in a sober person.

Horizontal alcohol nystagmus is one of the most reliable signs of intoxication.

Other conditions responsible for nystagmus:

- Opto-kinetic
- Errors in refraction and macular lesions
- Weak ocular muscles
- Injury to Cranial Nerves 3,4,6
- Cerebellar injuries
- Vestibular lesions
- Brain stem lesions
- High cervical cord lesions

Speech:

- Thick and slurred
- Stuttering
- Normal

As a result of muscle discoordination the tongue will be unable to form words properly and the result will be slurring or stuttering. These symptoms usually appear with moderate to strong intoxication. Be on the lookout for normal speech defects like

- Chronic stuttering
- Defects of the tongue and mouth

The test may consist of asking the person to read a passage, but it will become obvious during normal conversation.

Gait:

- Normal
- Broadgauge
- Stumbling

Pitfalls: Never ask the person to walk on a straight line. Not even a sober person

will be able to pass this test. The toe-hell walking technique is neither a fair test.

The best strategy is to watch him/her approaching the examination facility, or to ask the person to go to the scale and while doing so watch the gait. The accused must be aware that he/she is subjected to a gait test. Experience has shown that this is the easier approach. While he is walking, watch for orthopaedic defects that may cause this abnormality.

Think about other neurological defects that may affect his ability to walk properly
Types of Gait:

- a. Spastic Gait: narrow base-stiff legs-tilt the pelvis in order to lift a foot
PYRAMIDAL LESIONS
 - b. Hemiplegic gait: Only one leg is affected (as in above)
 - c. Sensory ataxia: raises feet high-stamping down-heel first-broad base (more steady if he watches the ground)This is positional ataxia.
 - d. Cerebellar gait: “drunken” or “reeling” gait. Broad and irregular base and the ataxia are equally severe with open or closed eyes.
 - e. Festinant gait: In Parkinson’s: Short shuffles, no arm swing, bent forwards.
 - f. Waddling gait: Like a duck. Body tilted backwards, increased lumbar lordosis, broad base and swaying of the body from side to side.
- Myopathy
-Muscle Dystrophy

Gait on turning: -Normal
 -Unsteady
 -Stumbling

Again, this test or observation can be performed when the person is the least alert or not aware. Watch him/her while he/she is approaching the facility, walking down the passage or to the weighing scale.

A little bit of postural hypotension should not be interpreted as an unsteadiness or gait abnormality. Avoid asking the person to rise from a chair and then walk in a certain direction.

Hand movements: -Disco-ordination gross
 -Disco-ordination mild
 -Disco-ordination absent

Definition of co-ordination:

It is the smooth recruitment, interaction and cooperation of separate muscles or groups in order to accomplish a definite motor act.

There are several tests that can be performed and each examiner develops his/her own style as far as this is concerned:

- ❖ Fingertip-to-nose test(open and closed eyes)
- ❖ Fingertip-to-fingertip-test (open and closed eyes)
- ❖ Patient’s fingertip to examiner’s fingertip
 Watch the patient un-button his shirt, dressing, undressing, handling objects

like

someone picking up a pen etc. It is not recommended that pins be picked up by

with short nails-use larger objects like fire matches

- ❖ “Mirror test” Ask the subject to perform the same hand movements as you do. Spread the fingers of one hand, touch each individual fingertip with the contralateral index finger or thumb. Reverse the hands and repeat the movement. The doctor does the same and the subject has to interpret the “mirror image”
- ❖ Flex the elbow to a right angle and ask the subject to pronate and supinate continuously and rapidly (Good test for disidiadokokinesia or cerebellar ataxia) When it is abnormal the movements will be slow, awkward and incomplete and the rhythm is irregular.
- ❖ Ask the subject to write a sentence on the GW 7/54 for later comparison

Rhomberg's Sign: -Marked
 -Moderate
 -Weak
 -Absent

Rhomberg is often regarded as a test for coordination of the lower limbs. It is, however, a test for loss of position sense (proprioception and semi-circular canals in the middle ear) or sensory ataxia in the legs and not a test for cerebellar ataxia.

The test:

Ask the subject to stand erect with his or her feet together and to close the eyes. Stand close by as a precaution in order to stop the person from falling over and hurting him or herself. Watch the movement of the body in relation to perpendicular object behind the subject. (Corner of the room, door, window etc) A positive sign is noted when a swaying, sometimes irregular swaying and even toppling over occurs. The essential feature is that the patient is unsteadier than with open eyes. With severe intoxication a positive Romberg is seen even with open eyes or in the sitting position.

Differential Diagnosis: Tabes dorsalis
 Spinal Injuries

Knee Reflexes: -Normal
 -Exaggerated
 -Depressed
 -Equal

Knee reflexes in sober subjects can have different interpretations. Hyper reflexes are encountered with upper motor neurone abnormalities and hyporeflexivity with lower motor neurone pathology.

In alcohol cases:

- ❖ Reflexes are equally depressed with alcohol intoxication
- ❖ Reflexes can have a pendular quality in cerebellar ataxia. (hypotonia)
- ❖ Exaggerated when the subject tries to impress the examiner-usually not equal in magnitude.

It is important to excite other reflexes during the examination (abdominal, ankle) in order to eliminate or confirm neuro-pathology.

Chronic ear disease: -Yes/No
Any visible discharge: -Yes/No

What are the medico-legal implications of ear diseases? Any middle ear condition may have an impact on the balance and the maintaining thereof in the subject.

- ❖ Balance abnormalities
- ❖ Vertigo
- ❖ Nausea
- ❖ Ataxia
- ❖ Inability to hear questions or commands- this is a catcher!

INTELLECTUAL FUNCTIONS

Orientation for

Time:	Good	Moderate	Bad	Indefinite
Place:	Good	Moderate	Bad	Indefinite

It is important to determine the intellectual and literacy levels of the subject. Is he or she from local or elsewhere? Is he or she familiar with the area? Ordinary questions are asked like:

- ❖ When did the accident occur
- ❖ At what time were you apprehended by the police office?
- ❖ Where did the accident or roadblock occur?
- ❖ Guess the time without looking on your watch
- ❖ What day of the week is it today (data etc)

Memory: Clear Vague Confused

- ❖ What is the name of the President (Common Knowledge)
- ❖ Which school did you attend?
- ❖ Etc

Behaviour:	Noisy	Jovial	Boastful	Excessive Confidence
	Indignant	Cheeky	Surly	Don't-care
	Emotional	Talkative	Apathetic	Excited
	Nervous	Argumentative		Impuse
	Uncontrollable	No insight	Other	

This questionnaire is self-explanatory. If the subject is cooperative, state it.

Conclusions: At the time of the examination the person is *strong/moderately/slightly/not under the influence of Alcohol/a Drug having Narcotic effect.

This conclusion is based on the total picture found during the examination and interview and not on a single symptom or sign.

During court proceedings the defence will attempt to discuss each sign and proof that a different condition than alcohol was responsible for it. "My client did not sleep well the previous night...which is the reason for his bloodshot eyes." "He is suffering from postural hypotension, therefore immediately after he has risen from the chair, he had a stumbling

gait” “He was psychologically shocked by his apprehension, was flabbergasted as a result of it and therefore he could not clearly remember what happened.”

The abovementioned are only a few examples, but the matter of the fact is that each symptom will be individually discussed and a possibility/probability attached to it.

The standard answer from the examiner will be that all those allegations may be true, but the possibility that the same person simultaneously could suffer from so many conditions sounds highly unlikely. Secondly, the conclusion of the examiner was not based on single signs but on a collective analysis of all the signs, conditions and behaviour of the accused.

At the time of the acutance it is *probable/possible/unlikely that the person was under the influence of *Alcohol/a drug having a narcotic effect.

WARNING:

Immediately strike out this part of the proforma.

There is no scientific way in which a doctor can answer it, at least not immediately after the physical/psychological examination. The examination is seldom done immediately after the incident. There is usually a time lapse between the incident and examination. In this period the subject could have sobered up or have become more intoxicated. Apart from intuition, there is no way in which answers can be produced to this effect. The utilization of the Breathalyser may make a difference. If two consecutive readings about an hour apart are taken, clear-cut answers may be provided. This will a) show the baseline condition at time x and b) a second reading at time X + 60 minutes will give an indication of a rising or subsiding blood alcohol concentration.

The backwards calculation is based on the fact that the blood alcohol clearance is at a rate of 0,01-0,02 per hour (Average 0,015) This is irrespective of sickness, injuries, conditions etc.

Alcohol elimination is the combined effect of:

- a) Liver Metabolism
- b) Unaltered alcohol through the respiratory system
- c) Unaltered alcohol excreted through the renal system
- d) Sweating

BAC incident = BAC sample Result + (Hours since Incident X 0,015)

Example:

A subject was examined and a blood sample taken 1 hour 30 minutes after the incident. What is the most probable BAC during the incident if a) He was in the waning phase of the Blood Alcohol Curve and b) the lab result showed a 0,15 g/dl BAC?

BAC incident=0,15+ (1,5x0,015)

BAC incident=0,15+0,0225

BAC incident=0,1725 g/100ml

It is only after the laboratory results become available that this part of the form can be answered with confidence and even still then certain provisions will create loopholes for the defence to thrive on. Why can this be answered after the results become available?

With the quantified results the examiner may be in a position to do backwards calculations and give a scientific and appropriate answer to the court.

General Questions in Court:

Questions by the Prosecution:

1. Doctor, looking at the clinical examination as well as the Blood Alcohol Concentration, are you of the opinion that the accused could have driven his car with the necessary skill and safety?

Answer: (For a person with a blood alcohol above the legal limit and positive Intoxication signs):

It has been scientifically proven that with blood alcohol levels as low as 0,04 the Reaction time of any person will be considerably impaired. Reaction time is one of the Human faculties that will determine his/her abilities to avoid dangerous situations.

With the involvement of the eye with poor vision in dark conditions, tunnel vision, Inability to accommodate properly, impaired depth perception etc will create a potential dangerous situation.

If the other faculties like motor and coordination impairment is added to these previously

mentioned I am of the opinion that the accused was not in a position to exercise caution and to operate any vehicle with necessary skills and safety acquired for this purpose.

2. Doctor, the laboratory results show that the accused had a blood alcohol concentration of 0,09 at the time of the examination. The accident occurred at 17:00 at the Police and the Police arrived on the scene at 17:15 and you were able to do a blood sampling at 19:00. Now, to your opinion, was the accused more intoxicated during the incident that during the time of examination?

Answer: Looking at my report (GW 7/54) I see that the accused had a furred tongue, which means he was most probably in the waning phase of his alcohol curve. Secondly he was under the supervision of the police since the accident and no claims were made as to the further consumption of alcohol after the accident.

Therefore, according to the Widmark's back calculation, the blood alcohol level lowers at a rate of 0,01-0,02 per hour. Two hours lapsed between the accident and blood sampling. This means that in that period of two hours the blood levels could have

gone

Down minimally by 0,02 and maximally by 0,04. If this is added to the laboratory result his blood alcohol during the accident could have been in the order of 0,10-0,11.

3. Doctor, the accused claims that he had only two single tots of Brandy over a period of two hours prior to the accident at 17:00. According to you report his weight was 100 kilogram. The laboratory report shows a BAC of 0,09 g/dl. Is there a correlation between the alleged intake of alcohol and the laboratory results?

Answer: The Widmark Formula makes provision for the alcohol in circulation and not those, which has been excreted, metabolised or alcohol still in the intestines.

Further, alcohol metabolism and excretion begins simultaneously with absorption. Therefore I believe that one should take the clearance rate also into consideration.

Thirdly, the accused claims that he had consumed 2 tots of brandy, which contains 43% of alcohol. A metric tot measures 25ml therefore it contains more or less 8,5 grams of pure alcohol. If this is applied in the Widmark formula:

$$A = P \times C \times R \times 10$$

$$17 \text{ gram (2x8, 5)} = 100\text{kg} \times \text{Concentration} \times 0,7 \text{(Male Widmark Factor)} \times 10$$

$$17 = 100 \times C \times 7$$

$$17 = 700 \times C$$

$$C = 17 \text{ div } 700$$

$$= 0.024 \text{ g/100 ml (Maximum attainable alcohol with the allegation made)}$$

His alcohol level at 19:00 was 0,09 and therefore there is no correlation between his alleged 2 tots of Brandy and the laboratory results.