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MEETING TO REVIEW REVISED 1956 WHO DOCUMENT ON "GUIDING PRINCIPLES IN THE MEDICAL EXAMINATION OF APPLICANTS FOR MOTOR VEHICLE DRIVING PERMITS"

Geneva, 8-13 January 1968

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1. INTRODUCTION

In 1955 the World Health Organization convened a meeting of a consultant group on medical requirements for the licensing of motor vehicle drivers. At this meeting the document "Guiding Principles in the Medical Examination of Applicants for Motor Vehicle Driving Permits" was approved; in 1956 this document (WHO/Accid.Prev./1 Rev.2/24 February 1956) was mimeographed and circulated to governments. Some of the above material is now out of date; in addition, as a result of recent developments the report does not take into account certain important medical matters, either at all or in sufficient detail.

In 1965 the Economic Commission for Europe circulated member governments asking firstly in what respects their national rules, or guide-lines, differed from the recommendations made in the "Guiding Principles in the Medical Examination of Applicants for Motor Vehicle Driving Permits" (WHO, 1956); secondly what amendments or additions, if any, they would like to see made. Replies were received from 17 countries. As a result of a request from the Economic Commission for Europe, WHO convened, in Geneva, January 1968, a group of consultants, in addition to representatives from certain non-governmental agencies and observers, to consider a revision of the 1956 document which had previously been prepared by Dr L. Norman, Chief Medical Officer, London Transport. Because the meeting also, of necessity, discussed certain medicine aspects of current drivers of motor vehicles, the title of this document has been rightly amended from that of the 1956 one.

The detailed comments made at the 1968 Geneva meeting, apart from those made by various organizations and individuals to whom the "revision" had previously been circulated by the Secretariat, and the replies received from the 17 countries already referred to have, as far as possible, been incorporated into the document which follows.

2. CLASSIFICATION OF PERMITS

For the purpose of this document drivers of motor vehicles have been classified into two groups:

Group I: Drivers of

(i) heavy motor vehicles used for the transport of goods;

(ii) vehicles used for professional transport of passengers (irrespective of the size of the vehicle and of the number of passengers), and public emergency vehicles (ambulances, police and fire brigade vehicles, etc.).

For the purpose of this document all the above drivers are considered as professional drivers.[1]

Group II: Drivers of

(i) light motor vehicles;

(ii) light motor cycles whose speed can exceed 40 km/hr.

Heavy motor vehicles, as quoted in Group I, are those defined in categories C, D and, as the case may be E of annexes 9 and 10 of the 1949 Convention on Road Traffic (at present under revision); light vehicles, as quoted in Group II, are those defined in categories A and B of the aforesaid annexes.[2]

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[1] Methods of educating drivers: document submitted by the International Transport Workers' Federation to the Sub-Committee on Road Transport of the Economic Commission for Europe, 14 November 1967 (W/Trans/WP20/144/Add.4).

[2] United Nations publications Sales No. 1950, VIII, 2.

3. GENERAL CONSIDERATIONS RELATING TO MEDICAL EXAMINATIONS

In this document specific medical recommendations have been made; it is realized that these may, in some instances, be subject to over-riding requirements of current national legislation.

The recommendations have been made taking into account recent developments and views; if these requirements are satisfied, the applicant may, so far as medical considerations are concerned, be permitted to drive.

The group of consultants wish to stress the important role of medical personnel in the fight against road accidents; the examinations required in connexion with the issue of permits must be taken seriously as, if those who are found to be medically unfit, or have a serious impairment of vision, drive, then traffic safety is reduced.

Apart from any specific statutory obligations and responsibilities, medical practitioners must advise their patients accordingly whenever driving is likely to be hazardous, either to the driver, to any passengers or to pedestrians. In some instances detailed advice may may be needed about matters not dealt with in this report.

In these days of rapidly increasing numbers of motor vehicles, it must be widely accepted, and realized, that the right to drive carries with it important responsibilities. In this respect the Committee dealt at length with the adverse influence of alcohol and certain drugs.

The consultant group also wished to draw attention to the fact that those authorities responsible for the issue of licences should take such steps as are necessary to require reasonable standards of physical, including eyesight, and mental fitness.

In order to ensure that persons are medically fit to drive a motor car, it is suggested that, if administratively possible, all drivers of light motor cycles whose speed can exceed 40 km/hr should, when applying for a permit:

(a) undergo a medical examination at the time of its issuance;

(b) have sufficient knowledge of traffic regulations;

(c) become the holder of a permit which may be withdrawn in case of repeated violations of the traffic regulations or in case of accidents.

The consultant group also suggests that before any first driving permit is issued, the applicant should be required to give particulars of any physical defect from which he is suffering. The responsibility for these arrangements rests mainly with the licensing authority concerned. Medical practitioners are sometimes asked to advise in individual cases of difficulty and doubt as to whether a person is medically fit to drive. In some countries it is recommended that a medical board be set up to advise the licensing authority (Spendlove 1967).

Applicants for a permit to drive light or heavy motor vehicles should be assessed medically according to the following main criteria:

(a) Is the applicant physically and mentally able to manipulate the controls and maintain such work for long periods?

(b) Has the applicant a safe standard of vision? (and hearing, for heavy vehicle drivers);

(c) Is there any risk of sudden loss of consciousness while driving?

(d) Is there a likelihood of severe fatigue towards the end of the day, with consequent increased danger of accident?

If the answers are satisfactory the applicant may safely be permitted to drive but if there is any disease or disability present which may become chronic or progressive he should be kept under regular observation. Alternatively he may be given a permit valid either for a limited period or subject to certain conditions.

An essential requirement should be that all medical driving certificates must be signed by a physician having the required knowledge and approved by the competent national authority. In some countries there may be a need for additional administrative arrangements, such as medical boards, or an officially appointed physician, to be available so that individual medical difficulties in connexion with specific examinations, can be referred for specialist opinion. Such difficulties may arise either at the time of the initial issue or of the renewal of the permit.

4. THE TYPE AND FREQUENCY OF MEDICAL EXAMINATIONS

In general, the medical requirements for drivers of vehicles of Group I should be more strict than those of Group II; this is because they are usually on the roads many hours each day and, in the case of passenger transport, of the driver's responsibilities. The length of their exposure to accidents is often greater than that of Group II drivers; however, as the experience and skill of drivers of Group I are usually greater, accident rates are usually lower.

As a matter of routine Group II drivers applying for a driving permit do not need to be medically examined. However, when individual applicants have certain medical disabilities then there may be such a need.

There is merit in paying additional attention to certain age-groups; as a general principle it is desirable that between the ages 65-70 every driver should undergo a medical examination.

Following an important illness, or a serious accident, or repeated minor accidents, a medical, and if necessary psychological, examination should be required before a return to driving is permitted.

For drivers of Group I vehicles, the medical certificate should be valid for a period not exceeding five years, after which a further medical examination should be required (ILO Memorandum No. 51); however, such drivers should be medically examined at intervals of three years after the age of 40 and annually after the age of 60. Examinations may also be required, for example, on resumption of duty after illness lasting more than three or four weeks, or after accidents which prevent the driver working for three days or more, or in any case where the supervisor considers that the driver should be medically examined in the interests of safety. It is also necessary to examine Group I drivers of any age who suffer from or who have been certified as suffering from, vertigo, fainting, epilepsy, or heart disease, or indeed any condition which is likely to affect the driver's appreciation of danger, to cloud his judgement or to render him suddenly unconscious; examinations in these cases should be undertaken whether the driver has been absent from work or not.

The reader should consult individual sections of this document wherein many detailed recommendations relating to different parts of the body are made. Section 21 discusses certain medical aspects relating to the medical examination of drivers.

5. THE RELATIONSHIP BETWEEN TRAFFIC ACCIDENTS AND MEDICAL CONDITIONS

Because of recent studies, a rather more liberal view is now taken of the influence of medical conditions on road safety, both of the effect of chronic medical conditions in the causation of traffic accidents and of the effect of medical conditions which may cause a sudden loss of consciousness while driving. All licensed drivers in every country have to undergo some type of selection procedure; evidence that physical conditions are responsible for a small proportion of road traffic accidents, possibly of the order of one per cent. to one per thousand, has been obtained from Sweden (Herner et al., 1966) and the United Kingdom (Grattan & Jeffcoate, 1968). If one includes psychological conditions the percentage is very much higher. It is not known, however, whether the more serious accidents tend to be caused by or associated with medical conditions. Furthermore, Waller (1965) has shown that drivers with certain chronic medical conditions have about twice as many accidents, mile for mile, as drivers without these conditions.

Many authorities, national and international, have studied the problems of medical fitness and road safety. The importance of a medical examination for drivers in road transport has been pointed out in various International Labour Office documents, especially in Memorandum No. 51 concerning Conditions of Employment in Road Transport (1954). Useful reports have been issued by the British Medical Association (1954), the American Medical Association (1959), the Canadian Medical Association (British Columbia Division) (1962), Waller (1967) and the Medical Commission on Accident Prevention (in press). The World Health Organization published a general review of the Epidemiology, Control and Prevention of Road Traffic Accidents (WHO, 1962). Among the many authorities concerned is the International Congress of Traffic Police, which at the Fifth Congress (Villetorte, 1967) recognized the need for periodic renewal of driving permits, and that the periodicity of such renewals should be fixed by medical personnel, taking into account the changes that take place in the average individual in respect of the physical and psychological faculties involved in driving.

A complete reference to all studies is not possible here. However, the commoner conditions are dealt with; additional reference should be made to sections of this document dealing with specific medical conditions. Discussion of conditions which occur only rarely has generally been omitted; in such cases an opinion as to fitness for driving would, no doubt, be obtained from a specialist.

6. EYESIGHT TESTING AND STANDARDS

The contribution of defective vision to the causation of road accidents is not fully known. The differences between the results of different investigations are discussed in Research on Road Safety (1963).

(a) Visual acuity

(i) Drivers of Group I vehicles should have visual acuity of at least 0.5 in one eye and 0.17 in the other with glasses if necessary;

(ii) Drivers of Group II vehicles should have visual acuity of at least 0.4 in the better eye, with correction if necessary. Persons with sight only in one eye may drive light vehicles provided the monocular condition has existed for sufficient time to allow adequate readaptation.

It is recognized that in some countries higher standards of vision for drivers than those mentioned above are required and this is obviously to the advantage of road safety.

For Group I drivers it is desirable that the stipulated visual standards be reached without the aid of glasses but if the use of glasses be permitted the refractive error should not exceed 6.0 diopters of myopia or hypermetropia, and should be adequately corrected and the correction tolerated. When glasses are necessary, and their use permitted, they must always be worn when driving and this should be recorded on the driver's permit. In this case a spare pair of glasses must also be carried.

For comparative purposes the equivalent standards on different notations are as follows:

Decimal notation	20 foot notation	6 metre notation	5 metre notation
0.1	20/200	6/60	5/50
		6/36(0.17)	5/40(0.125)
			5/30(0.17)
0.2	20/100	6/30	5/25
	20/80(0.25)	6/24	5/20(0.25)
	20/70(0.28)		
0.3	20/60(0.33)	6/18(0.33)	5/15(0.35)
0.4	20/50		
0.5	20/40	6/12	5/10
0.6	20/30(0.66)	6/9(0.66)	5/7.5(0.66)
0.7			
0.8	20/25		
0.9			
1.0	20/20	6/6	5/5

Contact lenses may sooner or later cause irritation in some people; their use by professional drivers when driving Group I vehicles occupationally should not be permitted unless specifically endorsed by an ophthalmologist. Persons with effective sight only in one eye should not use a contact lens when driving any vehicle.

Persons who have had cataracts removed from both eyes may drive Group II, but not Group I, vehicles. Spectacles will give clear straight ahead vision but there will be some difficulty in peripheral vision due to prismatic aberration; this may cause particular difficulty in reversing a vehicle. The examiner should inform his patients accordingly.

(b) Visual fields

Good lateral vision on both sides is an obvious necessity for safety in the case of Group I drivers. Drivers of Group II vehicles, if they have sight only in one eye should have unrestricted field of vision in this eye. Occasionally cases occur of severely restricted visual fields; these should not be permitted to drive any type of motor vehicle. An approximate measurement of the lateral visual fields may be undertaken by means of a simple perimeter. This is a practical routine test for the examination of large numbers of drivers. Another practical, and convenient, method is the "confrontation test" in which the medical examiner faces the examinee, covering each of the latter's eyes in turn and requesting the examinee to look at the examiner's nose with the eye open. Any movement of the fingers at the peripheral edge of the visual field should then be equally detected by both the examiner and the examinee, provided the examiner knows that his visual fields are normal. Any definite restriction of the visual field detected by the "confrontation test" should be referred to an ophthalmologist for a further opinion.

Spectacle frames with thick side pieces obscure lateral vision and should not be worn.

(c) Colour vision

Controlled studies in some countries have shown that colour discrimination is unnecessary for motor vehicle drivers and in such countries, and others, tests are not recommended. In some other countries, great importance is paid to such tests and no colour-blind person is issued a permit.

It is desirable to standardize and improve traffic lights, i.e. harmonize the colours with corresponding shape and relative positions which make it possible to recognize them independently of their colour.

(d) Diplopia

If there is diplopia a permit should not be granted for driving any type of motor vehicle.

(e) Glare and dark adaptation, stereoscopic perception and ocular muscle balance

Tests of glare and dark adaptation, stereoscopic perception and ocular muscle balance are not essential for the standard eyesight examination of motor vehicle drivers, but doubtful cases, particularly Group I drivers, should be referred to an ophthalmologist.

(f) Type and periodicity of examinations of visual function

Initial eye examinations for all applicants for driving permits should be carried out by a physician. If, however, these cannot be arranged on account of the large numbers of drivers concerned, examinations may be conducted by suitably trained and supervised personnel.

In the interests of safety it is desirable; that in the case of Group I drivers, tests of visual function be repeated every three years up to the age of 60 and then annually if the permit is to be renewed.

Group II drivers should have their eyesight retested, at least every five years, up to the age of 60 and then annually thereafter.

It should be borne in mind that when visual acuity is below normal the loss of sight may be due to chronic progressive disease (e.g. cataract, glaucoma, diabetic retinopathy) particularly in persons of middle age or older. In applicants or drivers aged 40 years or more where the corrected vision is subnormal, but nevertheless meeting minimal requirements, the cause of visual loss should be investigated before a permit is granted or renewed.

Where ocular pathology is present or suspected the examiner should be empowered to require periodic tests to be carried out at intervals more frequent than those recommended above.

Visual acuity, with glasses if worn, should be recorded on the permit (at each examination) in order that any deterioration may be detected.

7. EAR CONDITIONS

There is a comparatively high incidence of hearing impairment in the general population (WHO 1966).

(a) Impairment of hearing

There are no generally accepted standards of hearing for motor vehicle drivers. Inquiries made of insurance companies in Great Britain ("Rex" 1953) revealed that some companies do not accept insurances from drivers with varying degrees of impaired hearing, especially if major, but most are non-committal considering each case on its merits. The same paper refers to a scientific study in which the conclusion was reached that there was little difference between the accident rates of those with impaired hearing and those with normal hearing; in fact, the investigation showed a slight balance in favour of the former. It was concluded that the reason for this is that "deaf" persons are particularly conscious of their handicap and that they therefore exercise extra care. An interesting discussion on the importance of hearing to automobile drivers is given by Macfarlan (1937) who considers that the "deaf" are generally safe drivers; they are cautious and on the alert because they know the risk they are taking. While good hearing is an undoubted asset to a driver, it is by no means essential (Coppin & Peck, 1964; National Symposium 1962). In some cases hearing is more acute in the noise of traffic than in a quiet room; it is doubtful whether driving safety is materially enhanced by the possession of high degrees of auditory perception such as are required to hear a whispered voice in a still room at a considerable distance. In order to hear overtaking vehicles it is sometimes thought that hearing in the left ear is more important in countries where vehicles are driven on the right side of the road, but the importance of this should not be exaggerated, for whichever side the defect, unilateral deafness causes difficulty in the location of a sound. It is unlikely that moderate impairment of hearing in a competent and experienced driver will constitute a danger or detract seriously from his driving ability.

For practical purposes, the hearing of applicants for a motor vehicle driver's permit may be tested as follows: the examiner stands immediately behind the applicant, covering each of the latter's ears in turn. The applicant is then requested to repeat a series of numbers chosen at random which are first spoken and then whispered by the examiner. The distances at which the conversational and whispered voices are heard should be recorded for each ear separately. It is sometimes said that this test loses its value because examiners vary considerably in the loudness of their voice production; this criticism is only partially valid as examiners often develop, with experience of testing large numbers of cases, an adequate appreciation of any variation in an applicant's hearing. Another practical test is to use the ticking of a watch as the auditory signal; in both the tests it is mainly the higher frequencies which are under examination. Tests by means of an audiometer are not usually carried out as a routine. There may be considerable variation from day to day in an individual's degree of hearing impairment and for this reason the practical tests described are usually adequate and to be preferred to audiometry.

Persons who apply for the first time for a permit to drive Group I vehicles should not be permitted to undertake this work if they suffer from more than a "minor" degree of permanent deafness and if, as a result, they may have accidents; in case of doubt, a specialized opinion must be sought. Hearing losses are classifiable according to their severity (Glorig, 1958). Trained experienced drivers who develop an impairment of hearing may, however, be permitted to drive unless so severe as to interfere with the performance of the work, e.g. a bus driver who is unable to hear the emergency signal. No benefit is to be expected from the use of hearing aids in driving; this is because of extraneous noises, variability and mechanical defects which may develop in the instruments, and the difficulty in locating the position of a sound. Hearing aids should not be permitted while driving Group I vehicles.

Persons who are hard of hearing, or completely deaf, may drive light motor vehicles.

(b) Vertigo and labyrinthine conditions

In cases where there are sudden attacks of vertigo, for example in Menière's Syndrome with tinnitus, deafness and vertigo, persons should not be permitted to drive any motor vehicle. Cases of labyrinthitis (vestibular neuronitis) occur which necessitate a temporary cessation of driving any type of vehicle, but usually after some weeks of recovery from this condition, driving may be resumed. In doubtful cases, where the presence of vertigo or labyrinthine disease is suspected the patient should be referred to an otologist.

8. GENERAL PHYSIQUE AND PHYSICAL DISABILITIES

Persons with any marked disability, which is a risk to the proper and safe control of a vehicle, should not be permitted in the first instance to drive Group I vehicles. Where there is a disability of this kind, trained and experienced drivers of vehicles of Group I should discontinue driving and a careful assessment of the disability in relation to the driving requirements made.

Vehicles of Group II may be adapted to suit the requirements of disabled drivers in which case a permit may be issued.

In cases of doubt the licensing authority should arrange for a practical test of a person's driving abilities, after medical evaluation by a competent authority. Such drivers should only be given a limited permit to drive in order that their cases may be kept under observation by the licensing authority.

The assessment of physical disability should rather be based on mechanical considerations, that is, whether the disability or deformity is likely to interfere with the efficient and rapid manoeuvring and handling of controls under all driving conditions, including emergency action and for prolonged periods.

The alternative of using a car with specially adapted controls should, however, be considered. For example, cars can be obtained which are fitted with a main braking system which is operated by means of a hand control on the steering column instead of by a foot pedal.

The existence of a prosthesis for the neck of the femur, or any other part of the body, does not necessarily constitute an obstacle to driving provided it is well tolerated.

Applicants for permits as drivers of Group I vehicles should be of good general physique for the total work which has to be done, including the carrying of loads (ILO Convention 127 and ILO recommendation 128).

(a) Upper limbs

In Group I drivers, the shoulders, elbows, wrists and finger joint movements should be examined and any muscular wasting observed. Fixation of a shoulder joint, if painless, need not be any handicap in driving. Ankylosis of an elbow joint may, however, be a considerable handicap, and persons with this disability should not be permitted to drive Group I vehicles in the first instance. Where this disability develops in one elbow in a trained and experienced driver he may sometimes be permitted to drive, provided that the angle of fixation is suitable, i.e. around 135° and midway between pronation and supination. New applicants for driving should have full pronation and supination movements and a good range of flexion and extension of the wrist joints. Ankylosis of finger joints is usually no barrier to driving, but where one or more fingers are amputated the degree of grip obtainable should be measured in relation to the ability to secure adequate handling of the controls of a motor vehicle. Muscular wasting, if not progressive, need not bar a person from taking up driving, provided there is sufficient strength for manipulation of the controls.

In Group II drivers, who will usually be examined as patients of the medical practitioner rather than at the request of a vehicle licensing authority, any physical disabilities in the arms should be assessed in relation to the physical requirements of driving such vehicles.

(b) Lower limbs

Applicants to drive Group I vehicles should have free and painless movements of the hips, knees and ankles without severe muscle wasting and with good muscular power in each limb. Persons with an ankylosed knee joint should not be permitted to drive a Group I vehicle.

The degree of disability, where a joint is ankylosed, varies with the position in which the joint is fixed; it may be possible for the driver to continue driving his car (Group II) with safety.

(c) Spinal column

In cases where there is active spinal disease, such as tuberculosis or ankylosing spondylitis, applicants should not be permitted to drive Group I vehicles so long as the condition remains active. When such diseases become quiescent, and provided there is no serious physical disability or deformity, driving Group I and II vehicles may be permitted with safety. Because many people have unsuspected abnormalities, it is recommended that all drivers of Group I vehicles should have their spines X-rayed when applying for the first permit.

Persons suffering from prolapsed intervertebral disc are usually able to drive a heavy or light motor vehicle, even though they may be encased in a plaster of Paris jacket or fitted with a spinal brace. Such persons, once they have been fitted with the plaster jacket or corset, usually feel more comfortable when driving than previously. In this connexion, the design of the driver's seat is important; the back rest should be low down so as to accommodate comfortably the normal lumbar curvature of the spine, and the seat should be adjustable forwards, backwards, up and down, for the comfort of the particular driver. It is desirable to have shock absorbers on the seats of certain vehicles in order to reduce vibration as much as possible.

9. CARDIOVASCULAR CONDITIONS

Heart attacks may occur, whilst driving, in subjects without known previous heart disease; however, they are not commonly associated with serious accidents though occasionally tragic incidents occur.

Where there is doubt of the ability of individuals with cardiac disease to operate a motor vehicle, they should be referred to a cardiologist for examination and report.

(a) Ischaemic heart disease

Sudden death while driving has been the subject of a number of studies. Thus, Peterson & Petty (1962) found that vascular diseases affecting the heart, aorta or brain were the cause of death in all but one of 81 cases, ischaemic heart disease being responsible in three-quarters of them. Accidents occurred in 36 of the 81 deaths, but they were minor in degree, causing little damage to property and no serious injury to pedestrians, passengers or other drivers. Myerburg & Davis (1964) studied 52 deaths at the wheel of private cars; 32 drivers were able to stop and so avoid an accident. The remainder were minor accidents, none causing bodily injury. Thirteen lorry drivers died at the wheel; no accident, or at most a trivial one, followed. The experience of many cardiologists is that persons who

develop severe and even fatal coronary attacks while driving usually have sufficient warning and presence of mind to slow down or stop before losing consciousness.

It is recommended that persons with a history of ischaemic heart disease, i.e. myocardial infarction, coronary thrombosis, insufficiency or angina pectoris should not be permitted to drive Group I vehicles. Persons so affected may drive Group II vehicles, but should be kept under regular observation; they should be advised to discontinue driving if congestive cardiac failure or frequent anginal attacks develop, particularly if the latter are brought on by emotion. Where the anginal attacks are caused through exertion only it is usually safe for a driver of a Group II vehicle to continue driving until the attacks become frequent. After a cardiac infarction, a driver should only resume Group II vehicle driving when advised by the cardiologist that it is safe to do so.

(b) Arrhythmias

Not all arrhythmias are harmful. Sudden arrhythmias (or dysrrhythmias) are commonly present when coronary attacks involve sudden loss of consciousness. Paroxysmal tachycardia, a common condition, is a most unusual cause of syncopal attacks. The condition does not affect fitness to drive any type of vehicle. Atrial fibrillation generally prevents a person driving Group I vehicles, but he may drive Group II vehicles, subject to a satisfactory medical opinion.

(c) Heart block

A person with second degree block or complete heart block should not be permitted to drive Group I vehicles. Group II drivers with partial heart block may continue to drive, subject to regular medical review. Complete heart block may cause impaired blood supply to the brain, and if blurred vision, drowsiness, or Stokes-Adams attacks occur, the patient should be advised not to drive. Treatment by drugs which increase the heart rate is unpredictable and unreliable.

Because artificial pace-makers are subject to breakdown, the decision at present must be against allowing patients with pace-makers to drive Group I vehicles.

(d) Valvular heart disease

Well compensated and uncomplicated mitral valvular heart disease, and aortic incompetence, are generally not a bar to a permit, but require regular medical control. Even if the applicant is in good condition without symptoms of decompensation, there is, with respect to traffic safety, still special concern in cases of aortic stenosis, valvular valvotomy and valvular prosthesis. Because of the risk of atrial fibrillation, and subsequent embolus, it is advisable that these people do not drive Group I vehicles.

Syncope is one of the symptoms of severe aortic stenosis. It is usually provoked by effort and is very uncommon when the patient is at rest and seated. Occasionally syncope may be induced by emotion and attacks have rarely occurred while driving. Because of the rarity of such instances in this disease, aortic stenosis should not be a bar to driving Group II vehicles.

(e) Hypertension

No major studies have been made of the relationship between blood pressure and accident rates in drivers. The presence of a raised blood pressure in itself, whatever the cause, does not prevent a person from driving Group II motor vehicles. Certain complications of hypertension may result in disability which should prevent driving of any vehicles; such include damage to the eyes, brain and heart, and each case should be judged according to the extent of the complication.

The clinical examination of drivers is directed towards prediction of the occurrence of such conditions as cerebral haemorrhage or thrombosis, coronary infarction, dissection of the aorta, Stokes-Adams attacks, vertigo or fainting. Above certain levels of systolic or diastolic blood pressure, the risk of cerebro-vascular accidents becomes definite (Morris et al. 1966). The blood pressure is said to be raised by apprehension - as may occur during driving, but the experimental evidence for the effect of emotion on blood pressure is inconclusive.

The borderline case of fitness to drive Group I vehicles is that of a man aged 55, with systolic BP 210 mms. mercury or diastolic BP 105 mms. mercury, who is symptomless and who has no physical signs of cardiac failure or central nervous system damage. In assessing his fitness to continue driving Group I vehicles, the following factors should be considered: age, stature, obesity, family history, cigarette smoking, symptoms, xanthelasma palpebrum, arcus senilis, peripheral pulses, cardiac rhythm, fundis oculi, proteinuria, glycosuria, electrocardiograph, chest radiograph and blood lipids. These factors do not all have the same weight but preferably all should be assessed when judging the fitness of a driver of Group I vehicles to continue this work when he has a raised blood pressure. In general, their effect is more than additive. On the other hand negative findings in most of the factors might outweigh positive findings in two or three less important ones.

A wide range of hypotensive drugs is now available. Drivers of Group II vehicles may continue to drive while on such medication, subject to regular review by the physician. Group I drivers should not be allowed to continue to drive when they are receiving drugs which may cause postural hypotension, giddiness or faintness.

10. ENDOCRINE DISORDERS

(a) Diabetes mellitus

The number of road accidents directly due to diabetes, or its treatment, is small, but such cases occur every year and are generally because of hypoglycaemia following insulin treatment.

From the point of view of driving diabetics fall into three groups:

(i) Diabetics controlled by diet alone: these have no risk of hypoglycaemia. As the symptoms of diabetic coma come on slowly, other than in long-distance coach and lorry drivers, driving can be done safely and such people may drive Group I and II vehicles;

(ii) Diabetics controlled by diet and tablets (oral hypoglycaemic agents): these have a small risk of prolonged hypoglycaemia. Drivers should be made aware of this risk. They may drive both groups of vehicles, but long-distance Group I vehicle drivers should not be permitted to drive such vehicles.

(iii) Diabetics controlled by diet and insulin: these may in certain circumstances become hypoglycaemic; the symptoms are mainly cerebral and there may be impairment of judgment, defective muscular control, and, rarely, sudden unconsciousness. Hypoglycaemic attacks may occur unexpectedly at any time and drivers should always carry sugar. Diabetics of this group may drive Group II vehicles except for occasional cases of "brittle" or uncontrolled diabetics who should discontinue driving. Drivers of Group I vehicles who are receiving insulin should not be permitted to continue driving.

In addition to hypoglycaemic symptoms, which may occur unexpectedly after weeks or months of "normality", some diabetics of all three types may have complications such as impaired vision, cardiovascular conditions and peripheral neuritis. Each of these complications must be considered on its own merit in relation to fitness to drive.

All the described categories of diabetes should be under regular medical supervision.

(b) Thyrotoxicosis

In the case of controlled thyrotoxicosis, driving Group II vehicles may be permitted, subject to medical review at regular intervals. When the condition is controlled, and there are no symptoms of mental, cardiac or ocular disturbances, the driver may drive Group I vehicles, subject to a satisfactory medical review.

(c) Myxoedema

In severe cases there is an obvious slowness of reaction times, and persons should not be permitted to drive any motor vehicles. Where this condition is adequately controlled by medication, such a person may drive a Group II motor vehicle provided he is kept under regular observation and there is no gross slowing of the reactions or other symptoms liable to interfere with the safe control of a vehicle. Driving Group I vehicles should be prohibited if symptoms and signs of myxoedema are present.

(d) Addison's disease, pituitary or parathyroid disease

Treatment can greatly alleviate these conditions. Each case must be judged on its individual merits as to whether there is any disturbance of the central co-ordinating and locomotor functions which is liable to interfere with safe driving. Persons suffering from these conditions, when well controlled, may drive safely Group I or II motor vehicles, but in the case of the former this may not necessarily be the case with long distance drivers.

11. DISEASES OF THE NERVOUS SYSTEM

(a) Epilepsy

This section refers to all forms of epilepsy, i.e. generalized non-convulsive, generalized convulsive and partial forms of epilepsy. Separate attention should be paid to psychosis, personality and other mental disorders associated with epilepsy.

In general, the following recommendations are based on those of the Sixth International Neurological Congress, 1965.

The prevalence of epilepsy in adult life is probably about four to five per 1000 (College Gen. Pract., 1960).

The number of accidents due to epilepsy is difficult to determine. Hierons (1956) reported 28 cases of accidents due to epilepsy, the great majority minor ones, and he suggested that most patients have sufficient warning to stop or at least apply the brake of the vehicle. Elliott (1963) reported that less than one in 1000 accidents leading to casualties were caused by epilepsy. Herner (1966) found that about 10 out of 44 500 traffic accidents reported to the police were caused by epilepsy. However, these accidents appeared to be more serious than the accidents caused by other diseases.

Present knowledge of the natural history of patients with epileptic attacks for many years is fragmentary, especially as regards those patients who have very infrequent seizures that are naturally the main concern to those responsible for the issue of driving permits. Differences of opinion and practice in different countries were clearly brought out at the International Neurological Congress in Vienna (1965), the Report of which gives in detail the present views concerning epilepsy and driving. Most of the accidents appear to be caused by initial attacks, or by attacks in insufficiently treated epileptics, often driving illegally, and only about half of them could theoretically have been prevented by better medico-legal control. Stringent regulations are likely only to drive the problem underground and thus actually to increase the risks. The extent to which epilepsy is already concealed was shown by Webb (1955) who found a history of epilepsy in five out of 1200 professional drivers. Most countries allow epileptics under certain conditions to drive Group II vehicles, whether the patient-driver is on drugs or not.

If a driver develops epilepsy for the first time whilst he has a valid permit, then the permit should be cancelled and specialist advice obtained as to his fitness to drive.

In general no one with a history of epilepsy, in any form, or however brief should be permitted to drive a Group I vehicle. The present view, more liberal than that of the past, is that the epileptic whose fits are controlled by drugs, should be permitted to drive Group II motor vehicles after one to two years' freedom from attacks. Experience in Europe and America suggests that where a liberal policy has been adopted towards the controlled epileptic driver, the results in road safety have been satisfactory. Most medical and legal authorities accept the rule that an epileptic must be completely free of attacks, major or minor, for one to two years before he is safe to drive. Patients with nocturnal seizures only, or with a distinct warning aura before an attack, should still be covered by the one to two year rule.

It is important that epileptics should remain on drugs; about half the patients whose anti-convulsant drugs are stopped, because they have been free from fits for two years, begin to have attacks again (Juul Jensen, 1964).

If an epileptic seizure occurs for the first time as an episode after a brain operation, then no driving should be undertaken at least for three months and then only after specialist opinion.

In arriving at a decision in an individual case, the following considerations are essential: a fully documented report from the patient's physician is of value, but in some instances, the final recommendation should come preferably from a neurologist, or a psychiatrist with experience in epilepsy. The electroencephalograph (EEG) may be of importance in evaluation, but its prognostic value is limited. A reliable history of freedom from attacks, corroborated by close relatives or friends, and freedom from an accident on the road, are important. It is exceedingly important that epileptics avoid alcohol, especially before driving; such people should be suitably instructed as to the additional risks. The anti-seizure medication which has controlled the attacks must be continued without interruption, so long as it is indicated on medical grounds. Most authorities require medical reports at six or 12 month intervals.

(b) Cerebrovascular disease

Transient impairment of consciousness or awareness may be due to ischaemia resulting from cerebral or brain stem vascular insufficiency. Recurrent transient cerebral symptoms may precede or herald a major stroke and these should be regarded as a warning so that driving is stopped at this stage. After recovery from the acute stroke, some patients may be capable of driving, provided that there are no medically significant residual defects such as aphasia, paralysis, hemianopia or mental disturbances. Such defects must be looked for specifically, as they are not always recognized by the patient, who may be lacking in insight or judgment.

Driving Group II vehicles may be possible and safe with a hemiparesis, provided that the controls of the vehicle are suitably rearranged or modified, or a special type of vehicle provided. Such persons should remain under regular medical supervision. The driving of Group I vehicles should not be permitted.

Subject to specialist opinion, after one year of recovery from sub-arachnoid haemorrhage, a person may be permitted to drive Group II, but not Group I motor vehicles.

(c) Encephalitis

If there is evidence of the sequelae of encephalitis, such as rigidity of the arms or legs or loss of emotional control, of sufficient degree for the diagnosis to be made with certainty, the applicant should not be permitted to drive a light or heavy motor vehicle.

(d) Migraine

Migraine is not usually a barrier to driving any type of motor vehicle, but in some cases defects of the visual fields, such as scincillating scotoma, may occur rapidly and the physician should warn the patient accordingly.

(e) Myasthenia gravis

Persons suffering from myasthenia gravis should not drive Group I motor vehicles; except in mild cases it is advisable for sufferers not to drive Group II motor vehicles, but cases which respond well to medication may sometimes drive if they avoid doing so for long distances and are kept under regular and frequent medical observation.

(f) Hereditary diseases of the nervous system

Where conditions such as progressive muscular atrophy and congenital myotonic disorders are sufficiently severe as to be diagnosed with certainty, such persons should not be permitted to drive in the first instance, or to continue driving, Group I vehicles. Group II motor vehicle drivers should also be advised against driving if the condition is sufficiently severe as to interfere with the muscular co-ordination necessary for the safe handling of the motor vehicle.

(g) Other diseases of the central nervous system

Most persons who have suffered a traumatic lesion with damage to the spinal cord and resulting paraplegia may drive a Group II vehicle if it is fitted with specially adapted controls so that driving is undertaken by the use of the hands alone. Driving of Group I vehicles should not be permitted.

In most instances, persons suffering from certain organic diseases of the central nervous system, such as multiple sclerosis, paralysis agitans, brain tumour, syringomyelia, amyotrophic lateral sclerosis, severe poliomyelitis sequelae and tabes dorsalis, should not be permitted to drive in the first instance or to continue driving Group I vehicles. In some cases trained and experienced drivers may continue to drive in the earliest minimal stages of these diseases, but usually, if the condition is severe enough to be definitely diagnosed, it is best in the interests of safety to remove the driver from his duties of driving Group I vehicles. Certain of the signs present in these diseases may be of particular danger in connexion with driving, such as anaesthesia of the feet and loss of

proprioceptive position sense in tabes dorsalis; the occurrence of ataxia or spasticity of the leg muscles in multiple sclerosis may be highly dangerous in a driver. Where definite signs of these diseases are present, especially when there is loss of muscular co-ordination or definite diminution of muscular power, the driving of any motor vehicle should not be permitted.

(h) Trauma to the central nervous system

Trauma of the head may lead to organic lesions of the nervous system, including epilepsy, sub-arachnoid haemorrhage, motor dysfunctions, etc. The decision as to whether driving can be permitted depends on the clinical manifestations.

(i) Diseases of the peripheral nervous system

Affections such as neuritis, or palsy of individual nerves, should be judged in relation to driving motor vehicles on the degree of resultant impairment of function. Trigeminal neuralgia does not normally prevent a person from driving any type of motor vehicle. If there is any possibility of progression of the condition a person should be kept under frequent observation. Minor degrees of these conditions should not prevent a trained and experienced driver from continuing to operate Group I vehicles. Where there is a lesion of, or traumatic severance of individual nerves, the degree of resulting disability should be assessed in relation to the ability to manipulate the controls of a motor vehicle for long periods.

12. MENTAL DISORDERS

(a) Psychoses

Where there is a definite diagnosis of psychosis in the active phase by a psychiatrist, or other medical practitioners, whether schizophrenia, affective psychosis (particularly depressive with the attendant risk of suicide while driving), paranoid state, psychosis associated with alcoholism and drug dependance or other psychoses such as toxic, infectious endocrine and traumatic in nature, such persons should not drive any motor vehicle. Psychotic conditions vary in their severity and some patients have long remissions, and may at times be permitted to drive light vehicles. Persons with a currently significant history of any of these conditions should not be permitted to drive Group I vehicles.

Diagnosis of personality disorders would in general lead to exclusion from permission to drive a motor vehicle only in cases where the disorder reaches psychotic proportions. When a previous definite diagnosis of psychosis has been made or such a diagnosis is suspected during examination, a driving permit should only be issued upon certification of fitness by a psychiatrist.

(b) Dementias

In cases of senile dementia, presenile and other forms of dementia, where the condition is sufficiently evident to be diagnosed with certainty, the applicant should not be permitted to drive any motor vehicle.

(c) General paralysis

Where psychosis associated with general paralysis (dementia paralytica, general paralysis of the insane) is diagnosed, the driving of Group I motor vehicles should not be permitted; the driving of Group II motor vehicles should only be allowed when the absence of mental and locomotor signs, and serological tests in spinal fluid, suggest recovery. The person should be kept under regular observation.

(d) Brain operations in psychoses

In cases of leucotomy, lobotomy or topectomy, the underlying condition for which any of these operations was performed and the effect of the operation upon it should be assessed in relation to the responsibility of driving. The operation does not usually of itself render a person unsafe to drive a motor vehicle, but it should be remembered that rather more than 10 per cent. of these persons have epileptic fits after the operation. In general, persons should not be permitted to drive Group I motor vehicles if they have been subjected to any of these operations and it will usually be found advisable to remove experienced drivers who have had such operations from driving this type of motor vehicle.

(e) Mental retardation

In many cases the mentally retarded should not be permitted to drive motor vehicles because of their lowered intellectual and critical faculties, low speed of reflex action and sometimes difficulty in concentrating attention for long periods. However, some persons whose retardation is borderline to mild, and in whom such retardation may be difficult to identify on general examination, may be quite capable drivers. Where mental retardation is recognized, permission to drive Group I motor vehicles is not recommended. Persons with severe or profound mental retardation should not be permitted to drive any motor vehicle.

Illiterates who cannot read but who are not mentally retarded should not necessarily be disqualified from driving any type of vehicle.

(f) Psychoneuroses

This is one of the most difficult fields in which the physician may be called upon to express his opinion. Emotional disturbances are probably frequently associated with accidents; they also frequently occur in "normal" people. A loss of confidence in driving is a not infrequent occurrence among men who have been driving motor vehicles for many years, and it is important in the prevention of accidents that there should be no hesitation in preventing such drivers temporarily or permanently from driving. Drivers suffering from these conditions sometimes complain of quite irrelevant symptoms such as pain in a knee or foot and when, on examination, no signs are found, it becomes clear that such a person is really suffering from a loss of confidence. The usual symptoms of anxiety, insomnia, inability to concentrate, depression and unreasoned fears also tend to be present in varying degrees, and such cases usually benefit from being placed for a period of six or 12 months on work which does not involve driving a motor vehicle. Because of the possibility of recurrence, persons who have suffered at any time from conversion hysteria should not be permitted to drive Group I vehicles.

13. ALCOHOL

(a) Alcohol, driving performance and traffic accidents

Even small amounts of alcohol may impair the capacity of a person to drive with the maximum skill and care of which he is capable. Experiments to study the effect of alcohol on actual driving performance have been made. Cohen et al. (1958) studied the effect on the ability of experienced bus drivers to drive between posts. They found that performance was affected by very small amounts (as low as 20 mg/100 ml) and that performance deteriorated as the amount of alcohol taken was increased. Somewhat similar experiments and results were obtained by Bjerver & Goldberg (1951), Gelin & Wretmark (1951), Coldwell et al. (1958) and Kielholz et al. (1967). The evidence of these studies on actual driving performance shows that amounts of blood alcohol as low as 20-30 mg/100 ml may increase the number of mistakes made, the time taken to act and thus adversely affect performance.

There is much statistical evidence of the relation of alcohol to road accidents. The first controlled survey of this type was conducted in Evanston (United States of America) by Holcomb (1938). The concentrations of alcohol in the urine of 270 drivers involved in traffic accidents seen at hospital were compared with those of 1750 drivers chosen at random. It was found that as the alcohol concentration increased beyond 50 mg/100 ml the number of drivers in the accident group increased out of all proportion to those in the control group. A controlled study in Toronto, undertaken by Lucas et al. (1955) compared the blood alcohol concentrations of 433 drivers involved in accidents with 2015 other drivers. The danger of accidents became significant when the blood alcohol level was greater than 100 mg/100 ml, and when it rose above 150 mg/100 ml, the hazard was approximately 10 times greater than when the concentration was below 50 mg/100 ml. Freimuth et al. (1957) showed that, in Baltimore, United States of America, in 500 consecutive highway fatalities to drivers, passengers and pedestrians, about a third were associated with blood alcohol levels greater than 150 mg/100 ml and about half with levels greater than 50 mg/100 ml. These figures agree very well with those reported in a similar survey carried out in Perth, Western Australia, by Pearson (1957). A controlled study of drinking drivers involved in accidents was carried out by Vamosi (1963) in Bratislava, Czechoslovakia. The results showed the increase in accident hazard as the level of blood alcohol rose. and that the chances of involvement in a traffic accident were 124 times greater for a person with a blood alcohol level of over 150 mg/100 ml than they were for a person with only 30 mg/100 ml.

The studies quoted above suggest that a significant percentage of road traffic accidents would be prevented if drivers could be dissuaded from drinking. This may at present be regarded as idealistic, but nevertheless publicity material, and educational campaigns, should lead in this direction.

(b) Medical considerations

Drivers who drink alcohol, regularly or otherwise, present many risks to traffic safety. Those for whom drinking is a fairly regular pattern present special problems of identification to the physician examining candidates for driving permits; such people are particularly liable to drink either before or whilst driving.

Because of the serious consequences of dependence on alcohol, (alcoholism), the medical examiner should, prior to the issuance of a driving permit or during periodical examinations, examine for signs which may give rise to the suspicion that drinking constitutes a problem for the driver. This may be so in the case of persons of shabby appearance, poor hygiene, and with applicants whose behaviour and social adjustment have deteriorated and are inconsistent with those expected. There may also be unexplainable:

(i) contusions and abrasions (in various stages of healing);

(ii) varicose cheeks and an acetonic breath;

(iii) persistent vague somatic complaints, particularly insomnia, gastrointestinal difficulties, headaches, anorexia and morning vomiting;

(iv) evidence of neurological involvement such as coarse unexplained tremors of the hands, minor balance disorders and pain on pressure of the ankle muscles (deep sensitivity);

(v) a palpable, non-tender liver, epistaxis and linear ecchymosis;

(vi) evidence of premature organic brain deterioration, forgetfulness, disorientation, emotional lability, etc.

In the case of those just described above, medical questioning often reveals such matters as:

(i) a tendency toward making alibis and weak excuses for drinking;

(ii) a refusal to concede what is obviously an excessive consumption and annoyance when the subject is mentioned;

(iii) frequent absenteeism from his work (this often occurs in a pattern, such as following weekends and holidays);

(iv) repeated job changes (particularly if to successively lower levels) or employment in a capacity beneath his ability, education and background;

(v) persistent marital and family problems.

The above are only of value if interpreted in relation to the over-all medical context. They may lead to complementary or supplementary specialized examinations, in particular psychological ones prior to the adoption of any decision (Manual on Alcoholism, 1967).

(c) Alcohol, the law and driving

As already shown, drinking alcohol, even when taken in small amounts, has a deleterious effect on driving performance, impairing the capacity of the driver to drive with the maximum skill and care of which he is capable. There are detectable changes, following alcohol consumption, both in metabolism and in the psycho-physiological faculties required for safe driving; the latter include psychomotor and sensory performance (in particular vision and judgment of distance) as well as the efficient and critical evaluation of the mass of information to be assessed whilst driving.

The tendency in most parts of the world is therefore now to lower the concentration of blood alcohol accepted as evidence of impairment and considered as such by courts of law. The old accepted limit of 150 mg/100 ml is now considered by most countries as obsolete; in general, the maximum concentration allowed is 50 mg/100 ml. The Expert Committee on Alcohol of the World Health Organization reported in 1954 that, "Taking into consideration (1) the investigations performed in recent years on the effect of alcohol on different functions in laboratory experiments, (2) the results of statistically designed practical tests on drivers, air pilots, etc., and (3) the statistical evidence from the few adequate studies existing on alcohol and road accidents, the inference cannot be avoided that at a blood alcohol concentration of about 50 mg/100 ml a statistically significant impairment of performance is observed in more than half of the cases examined." Since then a considerable amount of work has been carried out which strengthens and supports this view.

Some countries make it an offence to consume alcohol in any amount before driving.

The biochemical tests necessary to establish the blood alcohol concentration may be permissive (i.e. with the driver's consent) or mandatory. Some countries make use of the breathalyser.

14. PSYCHOACTIVE DRUGS

There are several types of drugs which may affect a driver's skill and judgment; among these the more important are the amphetamines, barbiturates and other sedatives, cannabis (marihuana), hallucinogens, narcotics and cocaine. Eddy et al. (1965) have described their clinical effects.

The effects of some sedatives, and narcotics, are additive to those of alcohol. Generally, these drugs, if used at ordinary therapeutic dose levels in ambulatory patients, do not impair the ability to drive; this is not the case with higher doses, which are often self-administered.

A review of psychoactive drugs and road safety was prepared as a duplicated pamphlet by the World Health Organization (1965). This describes the nature, significance and extent of the problem, the factors which modify the effects of psychoactive drugs on driving performance, the particular effects on the latter of sedatives, stimulants, barbiturates and allied substances and tranquillising agents, and of the combined effect of sedatives and alcohol. This paper gives 137 references. In 1967 Kielhotz discussed this subject further.

Sedatives, tranquillisers and amphetamines should be prescribed for any driver only with caution; the physician should be particularly alert as to the possibility of drug abuse if the patient requests, or appears to require, more than the usual therapeutic dose. The side effects of antihistamine vary considerably; Miller (1957) suggests that patients who take these drugs should not drive until they have established by trial that they do not experience side-effects. Useful examples of particular drugs in relation to driving are given by Norman (1964).

15. ACUTE INFECTIOUS DISEASES

Persons suffering from most acute infectious diseases are generally temporarily unfit for work or driving a motor vehicle; they should not be issued with a driving permit until they have recovered. As far as drivers of Group I vehicles are concerned, special consideration should be given to bacteria carriers; medical examinations must be carried out because in some instances such drivers should not work.

16. DISEASES OF THE BLOOD

(a) Anaemia

In general blood diseases are not likely to interfere with safe driving unless a severe degree of anaemia is present.

In severe anaemia a permit to drive Group I or II vehicles should not be granted. However, even minor degrees of anaemia are characterized by increased fatigue which is an important factor in driving and may lead to slow reactions of the driver, particularly of Group I vehicles, towards the end of his working day. If therefore the symptoms and signs suggest that an applicant for a driving permit is suffering from anaemia, a haemoglobin estimation should be carried out and the applicant should be temporarily rejected pending the result of investigation and treatment. In trained and experienced drivers of Group I motor vehicles it is not usually necessary to advise exclusion from work unless the haemoglobin falls to such a level that signs and symptoms develop. Where the condition is likely to recur, regular periodic medical examination should be advised.

(b) Leukaemia and other blood dyscrasias

Such conditions should be judged on their individual merits as regards the person's fitness to drive, bearing in mind the associated anaemia and tendency to fatigue which, during the latter part of the day, may be potentially hazardous especially when driving Group I vehicles. Applicants suffering from blood disorders of this type should not be permitted to drive Group I vehicles in the first instance. Those who are already driving such vehicles may be permitted to continue if the condition is not of severe degree and fatigue and other danger symptoms and signs are absent. If there is a history or evidence of haemophilia the applicant should not be permitted to drive Group I vehicles.

17. DISEASES OF THE SKIN

Most skin diseases are not likely to interefere with the safe handling of a motor vehicle, but in certain cases where the skin is inelastic, thickened or scarred, movements of the limbs may be restricted. As there is a close developmental connexion between the skin and the central nervous system, certain skin diseases tend to be associated with neuroses and psychopathic personalities of various forms. The existence of a skin disease, such as some cases of severe seborrhoeic dermatitis may suggest the presence of a neurotic condition.

It is not generally necessary to advise the removal of a driver from driving Group I vehicles only on account of a skin condition.

The skin should be examined for evidence of needle marks suggesting possible drug addiction or diabetes.

18. DISEASES OF THE RESPIRATORY SYSTEM

(a) Tuberculosis

Inactive pulmonary tuberculosis does not make a person unfit for safe driving but a careful assessment of such a person's condition may be necessary in relation to the particular duties of his work as a driver. It is recommended that applicants who have active tuberculosis of the lungs and those who have suffered from tuberculosis of the lungs within the preceding 12 months should not be permitted to drive Group I vehicles in the first instance.

Drug therapy of tuberculosis enables most patients to resume driving after recovery from the active phase. Where a trained and experienced driver of Group I vehicles wishes to return to work after an absence due to pulmonary tuberculosis, his case should be carefully assessed in relation to the work required. In such cases the driver should be required to attend for medical examination at regular intervals.

(b) Chronic bronchitis

As the medical status of patients with severe chronic bronchitis and emphysema may progressively deteriorate, serious consideration must be given to refusing, at the time of initial application, the issue of a permit to drive Group I vehicles. For renewal of a permit, reference to specialist opinion is often necessary.

It is also usually necessary to prohibit plethoric thick-set men with severe chronic bronchitis from driving Group I vehicles because they may develop cough syncope (laryngeal vertigo).

19. DISEASES OF THE GASTROINTESTINAL SYSTEM

(a) Peptic ulceration and other digestive disturbances[1]

Applicants who have a history of peptic ulceration, ulcer-type pain, or any severe dyspepsia should not be permitted in the first instance to drive Group I vehicles, on account of the shift work, long hours and irregular meals which are sometimes unavoidable in this occupation. A person who has had an operation for peptic ulcer may, however, be permitted to drive Group I vehicles if he is free from symptoms and has recovered. Those who are already trained and experienced drivers are often able to continue at work if care is paid to diet and medication, but the driver's own condition, rather than considerations of safety, sometimes necessitates his transfer to alternative employment with regular hours of duty.

A history of duodenal ulcer or of some types of functional dyspepsia may be associated with a tense anxious personality, and these two conditions together may render an applicant unsuitable to drive Group I motor vehicles. Acute gastrointestinal conditions may render a person temporarily unfit to drive.

(b) Herniae

A hernia which is painless does not prevent a person from driving Group I or II vehicles; however, danger may arise from work associated with the former group of vehicle.

20. DISEASES OF THE GENITO-URINARY SYSTEM

Diseases of the urinary tract are not commonly associated with any lack of safety in driving a motor vehicle, but the possibility of chronic infection, resulting in undue fatigue, or of uraemia, should be considered. Urinary calculi, enlarged prostate, or urinary infections may result in frequency of micturition with consequent interference with the efficient and safe driving of a Group I vehicle. Patients suffering from acute gonorrhoea, and its complications, or untreated primary or secondary syphilis, are unfit to drive Group I vehicles.

21. MEDICAL EXAMINATION OF DRIVERS

(a) Suggested method

Most medical practitioners who examine applicants for permits, or who conduct other examinations of drivers, find it convenient to carry out the various procedures required according to a routine: the inadvertent omission of any important part of the medical examination is thus minimised. The time required to complete the examination varies greatly, but on an average approximately 15 to 20 minutes may be allowed for each examination.

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[1] It is commonly supposed that motor vehicle drivers and other transport workers suffer from peptic ulcers with greater frequency and severity than workers in most other occupations. This suggestion was made, for example, at an enquiry into the health of London central busmen in 1937 (Ministry of Labour, 1939). An investigation into the sickness experience of London Transport workers with special reference to digestive disturbances failed to show with certainty any difference in the sickness experience of transport workers as regards gastric conditions (Hill, A. B. 1937). A more recent investigation showed that drivers and other transport workers did not suffer any more or less from peptic ulceration than other types of workers (Doll, R. & Avery Jones, 1951).

During the medical examination adequate information, sometimes partially obtained by the use of a form which the examinee has to complete and may be subsequently required to sign as to the veracity of his written replies, must be obtained on such matters as:

(1) his previous medical history;

(2) nervous or mental disorders; fainting attacks; epileptic fits; "blackouts" or "nerves";

(3) heart disease and disorders;

(4) tuberculosis; asthma and chronic bronchitis;

(5) skin diseases;

(6) herniae (enquiries should be made whether a 'support' is worn);

(7) digestive disorders;

(8) endocrine disorders; diabetes and thyrotoxicosis;

(9) rheumatism or joint troubles;

(10) full details of previous accidents, injuries, major illnesses, hospitalization, and operations.

In addition, enquiries should be made as to what medicines are taken, the amount of alcohol consumed, in addition to details concerning the results of previous medical examinations, military and civil. In the latter category are included the results of pre and periodic medical examinations in connexion with employment, examinations for insurance purposes or those carried out previously in connexion with the issue of a permit.

It must be stressed that the medical history is always confidential, and the written replies to any questionnaire used, together with the results of the medical examination itself, should be retained by the medical practitioner. For the same reason applicants should be examined privately and not as a group.

The following is suggested as the minimum for the medical examination itself. The results of these examinations and tests will suggest whether any further detailed examinations, including neuro-psychiatric tests, are necessary.

(i) central nervous system: reaction of the pupils to light, accommodation and knee reflexes;

(ii) eyesight, including visual fields, Romberg and co-ordination (finger-nose test);

(iii) chest and heart disease; chest radiography if available. Systolic and diastolic blood pressure;

(iv) hearing;

(v) joint movements and muscular strength;

(vi) urine for sugar and protein.

The person being examined, if by a physician, should be undressed so as to make the detection of physical defects possible. The examination should be undertaken in good light and facilities should be provided at least for eyesight tests, ophthalmoscopic examination (where indicated), urine tests for sugar and protein, hearing examination, and measurement of blood pressure. Special examinations which are sometimes required include chest or other radiographs, blood sugar estimations, electroencephalograms, psychological or psychiatric tests and electrocardiograms.

Some authorities consider that routine electrocardiograms should be taken of all applicants for Group I driving, irrespective of age, in order to provide a baseline to compare with the results of future examinations. Drivers of Group I vehicles who are over the age of 60 should have electrocardiograms taken annually but care is needed in interpretation regarding fitness for driving. Abnormal electrocardiograms were found in 67 per cent. of apparently normal drivers in a German study (First International Conference on Accidents and Traffic Medicine, 1963).

(b) Psychological and psycho-physiological tests

Most accidents are believed to be due to human faults, that is to say, carelessness, inattention and wandering concentration. Many lives may rest upon the skill of the driver.

The mental aspects of the task of driving involve (i) concentration of the visual (and to a lesser extent auditory) processes, it may be for many hours at a time; (ii) concentration of the mental processes so as to maintain a close link between visual and usually auditory perceptive mechanisms and motor responses; and (iii) resistance to distraction.

Some psychological tests for evaluating driving behaviour are complex and require continuous control over several hours. Their use in the routine selection of Group I drivers is desirable. In Group II drivers they need be applied only in selected cases, e.g. accident-repeaters, or when requested by the medical examiner in the first instance. However, as no simplified tests, including those suitable for mass examinations of this kind are available at present, further studies are necessary. Psychological methods of selecting drivers were discussed at a 1967 WHO Symposium (Häkkinen, 1967; Binois, 1962).

22. PERMISSIBLE HOURS OF DRIVING

If a physician has to advise upon maximum hours of driving, reference may be made to the suggestions put forward by the Inland Transport Committee of the International Labour Organisation (Memorandum No. 51 and resolution No. 92). According to these, the driver of a Group I vehicle should have a break of at least half an hour between the fourth and sixth hours of driving. The total driving hours should not exceed 10 in every period of 24 hours. Every driver should, as a rule, have an average rest period of not less than 11 hours, which may, in certain cases, be reduced to eight hours. A model individual control book for drivers was recommended by a meeting of ILO experts in 1959.

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