children's beds is 1 to 3.4, but this figure hides great extremes. For instance, 303 wards say that they have a parent's bed for every child's bed or that they would never turn a parent away, whereas 97 wards, including 27 paediatric general or children's surgical wards, can offer no accommodation whatsoever, on or off the ward, except in a case of emergency.

Hospitals were flexible about the location of the accommodation. A total of 363 (46%) of the 790 wards contrive to have all their parents' beds on the unit, either in parent/baby cubicles or beside the child in the open ward; 126 (16%) can provide accommodation only off the ward; and the remainder manage a mixture of the two.

Discussion

These findings indicate that we have reached a halfway stage in the implementation of the Platt recommendations. Parents are still looked on as visitors in half the wards, which limit their presence by blanket rules. These wards need to think through the implications of this policy; if it is desirable for a parent not to be present at any time or on operating day it should be discussed individually with the particular child's welfare in mind. The analysis of the data for ear, nose, and throat wards confirms the picture we have built—namely, that parents have more problems in these wards than in any other. These wards have, however, improved more rapidly than other wards over the past seven years—for instance, the proportion of wards with unrestricted access has risen from 8% to 32%.

The provision of overnight accommodation for parents is still far from satisfactory. In wards where parents are encouraged to stay and help with the care of their children more

than half choose to do so. Elsewhere, wards provide no accommodation at all or the ward sisters claim that parents' beds lie empty; in these cases, we feel that there may be a negative attitude that discourages parents from asking to stay. The wards that welcome parents display enormous ingenuity in finding and locating beds, even though the ward might be old and crowded.

At least half of the wards that nurse children are not yet part of comprehensive children's units. There has been a welcome trend to admit children to the district general hospital rather than to the small local hospital, especially for surgery. Nevertheless, few specialist surgical wards are being incorporated into the children's unit, even in new hospitals. More disturbing is the problem that arises with the modern trend to open a hospital in parts; in certain cases, the comprehensive unit has been threatened by plans to hive off one part.

References

- ¹ Ministry of Health. Central Health Services Council. *The welfare of children in hospital, report of the committee*. London: HMSO, 1959. (Platt report.)
- ² Belson P. Parent power. In: Azarnoff P, Hardgrove C, eds. *The family in child health*. New York, Chichester: John Wiley, 1981.
- ³ Consumers' Association. *Children in hospital*. London: Consumers' Association, 1980.
- ⁴ Young G. Parliamentary written reply. *House of Commons official report (Hansard)* 1980 June 10;986:cols 70-1.
- ⁵ Department of Health and Social Security. *Hospital facilities for children*. London: HMSO, 1971. (HM(71)22).

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Aviation Medicine

Is the crew fit to fly?

II: Specific medical considerations

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No matter how a pilot reaches the doctor's consulting room there are several well recognised areas to which the examining doctor must pay particular attention.

Cardiovascular disorders

In civil aviation the most common reason for loss of licence is a cardiovascular disorder and this accounts for 60-65% of such losses each year in the United Kingdom.¹ Furthermore, about 75% of these are due to coronary artery disease.² Clearly, if coronary artery disease is overt there is no dilemma for the licensing authority; but considerable difficulty follows the

discovery of asymptomatic electrocardiographic changes on routine examination. Evidence of unequivocal infarction should lead to immediate revocation of the licence but any other changes—for example, ST segment and T wave abnormalities, which are common in normal people—demand referral for further assessment. This will usually require exercise testing with perhaps beta-blockade. These tests will often correct the ST segment and T wave changes if the myocardium is healthy (although beta-blockade has also been shown to improve or even return to normal the electrocardiograms of those with ischaemic heart disease³). Where doubt remains exercise thallium scanning or three dimensional echocardiography or both may be performed, while coronary arteriography may be required in selected cases.⁴ The need for such careful assessment, particularly when a professional career is threatened, was amply illustrated in a study in which all but one of 20 asymptomatic subjects with ischaemic changes on electrocardiograms were shown to have unobstructed coronary arteries.⁵

A pilot who presents only a slightly increased overall risk of sudden incapacitation may be allowed to continue flying with, or

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as, a copilot since actual accident and incident experience has shown the success of mandatory incapacitation training in airline operations. Obviously, two pilots with waivers like this must not be rostered to fly together and so such endorsements do not help flexibility in commercial operations. In military aviation myocardial infarction results in permanent grounding.

HYPERTENSION

The discovery of raised blood pressure readings at routine examination requires referral and a full standardised investigation including radiography of the renal tract, renal function tests, electrocardiography, haematology, and biochemistry. The side effects of many antihypertensive agents make them unacceptable for use in flight, and a thiazide diuretic with or without spironolactone was the treatment of choice for many years. Military experience in the United States has shown hydrochlorothiazide with spironolactone (Aldactazide) to be "safe and fairly effective" for aircrew with mild or moderate essential hypertension.⁶ The advent of more effective beta-blockers has naturally raised the possibility of their use for aircrew. A review of the results of 24 studies of the effects of beta-blocking agents on psychomotor performance concluded that most showed no effect, and even when an adverse effect was evident it was not likely to be greater than that expected in normal day to day variation.⁷ This finding and the lack of other side effects have made beta-blockade a realistic alternative to diuretics, although most performance studies to date—including those reviewed⁷—were probably insufficiently sensitive to the degree of decrement which is important in aviation. At present, both civil and military organisations in the United Kingdom allow restricted flying, after a period of ground assessment, when pilots are taking a cardioselective beta₁-blocker such as atenolol, acebutolol, or metoprolol. Careful supervision and monitoring is essential, particularly in view of the possibility of disinhibition, impaired judgment, and a reduction in the normal response to anxiety and stress, although such risks should become "vanishingly small"⁷ if hydrophilic beta-blockers are used.

Psychiatric disorders

Psychiatric illness is the other major cause of loss of licence: in civil aviation it is second only to cardiovascular disease.² Predictably, wastage is highest in the early phases of flying training when the hazards of aviation are new and frightening, but a second peak appears in the fifth and sixth decade. In professional aircrew it is usually related to domestic stress or training problems,⁸ such as conversion to new types of aircraft. Recognition of the disease state is the most difficult and yet most important problem facing the authorised medical examiner.

In aircrew the onset of a neurosis requires immediate grounding, at least for the acute stage and while drugs incompatible with the flying task are being used. A return to flying may be considered if a single episode remits fairly quickly and completely. A protracted illness, or one which relapses, is an indication for permanent loss of licence, as is a neurosis induced by the stress of flying such as fear of clouds. The organic components of psychosomatic disorders must be treated appropriately but some—including migraine and asthma, for example—may be incompatible with a continued flying career. The development of a functional psychosis requires immediate and permanent withdrawal of a licence as does any episode of drug dependence, but other personality disorders, including alcoholism (see below), may allow continued flying under very close supervision.

Respiratory disorders

Any respiratory disorder may cause incapacitation in flight and, rarely, death.⁹ Thus the risk of stress induced incapacita-

tion as a result of asthma usually means that the onset of this disorder in aircrew is disqualifying. If continued flying is allowed—for example, with mild illness in a navigator or engineer—limitations are necessary and monitoring must be strict. Treatment with disodium cromoglycate is permissible if it alone is able to suppress symptoms, but this is unusual and the need for antihistamines, steroids, or bronchodilator inhalers leads to grounding.

Recurrence after a first spontaneous pneumothorax is common,¹⁰ and because of this increased risk this is another condition that leads to immediate suspension of licence. A return to flying may be considered if three months after pleuroctomy (preferably bilateral) an attempt to induce an artificial pneumothorax fails. Many thoracic centres and the Royal Air Force have now abandoned the use of chemical pleurodesis since this procedure has been shown to result in a high recurrence rate.¹⁰

Finally, pulmonary sarcoidosis, a relatively common disorder⁹ that is usually discovered on routine chest radiography, is compatible with a return to flying duties with adequate supervision when the acute phase has regressed. The recent aviation medical interest shown in this illness was a result of its discovery at necropsy in the organs (and particularly the myocardium) of several aircrew who were in aircraft accidents. The finding was considered to be incidental, but concern remains regarding the rare possibility of sudden incapacitation due to cardiac involvement: full cardiovascular assessment has been recommended in all patients with sarcoidosis before returning to flying duties.¹¹

Endocrine disorders

International Civil Aviation Organisation guidelines allow professional aircrew who develop diabetes mellitus to continue flying provided that good control can be achieved by diet alone. Private pilots and air traffic control officers may also be relicensed if they are sufficiently well controlled on a biguanide oral hypoglycaemic agent. All diabetic aviators, however, must achieve satisfactory medical results at frequent intervals if they are to retain their licences. Thus body weight must be shown to be constant, the two hour postprandial blood sugar concentration must be less than 8.25 mmol/l (150 mg/100 ml) and the urine must be free of protein and ketones with only a trace of sugar allowed. Furthermore, the electrocardiogram, blood pressure, visual function, and central and peripheral neurological examinations must be normal. Such vigorous requirements are difficult to maintain.

Other conditions

OBESITY

Acquired major obesity is uncommon in aircrew, who have a high motivation to remain flying: any increase in weight is usually recognised early and dealt with appropriately.

PEPTIC ULCERATION

The development of peptic ulceration in experienced aircrew leads to grounding for the initial treatment phase, and the presence or not of complications will determine any resumption of flying. Surgery should be considered early in cases which bleed or following two relapses after medical treatment.

NEUROLOGICAL DISORDERS

Neurological disorders such as degenerative or neurovascular diseases, neuralgias, tumours, dementias, and multiple sclerosis are all permanent bars but inflammations and head injuries may allow a return to flying. On the job performance testing may be

required. In the case of a closed head injury, however, further guidelines are laid down since the degree of amnesia is a reasonable indication of the extent of brain damage.¹² Thus a permanent bar is imposed if the duration of amnesia is longer than four weeks, or if there is a permanent loss of cerebral function. Amnesia of three, two, or one week's duration is followed by grounding for 12, nine, or six months respectively, while a transient amnesia requires grounding for at least six weeks. Other causes of disturbance of consciousness—such as hyperglycaemia or hypoglycaemia, fugues, cerebrovascular accidents, vertigo, and simple faints—require full investigation and only a confirmed, simple, predictable, explicable, and therefore preventable vasovagal syncope would be compatible with a return to a full flying category.

The aging pilot

The problems associated with aging must be recognised when aircrew are in their fifth decade and beyond. Such problems include not only the well known increases in the risk of hypertension and ischaemic heart disease but also the increasing difficulty in coping with irregular work and sleep, the increasing likelihood of functional psychoses, and the degradation of auditory and visual function. The increased frequency of periodic medical examinations with age is the means by which most of these problems are monitored, but the way in which various functions are assessed could probably be improved. For example, a recent review has suggested that current tests of visual ability should be supplemented with tests more relevant to pilot performance, such as contrast sensitivity, function in low light levels, and dynamic visual acuity.¹³

Drug medication

Because of the problems that may result from loss of licence aircrew may be encouraged not to declare a history of illness at medical examinations, even though this information is actively sought by a written questionnaire at each medical. Since the medical examiner is often not the pilot's usual doctor great reliance is placed on the integrity of the examinee. Under certain circumstances aircrew may also be tempted to seek treatment from a private practitioner in the belief that medical information will not be passed back to medical examiners or the Civil Aviation Authority.

The question of whether a doctor should automatically inform the licensing authority of illnesses that are potentially lethal (to others) is a vexed one that is inevitably complicated by the ethical position of the doctor in relation to his patient. In this context, the advice offered to doctors when dealing with similar dilemmas on the ground is most apposite: "... rarely, the public interest may persuade the doctor that his duty to the community may override his duty to maintain his patient's confidence. ..."¹⁴ Failure to report such cases may have disastrous consequences as illustrated by the 1966 Lockheed Electra accident in the United States which resulted in the loss of 83 lives. The probable cause of this accident was pilot incapacitation due to coronary insufficiency occurring at a critical phase of landing. Subsequent investigation showed that for some years the pilot had been receiving treatment for angina pectoris and diabetes mellitus from a personal doctor but had not declared this history to his medical examiner.¹⁵

Before any medication is prescribed for aircrew the doctor must be satisfied that both the condition and the proposed treatment are not contraindications to flight. For example, blurring of vision caused by anticholinergic drugs is an unacceptable side effect, as would be any adverse effect on mental performance. In addition, the possibility of hypersensitivity or idiosyncratic reactions must be assessed by a trial of the drug on the ground for at least 24 hours before flight.

HYPNOTICS

Irregularities in work and rest created by airline operations are such that aircrew may seek medical advice and a prescription for hypnotics. In general practice the benzodiazepines have been established as "first line" treatment because of their efficacy and relative safety, but they have also been shown to have deleterious effects on mental performance.^{16, 17} Some benzodiazepines have long elimination half lives—for example, 14-90 hours for diazepam—which can produce accumulation and so prolong adverse effects on performance,¹⁸ so that daily use in aircrew should be avoided. Furthermore, because prolonged use of benzodiazepines may also result in dependence¹⁹ the choice of such drugs for use by aircrew must be made with care. They should certainly be prescribed at the lowest dose possible and should have been tried on the ground before operational use. An interval of 24 hours between ingestion and duty should be set and the pilot made to abstain from alcohol since this may have a synergistic rather than a simple additive effect on performance when combined with a benzodiazepine.²⁰ Temazepam (Euhypnos, Normison) is probably the hypnotic of choice and was used extensively with success by British military aircrew during the recent Falklands conflict.²¹

Other psychotropic drugs should be given only to grounded aircrew—not only because they are likely to compromise performance²² but also because the conditions for which they are prescribed are usually incompatible with flying duties.

ANTIHISTAMINES

Antihistamines (H_1 -receptor antagonists) should not be prescribed, except in topical preparations, because they may produce sedation and impairment of performance at therapeutic dosage.²³ Self medication may, however, occur because they are often incorporated into products that are bought "over the counter." In a recent United States Navy accident, which resulted in 14 deaths, the pilot's use of a "cold cure" was listed as a contributory factor to the cause of the accident.²⁴ At necropsy his blood contained brompheniramine (an antihistamine known to impair performance²⁵) at six to 11 times the normal therapeutic range. The recent development of two antihistamines, astemizole (Hismanal) and terfenadine (Triludan), which are apparently free of sedative side effects at therapeutic concentrations,^{23, 26} is only a partial solution since the conditions for which antihistamines are commonly prescribed may not be compatible with flight. This is also true of H_2 -receptor antagonists prescribed for the treatment of peptic ulcer.

STEROIDS AND ANTIBIOTICS

The possibility that flying will be contraindicated by the diagnosed condition usually excludes the use of steroids and antibiotics in operational aircrew. Long term antibiotic treatment may occasionally be required in conditions compatible with flying—for example, in acne or prolonged episodes of non-specific urethritis. Most antibiotics are intrinsically safe when used in otherwise healthy people but possible hypersensitivity must always be excluded by a trial on the ground. The aminoglycosides should, however, be avoided because of the risk of damage to the vestibular nerve which, although rare, would have serious consequences for a pilot's career.

On the whole, the decision to prescribe medication to aircrew must be based on sound clinical pharmacology applied with medical common sense and helped by a basic understanding of the aviation environment. The only occasion when medication must be given to all aircrew is when they are likely to enter a malarious area. All antimalarials at present used for prophylaxis are safe for use in aircrew and the choice of agent will be determined by the current pattern of drug resistance. Informa-

tion on this is available from the Public Health Laboratory Service.²⁷

Self medication and alcohol

In some parts of the world it is legally possible to purchase medicines which in the United Kingdom would be available only on prescription. As a result aircrew are constantly warned to avoid self medication and that availability does not necessarily equate with safety. Especial care must be exercised with "cold cures" (see above) and anti-diarrhoea agents which may contain opiates or anticholinergics. Nevertheless, the relevance of drugs to aviation accidents has necessitated the development of comprehensive toxicological screening procedures which use extraction techniques of sufficient efficiency to allow the sensitive detection of even subtherapeutic concentrations of drugs at necropsy.²⁸ In a survey of toxicological examinations made on 1345 pilots killed in American general aviation during a seven year period (1968-74) drugs were identified in 16 (1.2%) cases, but this percentage was small compared with the presence of alcohol in 262 (19.5%) pilots. Of these cases, the blood alcohol concentration in 117 (8.7% of the total) was in excess of 0.05%, a concentration high enough to be a possible contributing factor to an accident.²⁹

The adverse effects of alcohol on judgment and the performance of skilled tasks have long been recognised by the airlines, who recommend a minimum period of between eight and 12 hours "from bottle to throttle" for their aircrew. In practice, this interval may be too short since the rate of removal of alcohol from blood is relatively slow—about 3.26 mmol/l/h. Thus detectable blood concentrations may still be present over eight hours after the ingestion of three pints of beer.³⁰ A rule based on time alone may therefore be ineffective unless defined limits are also applied to the quantity of alcohol consumed.

Alcohol abuse is increasing in the United Kingdom and there is no reason to suppose that aircrew are any less susceptible to this problem than their non-flying peers. A retrospective analysis of liver histology from 423 United Kingdom aircrew (of all types) killed in aviation accidents between 1955 and 1979 suggested that 19 (4.5%) had histopathological evidence of alcohol abuse.³¹ Although this was unlikely to have been a higher incidence than that of any similar socioeconomic group, the nature of a pilot's occupation must surely make detection of this problem a priority, especially since self confession is rare. Blood sampling for γ -glutamyltransferase activity at routine medical examination has been advocated but licensing authorities world wide have concluded that this would not be cost effective, primarily because commercial aircraft accidents rarely have alcohol abuse cited as even a contributory cause. Although alcohol related accidents are more common in private aviation, they are still only a very small proportion—most accidents to private aviators are the result of poor flying technique—and the licensing authorities do not believe that occasional blood tests at routine examination would be an effective deterrent.

Once a diagnosis of alcoholism has been made loss of licence is automatic but the alcoholic pilot may be reinstated if clinical evidence of recovery, including a two year period of abstinence, is established.

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References

- Cooke JNC. Some medical conditions of importance in aviation medicine. In: Dhenin G, ed. *Aviation medicine*. Vol 2. London: Tri-Med Books Ltd, 1978:161.
- Bennett G. Medical wastage in civil pilots. *Aviat Space Environ Med* (in press).
- Prichard BNC. Beta blockade and the effects of stress on the normal and ischaemic heart. *Aviat Space Environ Med* 1981;52:S9-S18.

- Royal College of Physicians of London. The cardiovascular fitness of airline pilots. Report of a working party of the cardiology committee of the Royal College of Physicians of London. *Br Heart J* 1978;40:335-50.
- Taggart P, Carruthers M, Joseph S, et al. Electrocardiographic changes resembling myocardial ischaemia in asymptomatic men with normal coronary arteriograms. *Br Heart J* 1979;61:214-25.
- Hull DH, Wolthuis RA, Triebwasser JH, McAfoose DA. Treatment of hypertension in aviators: a clinical trial with aldactazide. *Aviat Space Environ Med* 1978;49:503-11.
- Glaister DH. Effects of beta blockers on psychomotor performance—a review. *Aviat Space Environ Med* 1981;52:S23-S30.
- Bennett G, O'Connor PJ. Medical wastage of military and civil aircrew in Great Britain 1963-1968. *Aerospace Med* 1970;41:550-2.
- Hill IR. Sarcoidosis: a review of some features of importance in aviation medicine. *Aviat Space Environ Med* 1977;48:953-4.
- Hopkirk JAC, Pullen MJ, Fraser JR. Pleurodesis: the results of treatment for spontaneous pneumothorax in the Royal Air Force. *Aviat Space Environ Med* 1983;54:158-60.
- Pettyjohn FS, Spoor DH, Buckendorf WA. Sarcoid and the heart—an aeromedical risk. *Aviat Space Environ Med* 1977;48:955-8.
- O'Connor PJ. Psychiatry and neurology in aviation medicine. In: Dhenin G, ed. *Aviation medicine*. Vol 2. London: Tri-Med Books Ltd, 1978:227.
- Sekuler R, Kline D, Dismukes K, eds. Aging and visual function of military pilots: a review. *Aviat Space Environ Med* 1982;53:747-58.
- Raffle A, ed. *Medical aspects of fitness to drive—a guide for medical practitioners*. 3rd ed. London: Medical Commission on Accident Prevention, 1976:70.
- Reighard HL, Mohler SR. Some aspects of sudden incapacitation due to cardiovascular disease. *Aerospace Med* 1967;38:1273-5.
- McNair DM. Anti-anxiety drugs and human performance. *Arch Gen Psychiatry* 1973;29:609-17.
- Borland RG, Nicholson AN. Comparison of the residual effects of two benzodiazepines (nitrazepam and flurazepam hydrochloride) and pentobarbitone sodium on human performance. *Br J Clin Pharmacol* 1975;2:9-17.
- Nicholson AN, Stone BM. *Handbook for flight medical officers*. AGARDograph No 270(E). Neuilly-sur-Seine, France: NATO Advisory Group for Aerospace Research and Development, 1982.
- Petursson H, Lader MH. Withdrawal from long-term benzodiazepine treatment. *Br Med J* 1981;283:643-5.
- Subhan Z, Hindmarch I. The effects of midazolam in conjunction with alcohol on iconic memory and recall. *Neuropsychobiol* (in press).
- Nicholson AN, Baird JA. Human factors of air operations in the south Atlantic campaign. Paper presented at the joint RSM-RCS symposium: Falkland Islands campaign—medical lessons, 1983 (in press).
- Snaith RP, Hindmarch I, Standing VF. Psychotropic drugs and road accidents. *Br Med J* 1977;2:263.
- Clarke CH, Nicholson AN. Performance studies with antihistamines. *Br J Clin Pharmacol* 1978;6:31-5.
- Clausen P. EA-6B Crash on Nimitz attributed to pilot error. *Aviation Weekly and Space Technology* 1982;117:22-3.
- Nicholson AN. Effect of the antihistamines, brompheniramine maleate and triprolidine hydrochloride, on performance in man. *Br J Clin Pharmacol* 1979;8:321-4.
- Nicholson AN, Stone BM. Performance studies in man with the H₁-histamine receptor antagonists, astemizole and terfenadine. *Br J Clin Pharmacol* 1982;13:199-202.
- Public Health Laboratory Service Malaria Reference Laboratory. Malaria prophylaxis. *Br Med J* 1983;286:787-9.
- Mayes RW. The extraction and identification of drugs in aviation toxicology. *Aviat Space Environ Med* 1982;53:332-5.
- Lacefield DJ, Roberts PA, Blossom CW. Toxicological findings in fatal civil aviation accidents, fiscal years 1968-1974. *Aviat Space Environ Med* 1975;46:1030-2.
- Saunders JB, Paton A. ABC of alcohol: alcohol in the body. *Br Med J* 1981;283:1380-1.
- Underwood-Ground KE. Liver pathology in aircrew. *Aviat Space Environ Med* 1982;53:14-8.

Is it possible for herpes simplex virus to be transmitted by a poorly sterilised vaginal speculum?

Since herpes virus is easily destroyed by simple methods of sterilisation (such as boiling), this problem should not normally arise in practice. Nevertheless, if by mistake a patient came into contact with an unsterilised instrument transmission might occur. It is uncertain how long the virus can survive on inanimate material,¹ but herpes simplex is a relatively hardy virus and in the presence of protein from vaginal secretions it might well survive on a vaginal speculum for an hour or possibly even longer.—JAMES OWEN DRIFE, senior lecturer in obstetrics and gynaecology, Leicester.

¹ Healey T. There's always a catch. *World Medicine* 1983;April 16:51-3.