Primary
prevention of
mental, neurological
and psychosocial
disorders

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Preface

In 1986, when it was becoming clear that effective and affordable measures could have a significant impact on the incidence of mental, neurological and psychosocial disorders, the Thirty-ninth World Health Assembly passed a resolution (WHA39.25) in which it asked the Director-General of the World Health Organization to prepare detailed guidelines on the prevention of these disorders. The Organization responded by producing a series of documents on various forms of mental disorder, revised and updated versions of which form the basis of this book. The reasons for choosing particular disorders are discussed in the opening chapter; let it be said here that they were chosen in the hope that the guidelines proposed for their prevention would not only be of great practical benefit, but would also point the way forward and serve as a model for efforts to prevent other disorders.

This book is intended to serve primarily as a handy reference book for policy-makers and professionals within and outside the medical sector who are in a position to help prevent mental, neurological and psychosocial disorders. As the book makes clear, primary prevention is not purely a medical matter — far from it. The contribution of doctors, nurses, midwives and other health workers is obviously extremely important, but vital preventive work can also be carried out by lawmakers, government departments, the police, administrators, educators, civic organizations (particularly women's organizations), engineers and many others. It is hoped that the book will encourage all these groups to intensify their efforts to prevent the disorders discussed here and tackle the root causes of other disorders using a similar approach.

A book of this nature depends greatly on the input and expertise of

many individuals. The contribution of Dr Giovanni de Girolamo, who reviewed the literature and prepared background documents and early drafts of the text, was particularly valuable. Dr John Orley carefully read and made comments on the final draft. The help of the following experts is also gratefully acknowledged:

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Dr José Manoel Bertolote

Editor

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CHAPTER 1

Principles of primary prevention

It is estimated that more than 1500 million people suffer from mental, neurological and pyschosocial disorders, a considerable proportion of which could be avoided by the use of effective, affordable and simple methods. In 1988 the Director-General of the World Health Organization (WHO), in response to a request of the Thirty-ninth World Health Assembly (contained in resolution WHA39.25), presented a report on the prevention of mental, neurological and psychosocial disorders (1), describing the size of the problem and presenting proposals for action. This book provides more detailed information and discusses ways in which some of the most important mental, neurological and psychosocial disorders can be prevented. It is intended that the preventive measures discussed in the book should act as guiding principles that can be adapted to suit local circumstances.

The book takes the following ideas as its starting point:

- Most mental and neurological disorders have multiple and interacting causes, with biological, psychological and sociocultural components.
- Preventive action should have a wide array of targets.
- Preventive action should be focused at the public-health level rather than the individual level.
- Whenever a difference in prevalence or incidence is found across comparable population groups, there is scope for primary prevention; the difference indicates the least that can be expected as a result of preventive action.

As will be seen in what follows, the effective prevention of mental and neurological disorders often falls outside the usual remit of mental health professionals (in fact, in many cases it falls outside the health sector altogether). This may be one of the reasons why many mental health professionals tend to underestimate the possibilities of primary prevention in their field. Perhaps they need to reconsider their potential role in primary prevention; for instance, they could develop their potential to act as advocates and advisers to professionals in other sectors. As Eisenberg (2) has put it, "what matters is not the mode of action of the agent, the venue in which it is applied, or the academic discipline of the practitioner, but the effectiveness of the measure in preventing diseases manifested by disturbances in mental function".

The concept of primary prevention

Throughout this document, "primary prevention" is used in the strict sense proposed by Leavell & Clark (3) to refer to methods designed to avoid the occurrence of a specific disorder or groups of disorders. It comprises those measures applicable to a particular disease or group of diseases in order to intercept their causes before they affect people, and should be differentiated not only from treatment and rehabilitation, but also from health promotion. The latter consists of "procedures employed in promoting health not directed at any particular disease or disorder but serving to further general health and well-being" (3), and is only one aspect of primary prevention. The distinctions drawn by Leavell & Clark between primary, secondary and tertiary prevention are shown in Annex 1.

When discussing primary prevention measures for mental, neurological and psychosocial disorders, a number of caveats should be kept in mind:

 Primary prevention efforts, especially in a sociocultural context, inevitably have implications for a number of conditions, in addition to the specific condition being targeted; that is, many of the conditions that predispose a person to one disorder are also implicated in other disorders. We cannot, at the outset, identify exactly who will manifest this or that disorder, if any. Therefore any recommendations for prevention have to be made within the context of a broadly based conceptual model. A notable aspect of the prevention of mental, neurological and psychosocial disorders is that relatively simple and inexpensive measures may have benefits extending far beyond the specific target.

- The many causes of mental, neurological and psychosocial disorders
 are highly diverse in origin, effect, timing and mechanism. There is
 no simple and quick solution to complex, multivariate social and
 health problems. Therefore comprehensive but culturally sensitive
 prevention plans must be tailored to specific causes and effects.
- Preventive activities must reflect an understanding that behaviour is a crucial factor. Effective prevention requires a change in the attitudes and behaviour of individuals as well as changes in systems.

Methodology

Given the impossibility of addressing the primary prevention of all forms of mental, neurological and psychosocial disorders, it was decided to select a number of disorders on the basis of the following criteria (4):

- Frequency: the incidence or prevalence of a condition.
- Severity: measured by mortality rates or by the degree of impairment, disability or handicap the condition causes to an individual, or by the burden it imposes on families, communities and society.
- *Importance*: the degree of concern expressed by the community or by health workers in relation to a given condition, irrespective of its severity.
- *Controllability*: a general measure of the existence of efficient, and hence efficacious and effective, interventions for specific conditions (see below for definitions of efficiency, efficacy and effectiveness). It is also a measure of the preventability of a condition.
- *Cost*: includes the cost of the physical facilities, equipment, supplies and personnel required for a specific intervention.

With these criteria in mind, the conditions chosen for consideration here are mental retardation, epilepsy, suicide and burnout in caregivers. An extensive review was carried out of the literature on each of these conditions. Where possible, only information obtained from sources adhering to internationally accepted scientific standards has been used in the book, and where the information was unexpected or apparently at variance with current knowledge, an effort has been made to obtain confirmation from other sources. In some instances, very little or no information could be found in relation to developing countries; epidemiological and etiological data for developing countries were particularly difficult to find. In cases where information from the so-called "fugitive literature" has been included, attention has been drawn to the fact. However, as a general rule it was preferred not to include unconfirmed findings.

Indicators

The following indicators are particularly useful in assessing preventive measures in the field of health, and are vital if misunderstandings and unrealistic expectations are to be avoided (5):

- Efficacy: the benefit or utility to the individual of the service, treatment regimen, drug or preventive or control measure advocated or applied.
- *Effectiveness*: the effect of the activity and the end results, outcomes or benefits for the population achieved in relation to the stated objectives.
- *Efficiency*: the effects or end results achieved in relation to the effort expended in terms of money, resources and time.

The example of contraception can provide a helpful illustration of the range and importance of these concepts. In terms of *efficacy*, the best and safest contraceptive method is total abstinence from sexual intercourse. In practice, however, the majority of the population may find this unacceptable or extremely difficult — if not impossible — to

achieve. Therefore the *effectiveness* of advocating abstinence as a contraceptive method is quite low and, from a public health perspective, its *efficiency* is negligible. Public acceptance and compliance (which are related to effectiveness) and costs (which are related to efficiency) seem to be the greatest limiting factors in the case of certain measures with an otherwise high degree of efficacy, as we shall see below. Of these three indicators, effectiveness has been proposed as the indicator of choice for the recommendation of preventive measures (6).

In any evaluation of preventive measures, it is also useful to take into account the source of evidence, some sources being more reliable than others. Some of the most important of them have been ranked as follows, in increasing order of reliability:

- the opinion of experts and respected authorities
- multiple time-series studies, with and without intervention
- well-designed cohort or case-control analytical studies
- well-designed controlled trials, without randomization
- at least one properly randomized, controlled trial.

Cost-benefit analysis

Cost—benefit analysis is one of the most important tools for assessing the efficiency of many health activities, including prevention. An effort was made to obtain all the information available on cost—benefits, but the information has not always been included here, for two reasons:

- 1. Information on health costs in general is in short supply: in fact, information on the cost of some preventive activities amounts to little more than guesses, and in many instances only partial costs are provided, which are of limited usefulness. Efficiency analyses cannot be based on guesswork or incomplete information.
- 2. As was to be expected, the little information on costs that is available comes from developed countries. Such information is of little benefit

if it cannot be compared with figures for developing countries or, indeed, with figures for other developed countries with different socioeconomic and health systems.

Cost—benefit analysis is only meaningful if real costs, from a real epidemiological and socioeconomic situation, are used. Health authorities are strongly urged to analyse the balance between targets and costs carefully in order to avoid setting standards which are either too high, and thus impossible to achieve with available local resources, or too low, and thus with no chance of making a significant impact on public health. Moreover, it should be remembered that not all costs and benefits can be measured in simple financial terms. Some effort must be made to address the ethical and humanitarian dimensions of costs and benefits, although there is as yet no precise model to follow when doing so.

Primary prevention

- Effective and affordable ways to prevent mental disorders already exist.
- Preventive action is not the sole preserve of the health sector
 — it also involves legislators, the media, women's organizations and many others.
- The ethical, humanitarian and cultural dimensions of preventive action should not be ignored.

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CHAPTER 2

Mental retardation

Mental retardation is a disorder that affects over 120 million people worldwide, often giving rise to severe lifelong disabilities. It is evident in a variety of conditions resulting from a wide range of causes: some authors have listed over 1000 separate causes of mental retardation (1), many of which can be prevented. Because of the sheer scale of the problem, the heavy burden that it imposes on the families of the mentally retarded and on health services, and the costs of care, every effort must be made to devise as effective a preventive programme as possible.

Definition

The following definition is given in *The ICD-10 classification of mental* and behavioural disorders (2, p. 226):

Mental retardation is a condition of arrested or incomplete development of the mind, which is especially characterized by impairment of skills manifested during the developmental period, which contribute to the overall level of intelligence, i.e. cognitive, language, motor, and social abilities. Retardation can occur with or without any other mental or physical disorder. However, mentally retarded individuals can experience the full range of mental disorders, and the prevalence of other mental disorders is at least three to four times greater in this population than in the general population. In addition, mentally retarded individuals are at greater risk of exploitation and physical/sexual abuse. Adaptive behaviour is always impaired, but in protected social environments where support is available this impairment may not be at all obvious in subjects with mild mental retardation.

The identification of mental retardation has been closely associated with the assessment of intelligence. A variety of tests over a long period have provided an enormous amount of information on the performance of children and adults of both sexes. Although most of the work on standardizing these tests has been carried out in developed countries, so that they cannot easily be applied in other countries, intelligence quotient (IQ) scores are still widely used in work on the classification, epidemiology and etiology of mental retardation. However, caution needs to be exercised in the use of IQ tests, as *The ICD-10 classification* notes:

Intelligence is not a unitary characteristic but is assessed on the basis of a large number of different, more-or-less specific skills. Although the general tendency is for all these skills to develop to a similar level in each individual, there can be large discrepancies, especially in persons who are mentally retarded. Such people may show severe impairments in one particular area (e.g. language), or may have a particular area of higher skill (e.g. in simple visuo-spatial tasks) against a background of severe mental retardation. This presents problems when determining the diagnostic category in which a retarded person should be classified. The assessment of intellectual level should be based on whatever information is available, including clinical findings, adaptive behaviour (judged in relation to the individual's cultural background), and psychometric test performance.

While it is certainly important to assess the IQ whenever possible by means of standardized individually administered intelligence tests for which local cultural norms have been determined, a sizeable proportion of the more severely retarded persons cannot be tested using standardized psychometric procedures. This is certainly true of severely retarded children in developing countries, and is probably also true of many adults in those countries, as well as children in developed countries.

Four different degrees of mental retardation are recognized in *The ICD-10 classification*. These are given here so as to avoid ambiguity and provide a sound clinical basis for the discussion that follows.

Mild mental retardation

- Mildly retarded people acquire language with some delay but most achieve the ability to use speech for everyday purposes, to hold conversations, and to engage in the clinical interview. Most of them also achieve full independence in self-care (eating, washing, dressing, bowel and bladder control) and in practical and domestic skills, even if the rate of development is considerably slower than normal. The main difficulties are usually seen in academic school work, and many have particular problems in reading and writing. However, mildly retarded people can be greatly helped by education designed to develop their skills and compensate for their handicaps. Most of those in the higher ranges of mild mental retardation are potentially capable of work demanding practical rather than academic abilities, including unskilled or semiskilled manual labour. In a sociocultural context requiring little academic achievement, some degree of mild retardation may not in itself represent a problem. However, if there is also noticeable emotional and social immaturity, the consequences of the handicap, e.g. inability to cope with the demands of marriage or childrearing, or difficulty fitting in with cultural traditions and expectations, will be apparent....
- If the proper standardized IQ tests are used, the range 50 to 69 is indicative of mild retardation.

Moderate mental retardation

Individuals in this category are slow in developing comprehension and use of language, and their eventual achievement in this area is limited. Achievement of self-care and motor skills is also retarded, and some need supervision throughout life. Progress in school work is limited, but a proportion of these individuals learn the basic skills needed for reading, writing and counting. Educational programmes can provide opportunities for them to develop their limited potential and to acquire some basic skills; such programmes are appropriate for slow learners with a low ceiling of achievement. As adults, moderately retarded people are usually able to do simple

practical work, if the tasks are carefully structured and skilled supervision is provided. Completely independent living in adult life is rarely achieved. Generally, however, such people are fully mobile and physically active and the majority show evidence of social development in their ability to establish contact, to communicate with others, and to engage in simple social activities. . . .

The IQ is usually in the range 35 to 49. Discrepant profiles of abilities are common in this group, with some individuals achieving higher levels in visuo-spatial skills than in tasks dependent on language, while others are markedly clumsy but enjoy social interaction and simple conversation. The level of development of language is variable: some of those affected can take part in simple conversations while others have only enough language to communicate their basic needs. Some never learn to use language, though they may understand simple instructions and may learn to use manual signs to compensate to some extent for their speech disabilities. An organic etiology can be identified in the majority of moderately mentally retarded people. . . . Epilepsy, and neurological and physical disabilities are also common, although most moderately retarded people are able to walk without assistance.

Severe mental retardation

- This category is broadly similar to that of moderate mental retardation in terms of the clinical picture, the presence of an organic etiology, and the associated conditions. The lower levels of achievement mentioned in [connection with moderate mental retardation] are also the most common in this group. [The main difference from moderate mental retardation lies in the fact that most] people in this category suffer from a marked degree of motor impairment or other associated deficits, indicating the presence of clinically significant damage to or maldevelopment of the central nervous system. . . .
- The IQ is usually in the range of 20 to 34.

Profound mental retardation

- The IQ in this category is estimated to be under 20, which means in practice that affected individuals are severely limited in their ability to understand or comply with requests or instructions. Most such individuals are immobile or severely restricted in mobility, incontinent, and capable at most of only very rudimentary forms of nonverbal communication. They possess little or no ability to care for their own basic needs, and require constant help and supervision. . . .
- ... Comprehension and use of language is limited to, at best, understanding basic commands and making simple requests. The most basic and simple visuo-spatial skills of sorting and matching may be acquired, and the affected person may be able with appropriate supervision and guidance to take a small part in domestic and practical tasks. An organic etiology can be identified in most cases. Severe neurological [impairments] or other physical disabilities affecting mobility are common, as are epilepsy and visual and hearing impairments.

Size of the problem

Table 1 shows the prevalence of mental retardation among children in developed and developing countries. The rates cannot be extrapolated over the whole range of age groups because persons with severe mental retardation have a much higher mortality rate than those who are in the normal intelligence range, and therefore are grossly under-represented in the higher age groups of the general population, even in developed countries; moreover, mild mental retardation is usually defined in

Table 1. Estimates of the prevalence of mental retardation among children below the age of 18

	Developed countries	Developing countries
All types of mental retardation	0.5–2.5%	4.6%
Severe mental retardation	0.3-0.4%	0.5-1.6%

terms of school performance and educability. A high proportion of those with mild mental retardation enter the workforce and may not continue to require or receive any special services in adult life. Hence the prevalence of both severe and mild retardation falls in the adult age groups, though largely for different reasons.

The disorder is frequent in both developed and developing countries; higher frequencies are found in the latter, although we do not have many reliable estimates concerning the overall prevalence of the different types of mental retardation in developing countries. The data on severe mental retardation among children in developing countries in Table 1 are taken from a multicentre study carried out in eight developing countries (3); given the limited sample on which they are based, they should be considered as tentative estimates. It can be seen that severe mental retardation represents only a fraction of all cases of mental retardation. As regards the prevalence of severe mental retardation in developed countries, three to four cases per 1000 children have consistently been found in studies conducted in the last 20 years. As regards incidence, in developed countries the rate for all the different etiologies combined, including rare conditions, and all cases of children with an IQ below 70, is about 10 per 1000 births (4).

Many prevalence studies have reported higher rates of mental retardation for men than for women (5), while most research has clearly identified an inverse relationship between socioeconomic status and the level of intellectual functioning in cases of mild mental retardation (5, 6). Some studies have also pointed to relatively high rates of severe retardation among groups in the lower social classes, which is hardly surprising given that a number of important risk factors are known to be class-linked (see Table 2).

Although it is not clear how many cases of mental retardation could be prevented in developed countries (because the figures for these countries already include the reductions achieved by ongoing preventive measures), we could reasonably expect to reduce the rates in developing countries to at least the levels currently found in developed countries.

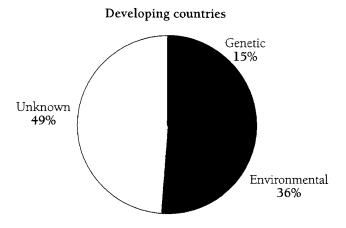
Etiology

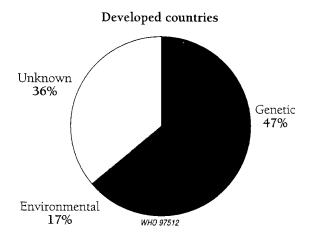
As mentioned above, mental retardation is found in a wide range of conditions resulting from many causes. The correct identification of the etiological factors involved in mental retardation is a vital step in any primary prevention programme. Table 2 shows the main causes of mental retardation at different phases of human life: Fig. 1 broadly compares the causes of mental retardation in developed and developing countries. On the whole, nearly three-quarters of all cases of severe mental retardation in developed countries are prenatally determined (4). In approximately a quarter to a third of the children in any randomly selected group of severely mentally handicapped children it is impossible to attribute a definite cause to the impairment

Table 2. Main causes of mental retardation

Prenatal		Perinatal	Postnatal
Genetic	Damage to the fetus		
Chromosomal abnormalities Down syndrome Fragile X syndrome	Infections (e.g. rubella) Intoxication (e.g. alcohol) Physical damage Placental dysfunction	Birth asphyxia Complications arising from prematurity Kernicterus	Injury (e.g. accidents, child abuse) Intoxication (e.g. lead,
Metabolic disorders Disorders of: amino-acid metabolism (e.g. phenylketonuria) urea cycle lipid metabolism carbohydrate metabolism purine metabolism	Endocrine disorders (e.g. hypothyroidism)	Intraventricular haemorrhage	mercury) Infections (e.g. encephalitis, meningitis)
Brain malformations Neural tube defects Hydrocephalus Microcephaly			

Fig. 1. Causes of mental retardation in developed and developing countries





underlying the handicap. However, as our knowledge of the specific causes of mental retardation, such as the fragile X syndrome, continues to progress, we can expect to see a reduction in the number of cases in which the cause of the impairment is unknown.

Preventive measures

Table 3 shows the relative contribution of the main causes of severe mental retardation to the total number of cases in developed and developing countries, together with an estimate of the proportion of cases which could be prevented if appropriate preventive measures were taken.

It is estimated that 14% of all cases of mental retardation in the developed countries, and 15% of cases in the developing countries, are preventable. In the developed countries, up to 16% of cases attributed to genetic factors and 40% of cases attributed to environmental factors could be prevented, while in the developing countries, up to 20% of cases attributed to genetic factors and 27% of cases attributed to environmental factors could be prevented. As will be seen in detail in the following sections, many sectors, in addition to the health sector, can be effective in the prevention of mental retardation. They include women's organizations, civic associations, teachers, journalists, parliamentarians, jurists, politicians, the traffic authorities and environmental officers.

Table 3. Causes of severe mental retardation (as a percentage of the total number of cases) and percentage of preventable cases

Causes	Developed	Developing	Preventable
	countries	countries	cases
	(%)	(%)	(%)
Genetic factors Chromosomal abnormalities Down syndrome	43–52	7–23	12–25
	15–40	ND	ND
	10–32	ND	ND
Other prenatal factors Prenatal infections Fetal alcohol syndrome Iodine deficiency ^a	1-40	13–55	5–50
	1-10	ND	5–20
	20-40	ND	50
	1-40	1–40	ND
Postnatal factors (infection, trauma, toxication)	2–15	18–20	4
Unknown/unexplained	25-47	9–53	NA

^a Iodine-deficient areas only.

ND. not determined.

NA, not applicable.

Since it is unfortunately impossible to prevent all cases of mental retardation, this book will focus on four etiology-specific types of mental retardation, namely, that due to iodine deficiency, Down syndrome, fetal alcohol syndrome and phenylketonuria. These types were chosen on the basis of their relative frequency and the availability of preventive measures of proven efficiency. One highly pertinent question is to what extent the incidence of mental retardation at birth could be reduced by general preventive measures and health promotion aimed at improving women's health, particularly during the earlier stages of pregnancy. There is strong evidence to suggest that improving women's health is a vital aspect of prevention, even though we cannot yet evaluate its effect on the frequency of particular forms of impairment such as brain malformation or placental dysfunction. For this reason, further evaluative research is urgently needed.

■ Iodine deficiency

Recent studies consider the mental defects due to iodine deficiency as part of a spectrum of the effects of iodine deficiency on growth and development which have been grouped together under the name "iodine deficiency disorders" (7). They occur either in a neurological form, characterized by mental retardation, deaf-mutism, spastic diplegia and squint, the absence of clinical hypothyroidism and the lack of response to thyroid hormones, or in a myxoedematous form, characterized by severe mental retardation, dwarfism and responsiveness to thyroid hormones. The neurological form is characteristic of the endemic iodine deficiency disorders found in many parts of the world, notably in China, India, Indonesia, Nepal, Papua New Guinea and South America. The myxoedematous form is characteristic of the Democratic Republic of the Congo. Mixed forms are also seen.

Maternal iodine deficiency is also associated with an increased incidence of other congenital abnormalities, stillbirth, miscarriage and low birth weight, which can be reduced by iodine supplementation.

Size of the problem

Iodine deficiency is a significant cause of mental retardation in both developed and developing countries. It is estimated that between 600 and 1000 million people are at risk of iodine deficiency in various regions of the world, mostly in developing countries; one study puts the figures at 710 million in Asia, 227 million in Africa, 60 million in Latin America and 20–30 million in Europe (8). At least 200–300 million of them have goitre or some other demonstrable consequence of iodine deficiency, and at least 6 million suffer from severe consequences of iodine deficiency. The most severe iodine deficiency occurs in inland mountainous areas, far from the sea, such as the Alps, the Andes or the Himalayas. However, iodine deficiency is not confined to mountainous regions; it has also been associated with areas exposed to frequent flooding. In areas of iodine deficiency, 1 in 10 neonates is affected by mental retardation caused by the deficiency, and there are small pockets where the figure reaches 1 in 4.

Etiology

Neonatal hypothyroidism is particularly serious for its consequences on brain development; the term "cretinism" refers to the severe consequences of hypothyroidism occurring at the fetal or neonatal stage and is characterized by severe mental retardation. The occurrence of cretinism increases significantly when the mother's daily intake of iodine falls below $20\,\mu g$ (the normal daily intake for adults being $80{\text -}150\,\mu g$) and excretion of iodine in urine falls to $25\,\mu g$ or less per day (the normal level being $80{\text -}150\,\mu g$ per day with a normal dietary intake). The excretion of iodine in urine depends on plasma iodine and is a good indicator of the level of intake.

In the fetus, a low level of circulating iodine seems likely to be the critical factor. However, iodine deficiency probably also has some effect on the mental functioning of older children and adults, because of the reduced level of circulating thyroxine.

Iodine deficiency also causes swelling of the thyroid gland, termed simple or non-toxic goitre. Goitre, especially when it affects more than 50% of an adult population, is a reliable indicator of an iodine deficiency that is sufficiently severe to cause frequent births of disabled children. The prevalence of goitre and the levels of urinary excretion of iodine are the two most valuable indicators of the severity of iodine deficiency in a given area.

Preventive measures

Only the use of iodine *before* pregnancy by prospective mothers in areas at risk can fully protect the developing fetus during the first trimester. Cretinism due to iodine deficiency does not respond to oral iodine supplements after birth. Salt iodization is usually the major preventive measure.

Once an iodine deficiency has been identified at a national or regional level, a programme must be developed to deal with it (8). The primary responsibility for developing the programme will almost always lie with the government, usually at national level, although in large countries with wide geographical or cultural variations a regional approach might be more appropriate. The governmental or regional agency responsible for public health or nutrition should take the lead in planning and implementing the programme, providing the necessary scientific and public health expertise.

In countries severely affected by the problem, a national committee for the prevention of iodine deficiency disorders should be set up. It should include representatives of the ministries responsible for health, education and the salt industry, local government organizations, nongovernmental health personnel, nongovernmental civic groups and the iodine-deficient communities themselves. An analysis needs to be carried out to determine the location and severity of the iodine deficiency and any factors which might affect the choice of intervention measures, particularly those relevant to the salt industry. On the

basis of this analysis, a plan can be developed that is appropriate to the specific conditions in a given country. The plan might include, for instance, legislation on salt iodization and the provision of adequate finance.

Salt iodization

Salt is an ideal vehicle for the addition of a micronutrient such as iodine, and therefore salt iodization will usually be the major preventive intervention in most programmes. However, the introduction of iodized salt is no small undertaking; it requires the full participation of all groups concerned with the production, marketing and consumption of salt. In many areas, it may be necessary to legally enforce the use of iodized salt; in fact, in many rural communities in the developing world, salt may be the only commodity introduced from the outside.

The main reasons for choosing salt iodization to prevent iodine deficiency disorders are that it provides a constant daily ratio of iodine that can be achieved without the need for trained health personnel or direct contact with every individual concerned, and its administration is very cheap, costing only 2–6 cents (in US\$) per person per year in most cases.

The techniques for iodizing salt are simple and well established (8). At the simplest level, iodine is added to an appropriate amount of salt and mixed using appropriate techniques. The amounts are determined on the basis of the recommended daily intake of iodine (at least $150\,\mu g$) and average per capita salt consumption, which may vary from region to region, depending on factors such as the local climate or customs.

Although the successful implementation of an iodization programme may take several years, because it involves changes in the sale and distribution of salt, salt iodization should still be the ultimate goal of any programme to prevent iodine deficiency. WHO has been instrumental in assisting some 35 countries in their efforts to prevent iodine deficiency disorders by using iodized salt.

Water iodization

Another way to administer iodine on a mass level is to add iodine directly to drinking-water. Any programme to iodize drinking-water requires the close involvement of the regional and local authorities responsible for the water supply in a particular area (8). The simplest way to iodize water is to add sufficient iodine to drinking-water in a jar to ensure a daily intake of at least $150\,\mu g$ iodine. The iodine solution can be prepared locally and distributed in dropper bottles to household heads. In northern Thailand, some 8 million people have benefited from this approach.

The public water supply can also be iodized by diverting a small amount of the water through a canister containing iodine crystals and then reintroducing this iodized water into the main water flow. The main problem with this method is that most of the areas with a high prevalence of iodine deficiency disorders do not have proper water supplies, as they are generally remote mountainous or rural areas.

Iodized oil and Lugol's solution

Iodized salt is usually the preferred form of preventive treatment, but occasionally immediate prophylactic measures are necessary. In such cases, individuals can be treated with iodized oil, given either intramuscularly or orally, or with Lugol's solution (8). Oil injections are a feasible and practical way to control endemic iodine deficiency disorders: one injection of 2–4 ml of iodized poppy-seed oil will protect individuals at risk for 3–5 years. To prevent fetal iodine deficiency disorders, iodized oil must be administered before conception; even treatment in the first trimester of pregnancy is not fully effective. The disadvantage of injecting iodized oil is that it needs to be done by trained health personnel; moreover, there is some risk of communicable diseases (including AIDS) being transmitted if needles are not properly sterilized.

Iodized oil taken orally is not as efficient as injected oil because it is not stored in the muscles. Moreover, experience with administering

iodized oil in this way is limited, and precise guidelines for the optimal dose and duration of effect have not yet been established (8). It is thought that a single dose of 1 ml (480 mg iodine) will provide sufficient iodine for one to two years. However, some preliminary studies, including a recent, carefully conducted study in the Democratic Republic of the Congo, suggest that doses as small as 0.1 ml could be equally effective, at least for one year. The advantage of oral administration is that it avoids the need for syringes, needles and sterile techniques, and can be administered by a responsible person without any medical training. The average cost of a preventive programme using iodized oil is 10–25 cents (in US\$) per person per year.

The main problem with iodized oil programmes is that they require direct contact between the basic health personnel implementing them and each individual receiving the treatment. The number of people who can be treated in this way is limited, whereas salt iodization programmes provide far wider preventive coverage. Although the use of iodized oil is therefore best considered as an emergency measure to buy time while steps are taken to iodize salt (and, in fact, may only be necessary for women of child-bearing age), it is nevertheless an effective measure. In Indonesia, for example, an iodization programme involving the use of iodized oil injections and iodized salt was found to reduce the rate of affected children aged 7–16 from 7% to almost zero. Other preventive programmes using iodized oil have been implemented in the Democratic Republic of the Congo and Nepal.

Iodine can also be administered orally in the form of Lugol's solution. The great advantages of Lugol's solution are its wide availability and low cost. It also provides a dose that is closer to physiological needs than the large one-off doses in iodized oil. However, its duration of effect is considerably shorter than that of iodized oil, and repeated applications are needed. Although no precise guidelines for the optimal dose and duration of effect are available, it is generally thought that one drop of Lugol's solution (6 mg iodine) every 30 days is an appropriate dose.

Education

A very important but somewhat neglected component of programmes to prevent iodine deficiency is education. Many programmes in the past have introduced iodine supplementation measures without explaining to the target group or the other parties involved why it is so important to prevent iodine deficiency disorders. Unexplained interventions may meet with indifference or resistance and are frequently not sustained. An effective educational campaign to raise awareness of the problem should therefore be a major component of any control programme. The campaign should be aimed at politicians, decision-makers, health workers, workers in the salt industry and, most importantly, the iodine-deficient community itself. The educational approach chosen needs to be adapted to the community's customs and level of understanding.

■ Down syndrome

Human somatic, diploid cells contain 46 chromosomes in 23 pairs: 44 autosomes and 2 sex chromosomes. Genes are carried on the chromosomes; chromosomal anomalies are abnormalities in the structure or number of the chromosomes, thus involving many genes. Autosomal defects have a more severe and more generalized effect than do anomalies of the sex chromosomes. Down syndrome is the result of trisomy of chromosome 21. The condition is accompanied by a number of physical abnormalities. The characteristic face — usually round, with eyes slanting laterally upwards, the features close together in the centre of the face, the epicanthic folds and rather low, slightly simplified external ears — is well known to every general practitioner, nurse, midwife and even the general public. In general, people with Down syndrome are shorter than average and there is a distinct tendency to obesity in later childhood and adult life. The muscles lack tone in infancy, making the baby seem even more fragile to hold. Congenital heart lesions are present in one-third of cases.

Mental retardation is almost invariably present in Down syndrome. The cognitive development of children with Down syndrome occurs in a series of steps with intervening plateaux, rather than as a continuous linear development. However, even with early intervention and enrichment programmes, there is little evidence that children with trisomy 21 are able to develop cognitive powers such as abstract reasoning. Many children with Down syndrome can learn to read, and some have a reading accuracy as high as that of a normal 14-year-old, but their level of comprehension is much lower.

The incidence of emotional and behavioural problems in children with Down syndrome is higher than in the normal population, but lower than in children with a similar degree of mental retardation who show clinical evidence of brain damage. The verbal abilities of children with Down syndrome are more retarded than their performance and motor skills.

Size of the problem

Genetic causes are now the most common causes of severe mental retardation in developed countries, accounting for up to half of all cases (9); their exact importance in developing countries is unknown. Of the genetic causes of mental retardation, chromosomal abnormalities at present probably account for approximately 15–40% of all cases of severe mental retardation in developed countries. The combined results of six studies covering almost 60 000 live births reveal an overall incidence rate for infants showing chromosomal abnormalities of 6.2 per 1000 live births (9). The majority of these chromosomal abnormalities are cases of Down syndrome (or trisomy 21); these account for 10–32% of all cases of severe mental retardation in developed countries and a slightly smaller proportion in developing countries (10, 11).

In many countries the incidence of Down syndrome has dropped from about 1.7 to less than 1 per 1000 live births in recent years. This dramatic drop can be attributed to the decreasing percentage of infants born to women aged 35 and over, as there is a well established

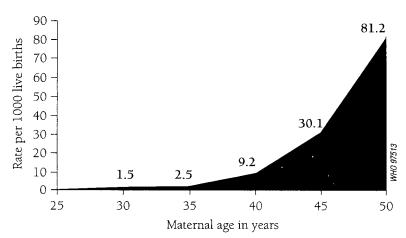


Fig. 2. Estimated risk of Down syndrome by maternal age (data from Gottesman (12))

relationship between the occurrence of Down syndrome and maternal age (see Fig. 2). The estimated risk of giving birth to a baby with Down syndrome for women aged 20–25 is about 1 in 2000, whereas in women aged 45 the risk is 1 in 30; for older women it is even higher. In addition, it has been shown that there is a higher than normal risk of such a birth if the mother is very young (below 16 years of age) or if the father is aged 50 or over. The mother contributes the extra chromosome in 75% of cases, while in about a quarter of the cases studied the extra chromosome had come from the father (13).

Although the incidence of Down syndrome is declining as a result of changing birth patterns and the use of selective abortion, its prevalence is increasing. This paradox arises because improved care has increased the longevity of such children at a rate that more than offsets the decline in incidence.

Preventive measures

The significant correlation between maternal age and the birth of a child with the most common chromosomal disorder, Down syndrome,

indicates the benefits to be obtained by reducing the number of pregnancies in older women. This method of primary prevention could reduce the number of children born with Down syndrome by up to 50%. It is therefore clear that careful birth planning represents an important preventive strategy in the case of Down syndrome.

In the case of children born to older mothers, techniques of prenatal diagnosis can be of great preventive value. Depending on national legislation, the identification of an affected fetus may allow selective abortion to prevent the birth of an affected child. For prenatal diagnosis of Down syndrome the most widely established technique is amniocentesis, to be performed at 15-16 weeks of pregnancy with the aid of continuous ultrasonography. Amniocentesis carries a risk of at least 1 in 240 of inducing a miscarriage but, in experienced hands, risks to the mother and child are minimized; the technique is useful in women over 35 years of age, a group that is particularly at risk of having a child with a chromosomal disorder. If, in countries where abortion is legally and culturally acceptable, all mothers aged 35 and over had amniocentesis, the incidence of chromosomal anomalies could be reduced by up to 30%. In the case of Down syndrome, which still accounts for a substantial number of cases of mental retardation, the effect of offering amniocentesis to all mothers over 35 might be a 10% reduction. The figure is estimated at 10% although only 4–7% of pregnant women are over 35, because of the increased incidence of aneuploidy, especially trisomy 21, in children born to mothers in this age group. Most of the reduction in incidence of Down syndrome that has already occurred is due to the reduction in maternal age. In considering the costeffectiveness of amniocentesis, its efficacy in detecting other congenital abnormalities, particularly neural tube defects, should also be taken into account.

Alpha-fetoprotein may be measured in the maternal serum as well as in the amniotic fluid obtained through amniocentesis. The fluid obtained may be analysed in three ways: by measuring proteins such as alpha-fetoprotein or other metabolites in the supernatant fluid; by analysing the chromosomal constitution of the cultured fetal cells; and by carrying out a biochemical analysis (especially enzyme assay and DNA analysis) of the cultured fetal cells. Pregnancies affected by trisomy 21 generally show lower levels of alpha-fetoprotein in maternal serum than normal pregnancies, and this information can be combined with maternal age to produce risk figures for each pregnancy.

Amniocentesis and the associated techniques of prenatal diagnosis are expensive and require advanced technology, but they can be used very effectively for appropriate screening and referral where resources permit.

Fetal alcohol syndrome

Concern about the effects of drinking during pregnancy dates back to ancient times. In Sparta and Carthage, couples were prohibited from drinking on their wedding night in order to protect any children conceived at that time. In one of the first scientific studies on the topic, conducted in 1899 by Sullivan among women in a prison in Liverpool, the author indicated that "the death rate amongst children of inebriated mothers was nearly two and a half times that amongst the infants of sober women of the same stock" (14). Since then, concerns have sometimes been expressed by physicians about the harmful effects of alcohol during pregnancy, and there was renewed interest in the subject in the late 1950s. However, it was only in 1968 and 1973, respectively, that Lemoine et al. and Jones & Smith independently described in detail a syndrome provoked by excessive alcohol intake during pregnancy, particularly in the first trimester, and called it "fetal alcohol syndrome" (FAS) (15, 16). The syndrome is characterized by mental retardation, abnormalities in the central nervous system, growth retardation, and craniofacial and cardiac abnormalities.

Specific criteria for the diagnosis of FAS were suggested in 1980 by a study group of the Research Society on Alcoholism in the USA.

According to these criteria, FAS should only be diagnosed when the patient shows signs in each of the following three categories:

- 1. Prenatal or postnatal growth retardation (weight, length or head circumference below the tenth percentile when corrected for gestational age).
- 2. Central nervous system involvement (signs of neurological abnormality, developmental delay or intellectual impairment).
- 3. Characteristic facial dysmorphology, with at least two of the following signs:
 - (a) microcephaly (head circumference below the third percentile);
 - (b) micro-ophthalmia or short palpebral fissures;
 - (c) poorly developed philtrum, thin upper lip or flattening of the maxillary area.

Retarded growth in weight, length and head circumference, both before and after birth, is the most common sign of FAS. Despite the association found in some studies between prematurity and maternal alcohol use, the observed growth retardation is not merely a reflection of prematurity. Infants affected by the syndrome are in fact significantly smaller than non-affected infants even after adjustment for gestational age. Postnatally, growth retardation persists even though nutrition is adequate and the environment is stable. Most recently, computerassisted quantitative morphometric techniques have been employed to refine the diagnostic criteria for FAS. Since infants affected by the syndrome are likely to be of low birth weight, and this represents a major risk factor for infant mortality, they are, like all babies of low birth weight, on average 40 times more likely to die in the first month of life than normal-weight babies. Additionally, it has been estimated that the risk of miscarriage is markedly higher for women who ingest more than 30 g of ethanol per day, or the equivalent of about two drinks.¹

However, although FAS is a clinically recognizable syndrome,

¹ Throughout this section, a drink is considered to be roughly equivalent to a simple measure of spirits, a small bottle or can of beer, or a glass of wine.

the diagnosis is not based on a single distinctive feature or on any laboratory test, and it may not always be determined in the neonate. Neurological impairment, and particularly mental retardation, may not be noticed until the child's cognitive skills are tested and developmental delay becomes apparent at one or two years of age. Mental retardation, attention deficits, delays in motor development, hyperactivity and sleep disturbances have all been observed in infants with FAS. In one study, infants born to mothers who reported consuming two or more drinks a day during pregnancy had, on average, a 7-point decrement in IQ at the age of seven. The severity of a child's mental disorder appears to correspond to the severity of the facial dysmorphology, and this can have important prognostic implications: children with severe facial dysmorphology often show little improvement over time, whereas those with milder facial anomalies respond more favourably to therapeutic interventions. The nature and extent of the abnormalities are related to blood alcohol levels and the gestational stage of exposure.

Children who demonstrate the signs of FAS often display other less specific malformations, involving the eyes, ears, nose and throat, as well as the cardiovascular, genito-urinary and musculoskeletal systems.

Some children show some of the signs associated with the syndrome, but not signs from all three of the categories required for a diagnosis of FAS; the term "possible fetal alcohol effects" (FAE) has been used to describe their condition. The most commonly observed anomaly is growth retardation, but learning disabilities, behavioural problems and a variety of other problems have also been observed. The risk of having a child with FAE has been estimated at 10% for women reporting between two and four drinks per day, and 19% for those averaging over four drinks. In one study, four-year-old children classified as having FAE at birth had IQ scores of over 6 IQ points (two-thirds of a standard deviation) below the rest of the sample, after adjusting for other risk factors (17). However, it is possible that other risk factors, including smoking, malnutrition, drugs and genetic factors, are implicated in FAE. The incidence rates of

FAE (or alcohol-related birth defects) are difficult to determine, since the adverse effects on the infant often cannot be directly attributed to alcohol exposure. However, it appears likely that FAE occurs far more frequently than FAS: it has been estimated that FAE occurs approximately three times more frequently than FAS in the general population, and nearly four times more frequently in the alcohol-abusing population (17).

Size of the problem

Early estimates of the incidence of FAS were in the range of 1-3 cases per 1000 live births. Abel & Sokol (17), basing their estimate on 20 studies from Australia, Europe and North America, which covered a total of over 88 000 births, found a rate of 1.9 cases of FAS per 1000 live births; rates were higher in the USA (2.2 per 1000) than in Europe (1.8 per 1000), and higher in retrospective studies (2.9 per 1000) than in prospective studies (1.1 per 1000). These figures suggest that FAS is one of the commonest causes of mental retardation, ranking ahead of Down syndrome and spina bifida. There are some population groups which seem to bear a disproportionate share of morbidity related to the syndrome: for instance, in the USA, rates of FAS among American Indians on reservations and black people are, respectively, 33 and 7 times higher than among white people. FAS is also more common among women of low socioeconomic status. The United States Department of Health and Social Services has provided precise data on the incidence of the syndrome and has estimated that between 1800 and 2400 infants are born with FAS every year, and that a further 36 000 pregnancies are affected by FAE.

Since FAS is a consequence of a specific behavioural pattern in pregnancy, that is, alcohol abuse, it is useful to estimate the overall prevalence of the baseline condition. In the USA, the average incidence rate of alcohol abuse among pregnant women has been estimated to be about 3.2% (17). Female heavy drinkers are over-represented in the 18–24 age group. Among pregnant women who abuse alcohol, the

incidence rate of FAS rises dramatically, ranging from 21 to 83 per 1000 live births. In the United Kingdom, two national surveys have identified a group of women of childbearing age among whom 8% were drinking 4–6 drinks a week and 3% were drinking 7–13 drinks per week (18). The latter women are at risk of having a child with FAS.

As a guide, it has been suggested that about one-third of children born to mothers who are chronically dependent on alcohol will have diagnosable FAS; perhaps twice that many will have some fetal effects of alcohol.

Risk factors

A number of antecedents and precursors of alcohol abuse have been determined and they can be valuable for the identification of people, including pregnant women, at risk of subsequent alcohol abuse. The most frequently reported risk factors are:

- a family history of dependence on drugs, alcohol or tobacco
- a broken home (e.g. divorced parents)
- a low income and low socioeconomic status
- association with peers who are dependent on drugs or alcohol
- poor working conditions.

As a result of genetic characteristics, familial pattern or long-term behavioural patterns, an individual with a family history of dependence on drugs, alcohol or tobacco is more likely to develop an alcohol-related problem. For example, the children of alcohol-dependent parents have a risk of alcohol abuse three to four times greater than others, even if reared apart from their alcohol-dependent parents. While the above-mentioned risk factors have been identified for alcohol abuse in general, there have been studies focusing on specific risk factors for FAS (19). The other factors ascertained include:

- black race
- · frequent beer drinking
- · lower maternal weight and weight gain.

Typical heavy-drinking pregnant women tend to be older, multiparous and smokers, with a high incidence of divorce and separation.

Etiology

Prenatal alcohol exposure is the cause of mental retardation seen in FAS and hence one of the leading known causes of mental retardation in industrialized countries. Although the lower limit of safe alcohol consumption during pregnancy has not been determined, it is clear that most known adverse effects in infants are associated with heavy maternal alcohol use. It is now well established that drinking more than five drinks a day can result in a child being born with FAS. There is also evidence that bouts of uncontrolled drinking ("binge drinking"), especially if associated with smoking, may harm the fetus. In general, prenatal alcohol exposure is associated with a continuum of risks: the more the mother drinks during pregnancy, the higher the risk of her having a baby with fetal alcohol effects. It also seems that the most critical period for alcohol teratogeny is around the time of conception.

Other factors in conjunction with the amount of alcohol intake may influence vulnerability to alcohol's teratogenic actions. These factors, including maternal age, social class, use of tobacco or illegal drugs, use of medicines, obstetric history and diet, may explain why some infants are spared while others are damaged by heavy drinking during pregnancy. Moreover, women who drink heavily often have a poor diet and are multiple substance-abusers, so that it is difficult to determine the precise contribution of alcohol to each case of abnormality.

Preventive measures

Because drinking is a learned behaviour, women's use of alcohol during or just before a pregnancy cannot be divorced from an understanding of their use of alcohol at other times or from how other women, or indeed society at large, use alcohol. Therefore a health prevention strategy for this particular type of alcohol abuse must be firmly linked to a general strategy for all alcohol abuse. Alcohol abuse is a major public health problem in many countries of the world, and a major cause of medical and psychiatric morbidity and mortality. The importance of adequate government policies to deal effectively with alcohol-related problems has been stressed several times by WHO, which has prepared several documents to advise governments on the most effective policies for reducing alcohol-related morbidity and mortality (20–22). The reader is referred to these documents for a more general discussion of the problems related to alcohol abuse.

It is clear that government policies related to alcohol consumption and abuse will have a direct impact on FAS. Regulatory codes are certainly an important tool for the prevention of alcohol-related problems, and should focus on the following areas:

- density of sales outlets (e.g. number and location)
- opening hours of sales outlets, or times when alcohol can be sold
- pricing and taxation of alcoholic beverages
- local options, such as allowing local authorities to determine whether or not alcohol is sold, depending on the level of alcohol abuse in their area
- advertising restrictions
- regulations that state conditions of sale (e.g. not to be sold to pregnant women or intoxicated people).

In some countries, significant initiatives have been taken by governments to tackle the problem of alcohol abuse in pregnancy. In the USA, for instance, recent legislation has required state health departments to report on the incidence of FAS as one of their duties in the field of maternal and child care. Moreover, a 50% reduction in the incidence of FAS among population groups reporting a disproportionately high rate (the current rate for American Indians and indigenous Alaskans is 4 per 1000 live births, and for black people 0.8 per 1000 live births) has recently been made an official objective of preventive health policies. In the same country, the 1981 Surgeon General's advisory, which

recommended abstinence from alcohol during pregnancy, bolstered educational efforts. In addition, since November 1989, it has been unlawful in the USA to manufacture, import or bottle any alcoholic beverage unless the container in which it is sold carries a warning about the risks of drinking while pregnant. Future research should assess whether this requirement has any impact on knowledge, attitudes or behaviour related to alcohol consumption during pregnancy. In the meantime, an official warning from a public health authority recommending that women abstain from alcohol when planning a pregnancy and during pregnancy is a major step forward in the implementation of preventive policies at government level.

In the case of FAS, the main reason for emphasizing prevention is that studies have shown that reduction of alcohol intake in pregnancy, particularly if started in the first trimester, does lead to improved fetal growth and brain development. Unfortunately, although many women, including alcohol-dependent women reduce their alcohol intake in early pregnancy, they often do not maintain the reduction for the rest of the pregnancy.

Because of the severe problems associated with alcohol abuse in pregnancy, it has been suggested that prenatal abuse of alcohol (as well as of other drugs) should be regarded as child abuse and neglect. This suggestion has led to controversial discussions on fetal rights and maternal rights, the right of the woman to have treatment for alcohol-dependence before becoming subject to legal sanctions, and appropriate mechanisms for intervention. If a woman is clearly abusing alcohol during pregnancy, local health and social services should make every effort to safeguard the child's health.

Action in the health sector

Medical settings are a focal point for preventive action related to alcohol problems in pregnancy, since pregnancy is for most women a time in their life when they have intensified, frequent contacts with health services and health personnel. The detection of medical and psychiatric

problems which can harm the fetus is a priority for the health services responsible for pregnant women. However, it should be noted that, because of a variety of psychosocial factors, antenatal clinics often fail to attract the very women who are at greatest risk, such as the very young, those with little education, women from lower socioeconomic classes and women from ethnic minorities. Outreach services should therefore be set up and special efforts made to facilitate and increase the contact between these population groups and maternal and child health services. In some countries (e.g. France, Sweden) financial benefits for the pregnant woman and young mother are dependent on attendance for antenatal and postnatal care.

Screening and early identification are particularly effective in dealing with a condition such as FAS, which is amenable to preventive measures. All women under medical care during pregnancy should be screened for alcohol problems. As many of the women at risk of FAS go unrecognized in antenatal clinics, screening is of fundamental importance. The introduction of a screening programme in a Swedish clinic increased the percentage of heavy drinkers recognized from 1% to 21% of patients per year (23). Sokol & Clarren have developed a simple and brief questionnaire for detecting heavy alcohol use in pregnant women (24). The test instrument, referred to as T-ACE (from the four test questions, which are on tolerance, annoyance, cutting down and "eye-openers"), was found to identify correctly 69% of the "risk drinkers" (defined as those consuming two or more drinks per day) in a cohort of 971 pregnant women. Moreover, the T-ACE test was found to be superior to other standard instruments used for detecting alcohol abuse, such as the MAST and CAGE tests, in identifying risky drinking behaviour. Because the test is brief, it could be easily used for screening purposes in antenatal clinics and by obstetricians and gynaecologists. Pending further validation with other sample populations, the widespread application of this simple test might contribute significantly to better risk identification, appropriately targeted prevention efforts and improved pregnancy outcomes.

Another simple screening test that allows people with alcohol problems to be easily recognized is the Alcohol Use Disorders Identification Test (AUDIT), developed by WHO (see Annex 2) (25). Although it has not yet been tested on pregnant women, it may prove useful in identifying women at risk. Another widely used screening instrument is the Ten-Question Drinking History (TQDH) developed by Rosett et al. (26) to assess the frequency of alcohol use and the amount of alcohol used. These screening instruments for the identification of pregnant women who abuse alcohol are especially important because, although damage in the first trimester may be irreversible, there is always an "opportunity for catch-up growth and physiologic restitution" at whatever stage the woman stops drinking (24).

It is important to determine whether women who drink throughout pregnancy can be differentiated from those who discontinue alcohol use at some time during pregnancy. The best predictors of continued drinking throughout pregnancy have been found to be the length of drinking history, reported tolerance to alcohol, a history of alcohol-related illness, and a preferred social context of drinking with other family members (27). The importance of identifying and targeting these high-risk women for intensive prevention efforts is perhaps best underscored by the fact that pregnancy outcome was found to be significantly compromised — that is, there was greater frequency of intrauterine growth retardation, dysmorphology and neurobehavioural alterations — in women who continued to drink throughout pregnancy in comparison to non-drinkers and those who discontinued drinking at some time during pregnancy.

The use of a screening instrument for the detection of alcohol abuse among pregnant women can also help to increase awareness among health workers about alcohol-related problems among pregnant women. This is especially important considering that women abusing alcohol have often been ostracized and stigmatized, regarded as social outcasts, and left to produce one or more children suffering from mental impairment as a result of FAS or FAE.

If mild or moderate alcohol-related problems are identified through

screening or clinical care, action, beginning with counselling, should be taken immediately and its effects observed. The primary goal of intervention is abstinence or a substantial reduction in maternal alcohol consumption. Most health professionals have sufficient skills to provide supportive counselling focused on this goal and to provide practical help to pregnant women in difficult circumstances. Since many women who abuse alcohol are reluctant to talk about their drinking problem, the onus is on obstetricians, general practitioners, midwives, social workers and nurses who come into contact with women during pregnancy to recognize any drinking problems at an early stage. The very fact of being pregnant may motivate some women to overcome their alcohol problem. Group and individual therapy sessions, education about alcohol dependence and the teaching of parenting skills are the major components of the treatment of pregnant alcohol-dependent women. Treatment groups often offer an ideal format for learning to have sober close friendships with other women.

If serious problems persist, specialized treatment may be necessary. It has been suggested that pregnant women who do not modify their heavy drinking within two weeks of being identified as at risk should be referred to specialized treatment programmes (26). Some of the women at risk of alcohol abuse suffer from psychosis, depression, anxiety or other mental disorders and may become alcohol-dependent in an attempt to relieve those conditions. A high rate of coexistence of alcohol abuse and mental disorders has in fact been observed in many studies (28). Women who report stressful life events, and who may resort to alcohol in search of relief from anxiety, anger, boredom or loneliness, are also at risk. Special attention should therefore be given to these particular groups in antenatal clinics and during screening, and primary preventive efforts should be carefully targeted at them.

Modifications of other risk factors, such as smoking, poor diet and low weight gain associated with malnutrition, will reduce hazards to the fetus in a synergistic manner, and should be significant objectives of a preventive programme.

It should always be borne in mind that a pregnant woman with a perceived drinking problem presents as two patients, not one, and what is in the best interests of the woman is not necessarily in the best interests of the fetus. For instance, disulfiram, which is often prescribed for alcohol abuse, has been suspected of being a possible teratogen and therefore should not be prescribed for pregnant women.

Midwives have an especially important role to play in educating pregnant women, as they are often seen as more helpful than doctors. Personal advice given in the primary-care setting has proved to be effective in reducing drinking, and is even more useful if backed up by written material.

Finally, it should be kept in mind that alcohol is excreted in breast milk; pregnant women should be encouraged to abstain from drinking throughout the breast-feeding period.

Action in other sectors

Efforts to educate the public about FAS have resulted in widespread public awareness of the syndrome and the dangers associated with drinking while pregnant. It is particularly important to publicize the risks of drinking to women planning a pregnancy.

Several population surveys have found that although many people are aware of the increased risks associated with heavy drinking during pregnancy, there is a need to educate young adults on the specific harmful effects of alcohol intake during pregnancy. It is still unclear why some mothers continue drinking during pregnancy and others do not. They may be unaware of the implications, or they may not know how harmful low levels of drinking can be. Even if they are aware, this knowledge may not be translated into action. However, experience in the USA has shown that giving information about the effects of alcohol in pregnancy does have some impact over time on modifying levels of drinking both before and during pregnancy. Studies have shown that publicity is associated with reductions in drinking in certain groups of pregnant women, namely, better educated and older women who are

light or moderate drinkers (who are, in fact, more at risk of FAE than of FAS). Specific educational programmes have therefore to be targeted at special population groups at risk of FAS, especially women of low socioeconomic status with little education.

Educational strategies to prevent alcohol-related morbidity, including FAS, have to be integrated into an overall primary prevention plan. Unless a clear prevention policy exists, education efforts may produce conflicting messages which only confuse the target audience. In order to be effective, public education programmes have to be designed with the following factors in mind:

- the nature of the target audience (in this case pregnant women or women of childbearing age)
- the immediate relevance of the information to the target audience
- how best to convey the message to be got across (for instance, not to drink when pregnant)
- the mode in which the message is presented (which can vary from placing a warning label on the containers of alcoholic beverages, to making pamphlets available at food stores, in health clinics and doctors' offices, and to presenting messages on television and radio at times when the target audience is likely to be watching or listening)
- the language in which the message is presented
- the need for repetition of the message this is a crucial point for the success of any public information effort.

The use of written material, particularly leaflets, is a long established method for providing health information; in many cases they are distributed in general practices. The language used needs to be carefully chosen, and the material should contain practical suggestions on how to change behaviour (in this case, drinking habits). Other important initiatives to be undertaken include putting warning labels on alcoholic-beverage containers; placing signs at places where people purchase alcoholic beverages; ensuring effective media coverage; and providing a crisis line for information and referral, to act as a link

between the information transmitted in the public awareness campaign and the services available in the community.

Although the idea of relative risk is difficult to communicate, it should be remembered that exaggeration of the risk may result in women disregarding the warnings altogether. A sensible way to approach the problem would be to warn that drinking may cause adverse consequences, but without giving the impression that a single drink might result in FAS or FAE. It should also be made clear that it is never too late to reduce alcohol intake, and that the more that is drunk the more likely the baby is to be affected. The content should be scientifically accurate and should preferably give some indication of the evidence on which it is founded. The form should be straightforward and not likely to provoke unnecessary anxiety.

Women's groups and associations can play a major role in educational campaigns. They not only represent the most directly interested party, but they are also in a good position to identify the appropriate message, language and media of choice for specific groups.

Costs

FAS is a major public health problem; in the USA, it has been estimated that the economic cost of providing treatment for only some of the disorders related to FAS is about US\$ 321 million annually. The total cost of residential and support services for mentally retarded people in the USA in 1983 was about US\$ 11.7 billion, and it has been estimated that about 11% of these costs are due to FAS alone (17). It is therefore clear that a large amount of money could be saved by preventing FAS.

■ Phenylketonuria

Phenylalanine, while essential for human growth and development and present in all natural foods containing protein, may accumulate in the blood and urine when an individual is lacking in the liver enzyme phenylalanine hydroxylase (PHE) responsible for the catalysis of phenylalanine and its metabolites. It is this excess of phenylalanine or one of its metabolites which is thought to inhibit the biochemical processes needed for normal brain development. There are at least three types of this condition, of which only one (which is the most common) can be successfully prevented. Several investigators have suggested a link between the severity of damage resulting from phenylketonuria (PKU) and maternal blood PHE levels.

Reduced intelligence must be expected in 95% of untreated or late-diagnosed PKU babies. Besides mental retardation, common clinical symptomatology of PKU involves convulsions, hyperactivity and eczema; however, clinical diagnoses are rarely made before the child is six months old and usually only after there are obvious signs of mental retardation.

In many countries, neonatal screening permits early diagnosis of PKU so that brain damage can be prevented by means of a low-phenylalanine diet. Proper dietary management initiated before the child is four weeks old is highly effective in reducing mental impairment in patients with classical PKU. After that time, periodic laboratory monitoring of phenylalanine levels in the blood is helpful in ensuring that the diet provides the appropriate low amounts of phenylalanine.

A relatively recent problem is that many girls with PKU who received early treatment are now reaching childbearing age and are at risk of bearing children with mental retardation, microcephaly, congenital heart disease or low birth weight. These birth defects are a consequence of the maternal disorder and occur regardless of whether the child has PKU or not. Dietary control during pregnancy is an important preventive measure in these cases; it seems to offer at least partial and perhaps complete protection to the fetus, particularly if initiated prior to conception. It has been estimated that in the USA about 2700 women who are currently of reproductive age are at risk of delivering infants adversely affected by untreated maternal PKU.

Size of the problem

PKU is an autosomal recessive disorder. It is estimated that one person in 60 is a heterozygous carrier of the mutant. Although the worldwide incidence of PKU is approximately 1 in 12 000–15 000 births, it varies widely from country to country and even within countries (29). For instance, the incidence in Ireland has been reported as 1:4500 while the incidence in the Netherlands is approximately 1:26 000. Incidence variations also occur among ethnic groups within the same geographical area; for instance, PKU has been only rarely reported among black Americans and the incidence of PKU among Ashkenazic Jews in Israel is only 1:300 000.

Preventive measures

The above considerations have important implications for the discussion of prevention, as they demonstrate the link between the treatment of a disorder and the primary prevention of its most severe consequences, such as mental retardation. As stressed by Eisenberg (13), "Whether one labels metabolic screening plus dietary management primary or secondary prevention is, to some extent, arbitrary. That is, the newborn with galactosemia does have an inherited metabolic disorder that we are unable to reverse at the molecular level. However, although the genotype and the cellular phenotype remain unchanged, a lactose-free diet fully obviates all the deleterious consequences of the metabolic error, and normal development ensues. Clinical disease never becomes manifest and, in this sense, dietary management can be considered primary prevention."

An effective preventive programme for PKU should provide total coverage of the target population. Ideally, a national neonatal screening programme should be set up. Many countries have passed a law requiring neonatal screening, and regulations governing its implementation exist. For instance, in the USA, virtually all newborn infants since 1961 have been screened for PKU. Between 1961 and 1985, approximately 90 million newborn infants were screened for PKU (30).

Most neonatal screening programmes for PKU have developed in one of two ways. Either screening has been made mandatory by legislation or a pilot programme developed locally has expanded to become a much larger national programme. Either approach can be successful, the degree of success being directly related to the quality of planning. In order to implement a national screening programme for PKU, it is important to begin by gathering information which allows the programme organizer to:

- assess the expected incidence of PKU within the population
- determine the availability of, and mechanism for, securing the dietary products necessary for the treatment of PKU
- calculate the economic impact of case detection, including costsavings from not having to provide specialized care for the cases detected
- review procedures and identify facilities for laboratory analysis of specimens
- review specimen collection and transport problems relative to the local situation
- identify experts who are proponents of screening in order to form a nucleus of advisers with technical expertise
- determine revenue resources which might be tapped in order to support the screening programme
- develop a case register to monitor outcomes
- develop a specific plan (including the setting-up of a case register) to assist older women with disease management during childbearing years.

It is important to remember that screening is only the first step in the process, and without a properly functioning follow-up and treatment system it may do little more than create uncertainty and anxiety in parents. It is therefore vital that all those involved in the screening programme, from laboratories to health care providers (particularly those providing maternal and child care), collaborate closely to ensure that the programme is effective.

Action in the health sector

An essential step in the prevention of the brain-damaging effects of PKU is to use neonatal screening to detect the affected babies and to take the necessary preventive dietary measures immediately. Neonatal screening is routine in many developed countries, where all neonates are screened for a number of congenital disorders which can lead to mental retardation. However, screening programmes are of little or no value in the absence of a comprehensive follow-up programme to ensure that the infant at risk receives optimal care.

All infants under seven days old, regardless of prematurity, illness, feeding history or antibiotic treatment, should be screened for PKU. A blood sample is usually taken from the baby's heel and the screening test (originally developed by Guthrie) is carried out on dried blood spots on filter paper (31); blood phenylalanine levels are measured by bacterial inhibition or fluorescent assays, or in some cases by amino-acid analysis. A statistically determined cut-off value should be used for triggering follow-up serum testing such that test sensitivity allows a small number of "false positives" with a minimal number of "false negatives". Most screening programmes today use a value of 4 mg/dl (240 μmol/l) for this value. The sensitivity of testing is dependent on the level of phenylalanine used as a cut-off value and the age and protein intake of the patient at the time of testing. Testing infants below 24 hours of age and utilizing a 240 \mumol/l cut-off will result in 16% of cases being missed, while screening at 24-48 hours of age will result in only 2.2% of cases being missed; optimal screening should occur in infants older than 24 hours and below seven days of age. The specificity of the screening test is excellent, approaching 99%. About 1% of all tested babies prove to be false positives, and so confirmatory tests need to be carried out on those with positive results.

Blood phenylalanine levels in excess of $8\,\text{mg/dl}$ ($480\,\mu\text{mol/l}$) should be confirmed with serum tests as soon as possible, and certainly before the infant is two weeks old. Infants with levels of between

 $4\,\text{mg/dl}$ and $8\,\text{mg/dl}$ ($240\,\mu\text{mol/l}$ and $480\,\mu\text{mol/l}$) may be rescreened; however, if high levels persist, serum testing should be carried out. The possibility of tyrosinaemia or other non-classical forms of PKU, including biopterin deficiency, should not be overlooked. It is important to remember that many deliveries take place outside hospitals (mostly at home), especially in developing countries; in these cases it is important to ensure that community nurses visit the home and collect blood specimens, so that all babies at risk of PKU are identified immediately. This form of preventive community care is particularly valuable.

Infants with PKU should be on a special diet by the time they are three weeks old. Phenylalanine contributes approximately 3–5% of all protein and it is not possible to design a nutritionally adequate diet based only on natural foods that is sufficiently limited in total phenylalanine. Formulas very low in, or free of, phenylalanine are available to replace those foods that must be eliminated owing to their high protein/phenylalanine content (including milk, meat, fish, eggs, cheese and nuts).

For infants, there are dietary products which are based on a casein hydrolysate containing a small amount of phenylalanine, and other synthetic amino-acid preparations containing no phenylalanine. These products provide 80–90% or more of the child's requirements of protein, vitamins and minerals, and up to 75% or more of the child's energy needs. Care must be taken to ensure that adequate energy is provided by low-phenylalanine dietary sources of fat and carbohydrate. For young infants, fat in the form of corn oil and carbohydrates such as dextrose, dextrimaltose or preparations of glucose polymers should be added directly to the formula powder.

Solid foods are introduced at the normal age (4–6 months) and gradually substituted for the added milk or infant formula. Low-phenylalanine foods, including fruit, vegetables, small cereal and grain products, and a variety of special low-protein products, are allowed in small, measured amounts. Phenylalanine-free foods such as carbonated beverages and ice-lollies are allowed as needed for energy and at

parental discretion. In recent years, partial breast-feeding of infants supplemented by PKU formula has been successfully tried by a growing number of motivated mothers. Mature women's breast milk is significantly lower in phenylalanine (with a mean of $41\,\text{mg/dl}$: $2460\,\mu\text{mol/l}$) than infant formulas ($75\,\text{mg/dl}$: $4500\,\mu\text{mol/l}$) or cow's milk ($159\,\text{mg/dl}$: $9540\,\mu\text{mol/l}$), and it may be used to provide the phenylalanine traditionally provided by cow's milk or infant formula. Usually 2–4 breast feeds are possible, with supplemental formula feeds.

Nutritional deficiencies have rarely been observed in children on these formulas. Since dietary management is an essential part of the treatment, supplemental food products must be readily available to the child. In any case, the PKU screening system should incorporate some mechanism for dietary management. Wherever possible, nutritional or medical interventions should be included in the plan to ensure an optimal outcome.

Stabilized, normal phenylalanine values should therefore be assured by 4–6 weeks of age. The initial effect of dietary management should be closely monitored by means of serum phenylalanine measurements until phenylalanine levels are stabilized, at which point a schedule for periodic blood monitoring should be established.

A centralized laboratory capable of analysing at least 30 000–50 000 specimens should be considered. Larger capacities are acceptable, but laboratories analysing fewer specimens have traditionally missed a greater percentage of cases. Reliable standards, properly applied, and both external and internal quality assurance are indispensable. Screening for hypothyroidism may be coupled with screening for the less prevalent problem of PKU in order to increase the overall cost–effectiveness of screening.

A system must be in place whereby the person who receives the laboratory results performs follow-up testing (if necessary) and initiates, or refers patients for, treatment. Clear written guidelines must delineate that person's responsibilities, including contact protocols and documentation methodologies as well as a definition of the starting point and the end-point of the follow-up procedure. Treatment of the

disorder has been most effective, including in preventing brain damage, when it has combined medical and nutritional efforts, through periodic visits to a knowledgeable physician coupled with dietary support from a trained nutritionist.

An adequate screening programme for PKU should therefore assure:

- total participation by the eligible population
- notification of parents about neonatal screening to secure their participation
- reliable and prompt performance of the screening test
- prompt follow-up of positive tests
- · accurate diagnosis, with confirmatory positive tests
- appropriate counselling of parents and treatment of patients.

It has been estimated that neonatal screening and preventive dietary management have prevented some 250 cases of mental retardation every year in the USA (32).

Prevention of maternal PKU

As mentioned above, a new problem has arisen now that many girls with PKU who received early treatment are reaching childbearing age; appropriate dietary management is needed to prevent their giving birth to infants suffering from mental retardation. The aim of the diet is to reduce the maternal blood phenylalanine concentration to a level considered safe for the fetus (4–10 mg/dl: 240–600 µmol/l) and to eliminate urinary phenylketones and other phenylalanine metabolites. The diet must combine low-protein foods, almost exclusively fruit and vegetables, and a special formula containing all amino acids except phenylalanine. Thus the phenylalanine intake is strictly controlled by limiting the protein content of the diet.

The effective implementation of the preventive programme for maternal PKU involves four stages, namely:

- 1. The prevention of unplanned pregnancies
- 2. Reproductive decision-making

- 3. Diet initiation
- 4. Diet during pregnancy.

The most important of these is the conscious decision to become pregnant in the first place. The focus of the information and support provided in the first stage is therefore on contraception and sex education. In the second stage, information relevant to reproductive decision-making (e.g. risks, effectiveness of treatment) is provided, while in the third and fourth stages the focus moves on to details of the diet. Group counselling offers several advantages for women with PKU; for example, attention to psychosocial variables associated with attainment of the behavioural goals at each stage may enable women at risk of not complying with medical recommendations to be identified. For some women, special educational programmes would be required.

Action in other sectors

Since the prevention of the harmful effects of this metabolic disorder on the brain of the newborn child depends almost completely on compliance with the dietary treatment, parental education is of paramount importance. A parental support group should be organized wherever possible. If it is not appropriate for dietary products to be supplied for the child through the screening programme, other means, such as financial assistance, should be sought, to ensure that the child is able to follow the diet. Pamphlets for parental education need to be very simple and clearly illustrated with diagrams and pictures. In Mexico, comic books have been distributed to mothers, while television presentations on the topic have been effective in Brazil. Whatever approach is taken, a considerable effort must be made to get the message across effectively. It will also be necessary to educate physicians, nurses and technicians as to proper specimen collection techniques; successful programmes for this already exist in the developed countries, and other countries should adopt the same programmes.

Costs

Several studies have attempted to assess the cost-effectiveness of various strategies for neonatal screening for PKU. Costs vary with the location of the facilities needed for the screening programme, and each country must base its calculations on local economic factors. Most calculations inadvertently omit the costs associated with specimen collection, long-term follow-up and tracking patients following unsatisfactory first specimens. It is also important to include savings made by avoiding the expense of caring for a mentally retarded child. The comparatively low costs of routine re-testing and the financial contribution to the economy made by patients who would otherwise have been non-productive can also be included in the calculations.

All studies suggest that neonatal screening for PKU offers large cost-savings to society. The United States Office of Technology Assessment recently carried out a detailed analysis of the cost—effectiveness of various screening strategies for PKU and congenital hypothyroidism. The costs included the expense of blood specimen collection, laboratory detection and medical treatment. Savings in the cost of foster care, institutional care and special education resulting from early detection were also included. The study concluded that screening led to substantial savings to the health care system. When PKU screening was statistically coupled to screening for congenital hypothyroidism, savings to the country amounted to almost US\$ 100000 per case detected. The study further concluded that the expenses of specimen collection and laboratory detection were major components of the cost; centralization of the laboratory work reduced costs substantially by avoiding duplication and reducing overheads (29).

Another estimate puts the annual cost of screening for PKU in the USA, where 3.7 million children are born each year and screening costs US\$ 1.50 per sample, at about US\$ 5.5 million (33). Without screening, PKU would remain undetected in about 370 children every year; assuming they all developed mental retardation requiring 24-hour

residential care, the annual cost of caring for them would be about US\$ 23 000 per case per year, giving a total annual cost of about US\$ 8.5 million. Neonatal screening for PKU in the USA therefore represents a saving of approximately US\$ 3 million per year.

Action to prevent mental retardation

- Raising public awareness should be a major part of any preventive programme.
- Up to 15% of cases of mental retardation could be prevented by attacking the causes of diseases that can lead to mental retardation, as in the following examples:

lodine deficiency disorders

- lodize salt or water supply.
- Treat individuals at risk with iodized oil or Lugol's solution.

Down syndrome

- Discourage pregnancies in women over the age of 35.
- If appropriate, provide amniocentesis to women over the age of 35.

Fetal alcohol syndrome

- Use simple screening tests to identify women at risk.
- Discourage women from drinking alcohol during pregnancy.
- Alert women to the fact that drinking alcohol around the time of conception increases the risk to the child

Phenylketonuria

- Screen all newborn babies for phenylketonuria.
- Treat with a special low-phenylalanine diet.
- · Discourage pregnancies in women with phenylketonuria.

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CHAPTER 3

Epilepsy

pilepsy, a condition characterized by recurrent epileptic seizures, affects 1 in every 100 people, and represents a heavy burden on patients, their families and the economy in both developed and developing countries. Of the 50 million people with epilepsy in the world today, at least half are either not properly treated or not treated at all. Indeed, many patients only receive medical care as a result of accidents due to epileptic seizures. This is at a time when experts are confident that tremendous improvements could be achieved in the prevention of epilepsy and in the care of people with epilepsy by implementing the 1978 Alma-Ata Declaration on Primary Health Care. Safe, low-cost drugs can be used to successfully control epilepsy in the vast majority of cases: adequate treatment can be provided for an average of US\$ 5 per patient per year. There are simple and effective models for community-based rehabilitation, and, perhaps most importantly, there are several simple, low-cost and yet highly efficacious measures that can prevent the development of epilepsy (1).

Epilepsy is a recurrent disorder characterized by outbursts of excessive activity in part or the whole of the brain. The activity may remain localized or may spread to involve the whole cerebrum. The classical manifestations of generalized epilepsy are loss of consciousness and convulsions, the body at first going into extensor rigidity (the tonic phase) and then into a series of jerking movements (the clonic phase). There may be a period of apparent sleep before consciousness, sometimes clouded or confused, returns. Attacks can be preceded by some form of premonitory aura, the nature of which may be an indication of the region of the brain in which the abnormal discharge of activity

began. Minor or partial expression of epilepsy, with psychomotor and autonomic symptoms, can occur, as well as major attacks. About two-thirds of all causes of epilepsy are idiopathic, that is, no structural or metabolic cause can be determined.

There are many distinct clinical presentations of epilepsy that can be classified according to several criteria. Most of the classifications agree in indicating a group of partial (or localized) seizures and another group of generalized seizures. Other forms are variously classified as undetermined, special or unclassified syndromes (1).

Size of the problem

Epidemiological studies of epilepsy from around the world show prevalence rates ranging from 0.9 to 57.0 per 1000 population; the figures for developed countries range from 1.5 to 20.0 (2–21) and for developing countries from 0.9 to 57.0 (22–49). The great diversity of these results can be accounted for by both real differences in the prevalence of epilepsy and by methodological factors such as diagnostic criteria, instruments, sampling criteria and population selection. The last two factors are particularly important, and could account for the exceedingly high prevalence rates found in Liberia (50), Panama (30) and the United Republic of Tanzania (33, 34). It appears that in developed countries men are slightly more affected than women, and that prevalence peaks between the ages of 30 and 50.

Data that would allow a comparison of incidence rates for epilepsy in developed and developing countries are far less abundant. The few incidence studies from developing countries (37, 40, 45, 51) show annual incidence rates of between 30 and 47 per 100 000 population. The corresponding figures for a number of industrialized countries are between 29 and 53 per 100 000 population (3–6, 8, 9, 11–14, 16, 18, 20, 52).

The differences in the prevalence rates between developed and developing countries may be the result of more risk factors being operative in developing countries than in developed ones. This is partly confirmed by the figures on incidence rates: at birth, the situation is more or less the same in both developed and developing countries, and it is probably in the postnatal period that the situation diversifies. Taking action to reduce the risk factors would therefore not only decrease the gap between developing and developed countries, but would also reduce the prevalence rates of epilepsy in all countries. Approximately 2 million people develop epilepsy every year; we have good reason to believe that this figure could be reduced by at least 50% if proper preventive measures were taken.

Etiology

The list of factors proposed as possible causes of epilepsy is very long indeed. One of the major factors is genetic predisposition, either alone or in conjunction with any factor that causes damage to the brain, although differences can be noticed in incidence according to the type and localization of any brain injury. Table 4 shows a list of factors that can be reliably taken as having a causative role in epilepsy.

Table 4. Main causes of epilepsy

Prenatal causes	Perinatal causes	Postnatal causes
Genetic factors Infections during pregnancy Dysmorphia	Birth asphyxia Brain injury during labour	Febrile convulsions Brain injury Infections of the central nervous system (meningitis, encephalitis) Parasitic diseases of the central nervous system (malaria,
		cysticercosis, schistosomiasis) Toxic factors (alcohol, lead, pesticides)
		Vascular factors Neoplasms

Prenatal causes

Many people with epilepsy come from families with a history of epilepsy, with or without other signs such as mental retardation, malformations or motor disabilities (53–60). In some communities this has led to discrimination against people with epilepsy, preventing them from finding marriage partners from families without a history of epilepsy. Such discrimination, together with the practice of inbreeding due to cultural prescriptions or the non-availability of exogamous partners, increases the risk of seizures in the offspring; the highest rates of epilepsy in the world are found in regions where this is the case (33, 34, 50).

Evidence of epilepsy has also been found in people with congenital toxoplasmosis (61). Post-mortem examinations of people with epilepsy have revealed an excess of dysmorphias, particularly ectopias and abnormal migration of cells.

Perinatal causes

Data from developed countries indicate that about 13–14% of all epilepsies are accounted for by perinatal pathology, including placental diseases, diseases of the umbilical cord, prolonged or abnormal labour and airway obstruction, all of which lead to asphyxia, hypoxia or ischaemia (58, 62–65). There is no reason to believe that the situation in developing countries is any better.

Postnatal causes

Infections, fever and brain injury are among the commonest causes of epilepsy. Infectious diseases (e.g. diphtheria, pertussis, tetanus, measles, poliomyelitis, pneumococcosis, meningococcosis, syphilis, tuberculosis) and parasitic diseases (e.g. malaria, toxoplasmosis, trypanosomiasis) can affect brain function either directly or indirectly, by causing a rise in body temperature. In some children, fever (in itself caused by infectious and parasitic diseases) can cause seizures, known

as febrile convulsions (38, 57–59, 66–70). Brain immaturity or other predisposing conditions, such as malnutrition or dehydration, may be contributory factors; febrile convulsions are more frequent in children aged from six months to six years.

Diseases such as cysticercosis, malaria, toxoplasmosis and schistosomiasis, which are more common in developing countries, are considered to increase epilepsy frequency:

- Cysticercosis has been identified as an important cause of epilepsy in many parts of the world (71–86) in some parts of South America it is the most frequent identifiable cause of epilepsy, accounting for 50% of late-onset epilepsy (87, 88).
- In some regions of Africa, 60% of seizure disorders in the first six years of life seen in a general hospital were related to malaria (61, 89).
- Epilepsy can be found in 25–60% of patients affected by toxoplasmosis (61).
- Meningitis of diverse etiologies (e.g. tuberculous, meningococcal, viral) can leave between 1.3% and 20% of those affected with epilepsy (58, 69, 90–97).

Many other diseases of more limited occurrence, such as Chagas disease, sleeping sickness, schistosomiasis, paragonimiasis and hydatid disease, are also considered to be possible causes of epilepsy (61, 98–100).

Brain injuries caused in various ways are a notable risk factor for epilepsy (38, 53, 58, 59, 101–106). Traffic accidents are probably the most common cause of brain injury, both in developed countries (where it has been well documented) and in developing countries; they may actually play a greater role in developing countries, where roads and vehicles may be in poorer condition and traffic regulations less strictly enforced. Other causes of brain injury include accidents at the workplace and in the home and interpersonal violence. Some authors have also found that stroke can cause both seizures and epilepsy, particularly in adults (107–109).

Among the most important toxic agents causing epilepsy are alcohol (from licit or illicit alcoholic beverages), lead and pesticides (particularly chloride derivatives) (110–112).

Risk factors

Many authors (19, 53, 55, 56, 66, 90, 113–115) have tried to calculate the relative risk for several of the proposed causal factors, but the lack of comparable operational definitions and some serious methodological problems have prevented a clear picture from emerging. Nevertheless, for at least four of these factors — namely, genetic factors, febrile convulsion, brain injury and meningitis — it has been possible to

Table 5. Estimated relative risks for epilepsy

Causative factor	Relative risk ^a
Genetic factors	0.7–5.6
Brain injury	1.4-12.7
Febrile convulsions	3.0-14.2
Pyogenic meningitis	7.0-40.0

^a If the risk in the general population is taken as 1.

Table 6. Suggested causes of epilepsy for which the association is controversial or not proven

Prenatal and perinatal factors	Postnatal factors
Characteristics of the mother: age above 40 years	Side-effects of immunization
Pregnancy complications: toxaemia, haemorrhage, nausea and vomiting, pyelitis	Haemoglobinopathies
Labour complications: dystocia, abnormal presentation, prolapse and other uterine abnormalities, instrumental labour, use of anaesthesia or analgesia, protracted labour	Sexually transmitted diseases
Characteristics of the baby: weight below 2500 g, prematurity or postmaturity, delayed breathing and asphyxia, fetal lesions other than direct brain injury	

establish the relative risks (see Table 5). These findings undoubtedly show associations between these factors and epilepsy, but we cannot state that they cause epilepsy; they may be derived from the same, as yet unidentified, underlying cause as epilepsy.

Recent analytical studies have addressed the possible association between a host of factors as putative causes of epilepsy and the occurrence of epilepsy. Table 6 shows factors for which no evidence, or at most only controversial evidence, of a positive association with epilepsy has been found (54, 58, 59, 63, 70, 97, 105, 116–126). It is surprising to see that some factors firmly believed on clinical grounds to cause epilepsy (e.g. toxaemia during pregnancy) failed to confirm that impression in the few controlled studies conducted.

Preventive measures

Efforts to reduce the incidence and prevalence of epilepsy should be concentrated in the following areas:

- adequate prenatal care
- safe delivery
- control of fever in children
- prevention of brain injury
- · control of parasitic and infectious diseases
- provision of genetic counselling.

Adequate prenatal care

The immunization of women before they get pregnant, improving their nutritional status, the reduction or elimination of alcohol intake during pregnancy, screening for high-risk pregnancies and controlling infectious and parasitic diseases during pregnancy may all help to reduce the risk of epilepsy. Prenatal care, as an essential component of primary health care, is dealt with by many health workers. It is the responsibility of policy-makers to ensure that pregnant women receive care which affords them protection against infectious and parasitic

diseases, monitors their nutritional status and emphasizes abstinence from alcohol. Care providers, particularly primary health workers, must implement the policy. Meanwhile, the educational sector and the media should be active in disseminating information on both the vulnerability of the pregnant woman and fetus and the importance of preventive action during pregnancy. Women's associations and other consumer associations, including those involving people with epilepsy, have an important role to play in advocating the provision of adequate prenatal care and in encouraging women to make full use of it.

Safe delivery

Complications at birth, such as coiling of the umbilical cord or hypoxia, can be reduced by providing comprehensive prenatal care and back-up services for high-risk pregnancies. Improving the quality of birth attendance can also lead to a reduction in a variety of other obstetric complications that could contribute to later seizures. In many places, midwives and traditional birth attendants are particularly important; they should be given the relevant information and training, in a way that respects their various cultural traditions. Where appropriate, links should be established between the informal and formal systems of obstetric care.

Again, women's associations and other consumer associations, including those involving people with epilepsy, have an important role to play in advocating the provision of adequate obstetric and birth attendance services and encouraging women to make full use of them.

Control of fever in children

There are, broadly speaking, two approaches to controlling fever in children: immunization and the control of infectious and parasitic diseases, and lowering the body temperature of the child. Immunization programmes have proved to be highly successful in the control of

most febrile diseases. Certain environmental interventions have also been quite successful in reducing and controlling some of the parasitic diseases that directly or indirectly affect the brain. Both types of intervention are now standard practice and in widespread use, and are of paramount importance for the prevention of epilepsy. Immunization programmes or programmes to control and eradicate, say, malaria, schistosomiasis or trypanosomiasis contribute to the primary prevention of epilepsy by reducing the risk of febrile episodes in children.

Immunization and sanitation are often core responsibilities of public-sector health workers. Policy-makers and all those involved in health planning, administration and promotion also have a major role to play, for instance in promoting programmes of immunization and the control of malaria epidemics. Several of the measures to control infectious and parasitic diseases require the involvement of sectors dealing directly with the environment, from sanitary and civil engineering to food processing.

When a child is suffering from febrile convulsions, the body temperature of the child must be immediately lowered by means of an antipyretic drug or cool baths or compresses, and the condition causing the fever must be treated. It should be borne in mind that fever in children may have different implications from one region to another. For instance, in regions where malaria is endemic, a febrile convulsion suggests the possibility of cerebral malaria and the child should be treated accordingly. It is particularly important to warn against wrapping up feverish children or keeping them warm, where this is the local tradition because of cultural concepts of "hot" and "cold". Primary health care workers who provide child and maternal care are best placed to instruct parents on how to lower the temperature of a feverish child both safely and efficiently.

Mothers should be reassured that the risk of a child who has had one episode of febrile convulsions developing epilepsy is only marginally higher than that of a child who has never suffered a febrile convulsion. By the age of seven, about 1.5–7.0% of children who have had a febrile

convulsion will have had one non-febrile convulsion. Parents should be instructed in proper seizure control if their child is one of the few who do develop epilepsy.

Prevention of brain injury

Every measure taken to promote road safety can reduce the incidence of brain injury and thereby contribute to a reduction in the number of cases of epilepsy. Specific measures include introducing safer traffic regulations, speed limits and severe penalties for drunken driving, and promoting the use of seat-belts, child safety seats and cycle helmets. The number of brain injuries resulting from accidents at the workplace can be significantly reduced by enforcing safety measures such as the use of safety helmets, protective ropes, scaffolding and better lighting. In the home, care should be taken to eliminate any sharp corners at children's head height, and stairs and windows should be made as safe as possible.

It is striking that these safety measures require the input of many groups from outside the health sector, including legislators, traffic authorities, the police, schools, the media, unions, employers, workers, civil engineers, architects, interior designers and parents. All have a role to play in preventing brain injury and, where necessary, in changing local customs and attitudes.

The association between high blood pressure and stroke, and between stroke and epilepsy, has already been mentioned. The successful treatment of individuals with high blood pressure will therefore lead to a reduction in the number of episodes of convulsion and epilepsy. Primary health care workers can be very effective in identifying people with high blood pressure by taking periodic measurements. In most cases, high blood pressure can be reduced and controlled by getting patients to follow a diet low in salt, watch their weight and take physical exercise; in some cases, medicines will also be needed. (Detailed recommendations for the prevention of stroke can be found in (127).)

Control of parasitic and infectious diseases

There are two major approaches to the control of infectious and parasitic diseases: an expanded immunization programme and the environmental control of parasitic diseases. The importance of controlling diseases which cause febrile episodes has already been stressed. However, some diseases have a direct impact on the brain itself and thus pose a specific risk for the development of epilepsy. Immunization against vaccine-preventable diseases, such as diphtheria, pertussis, tetanus, measles and tuberculosis, not only reduces brain injury caused directly by those diseases, but also reduces infection-related febrile episodes that carry a risk of febrile convulsions. Immunization is the primary responsibility of certain health workers, but everyone in the public sector, from health planners and administrators to health promoters, should be involved in immunization programmes.

Brain cysticercosis, which is particularly prevalent in parts of South America, can be effectively controlled through sanitary and hygiene measures related to both the disposal of human faeces and the production, distribution and preparation of pork foodstuffs. Breaking the biological cycle of the parasite will decrease both pig and human cysticercosis. Several efficient strategies have been developed to control schistosomiasis and malaria, which is rampant in some regions of Africa and widespread in some South American, Caribbean and Asian countries. Most parasitic diseases are preventable and efforts should be aimed at eradicating them. Sanitation is the primary responsibility of certain health workers, but health planners and administrators should also be involved in seeking to eradicate parasitic diseases.

Provision of genetic counselling

The purpose of genetic counselling is to provide prospective parents with a family history of epilepsy with the information they need to make informed choices; accurate information about the true risk to any children they may have can be reassuring, and can also help to reduce

the stigma sometimes attached to epilepsy and dispel the ignorance that can lead to discrimination.

The disproportionately high prevalence of epilepsy in some areas is believed to be the consequence of a high rate of inbreeding among families with a genetic disposition to epilepsy. In such cases, in addition to routine genetic counselling, specific educational measures are needed, in order to make parents aware of the risks and to teach them about special precautions to be taken in the case of febrile conditions and convulsions. Seizures are frequently disregarded, being seen as "one-off" incidents. Parents must be made aware that, as there is mounting evidence that seizures may beget seizures, the sooner the seizures are controlled the better the outcome will be.

Genetic counselling is provided by primary health care workers, neurologists, psychiatrists and specialists in medical genetics. Schools and the media play a major role in passing on accurate information and helping to dispel the myths still associated with epilepsy in many places.

Concluding remarks

Most of the measures outlined above are relatively simple, affordable and cost–effective; any primary health care facility could be reasonably expected to provide them. There can be little doubt that these measures, if taken together, can make a major contribution to the prevention of epilepsy. For example, in one developing country, the prevalence rates for epilepsy in two neighbouring rural communities were compared. The first one lacked any organized health care system, whereas the second one, with the same ethnic background and socioeconomic level, had a highly organized health care system, offering prenatal and perinatal care. programmes for maternal and child care, and vaccination and nutrition programmes. The prevalence rate for epilepsy in the first community was 37 per 1000 population as compared with 5.3 per 1000 population in the second; the latter rate is comparable to prevalence rates in developed countries.

If preventive measures are inadequate or unsuccessful, people affected by epilepsy should be treated at primary health care level. Guidelines for treatment can be found in the WHO document *Initiative* of support to people with epilepsy (1).

Action to prevent epilepsy

- Ensure adequate prenatal care and promote safe birth practices.
- Expand vaccination programmes for infectious diseases.
- Take environmental measures to control parasitic diseases.
- Lower the body temperature of a feverish child.
- Promote safety on the road, in the home and at the workplace.
- Reduce high blood pressure.
- Provide genetic counselling

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CHAPTER 4

Suicide

For the act of killing oneself to be classed as suicide, it must be deliberately initiated and performed by the person concerned in the full knowledge, or expectation, of its fatal outcome (1). Suicidal acts with a non-fatal outcome are labelled suicide attempts, attempted suicides, parasuicides or acts of deliberate self-harm. There is a growing tendency among experts in the field to broaden the concept of suicide and speak of suicidal behaviours instead (2), but for the moment it is reasonable to continue to use the more traditional and accepted concept of suicide. For the purposes of this book, the primary prevention of suicide refers to measures intended to prevent acts which may result in a fatal outcome; it does not necessarily cover attempted suicide, suicidal ideation or other suicidal behaviours.

Conceptual models

The most important conceptual models relevant to prevention of suicide are the medical model, the sociological model and the human-ecological model.

According to the medical model, a disease — the target for preventive action — is the result of the interaction of an agent (the cause), a host (the human being) and an environment (physical, psychological and social conditions). Prevention therefore requires the previous identification of a specific etiology or of conditions in the environment or in the host under which the disease process is started. According to the most widely accepted medical model, suicide is a sign or consequence of a mental disorder; in other words, a mental disorder acts as the agent and suicide is the outcome, and target for preventive action.

Successfully treating a person for the mental disorder would consequently reduce or prevent suicide. Experience, however, has shown that the results of using this model are less than satisfactory. A review of the literature (1) revealed the following:

- Twelve studies on suicide found that psychosocial/psychiatric interventions had no effect on the outcome; however, of nine studies which dealt with attempted suicide as well as suicide, seven found that psychosocial/psychiatric interventions did have an effect.
- Although no controlled studies on pharmacological treatment were identified, open studies showed no positive effect for the use of tricyclic antidepressants; moreover, many suicides have actually been committed by overdosing on tricyclic antidepressants. However, patients treated at lithium clinics showed mortality rates similar to those of the general population, thus indicating that the treatment afforded some protection (3–5).
- Meta-analysis of six controlled studies on electroconvulsive therapy was inconclusive.

The sociological model dates back to 1897, when Durkheim, in his classic work *Le suicide*, categorized suicides as anomic, altruistic, egoistic and fatalistic (6). He considered anomic suicide, the result of weak or absent social norms or standards, as the prototype of suicide.

An analysis of social categories indicates that sex, age, ethnicity, marital status, employment status and migrant status are relevant variables with regard to suicide (7). High-risk groups include men, the elderly (and more recently, in some places, young people), ethnic minorities, people living alone, the unemployed and migrants. Of all these variables, only employment is possibly amenable to direct intervention, the others being either natural and unavoidable factors, such as sex, age and ethnicity, or variables which are difficult to control, such as marital status and migration. Preventive activities, therefore, first need to identify specific elements in each of these variables which may

lead to suicide; at this point, the sociological model clearly becomes a psychosocial model because the analysis relies on both sociological and psychological concepts.

From a public health perspective, the main problem with the psychosocial approach to the prevention of suicide is the lack of evidence on its impact. Several promising programmes exist, but none of them has been in operation long enough to make a reliable evaluation possible; where they have been evaluated, the results are inconclusive. Perhaps one of the most widespread measures taken has been the setting-up of suicide-prevention centres, but their effectiveness has yet to be demonstrated (1, 8–9).

The human-ecological model sees suicide as the final step in a series of independent but interrelated factors and pathways, as summarized in Fig. 3. According to this model, the primary prevention of suicidal acts consists of any action that contributes to decreasing the frequency of those acts, irrespective of their conditioning or triggering factors. This approach aims to reduce or restrict access to means of suicide and differs from other approaches, such as those which concentrate primarily on reducing or controlling suicidal ideation, by focusing on the

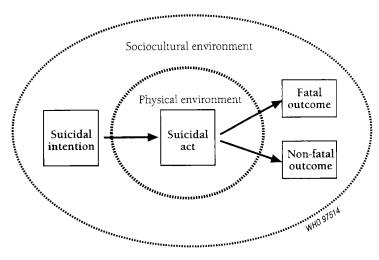


Fig. 3. Suicide: the human-ecological model

potentially lethal act and its immediate personal and environmental circumstances.

Size of the problem

Suicide is among the 10 leading causes of death for all ages in most of the countries for which information is available; in some countries, it is among the top three causes of death for people aged 15–34 years. Annual suicide rates as high as 1 per 2200 population have been reported (e.g. in Lithuania) or even 1 per 1000 population in some isolated regions (e.g. in the Falkland Islands). It is estimated that, on average, 400 000 people commit suicide every year around the world. Despite these figures, there is reason to believe that suicide is underreported by between 20% and 100% in some places, as a result of prevailing social or religious attitudes.

Table 7 presents data on suicide rates in selected countries. As can be seen, it affects equally the developed and developing countries (with the exception of, perhaps, the Islamic countries) and countries with quite distinct cultural traditions, such as Bulgaria, Japan and Switzerland.

In addition, in Europe, for every person who committed suicide, 10 people made a non-fatal suicide attempt or deliberately harmed themselves seriously enough to require some sort of medical assistance. The actual number of people inflicting some form of deliberate self-harm on themselves is not known, but is probably higher still, as they do not always have contact with the medical services. In North America and Europe, 4–5% of persons aged 15 or over have at some time attempted to commit suicide or to harm themselves intentionally.

The research evidence available suggests characteristic differences between suicide and attempted suicide; the method of self-harm chosen, the clinical aspects (such as psychiatric diagnosis and treatment), the psychological features and the personality patterns all differ. There are also differences in the age and sex of the people involved and in the emotional precipitants of the behaviour. However, in terms of social

Table 7. Suicide rates in selected countries^a

Country ^b	Suicide rate by sex ^c		Overall suicide
	Male	Female	rate ^c
Albania (1993)	3	2	3
Argentina (1991)	9	3	6
Armenia (1992)	4	1	2
Australia (1993)	18	4	11
Austria (1996)	27	8	18
Belarus (1993)	4 9	10	28
Belgium (1992)	22	9	15
Brazil (1989)	6	2	4
Bulgaria (1994)	18	6	12
Canada (1992)	21	6	13
Chile (1989)	10	2	6
Czech Republic (1996)	20	5	12
Denmark (1994)	21	8	15
Estonia (1995)	67	13	39
Finland (1995)	41	11	26
France (1994)	26	9	17
Germany (1995)	18	6	12
Greece (1995)	5	ĺ	3
Hungary (1995)	42	11	26
Iceland (1994)	15	2	9
Ireland (1993)	15	4	10
Israel (1992)	11	4	7
Italy (1993)	9	3	6
Japan (1993)	22	11	17
Kazakhstan (1995)	 57	9	32
Kyrgyzstan (1995)	30	7	18
Latvia (1995)	69	12	39
Lithuania (1995)	81	13	45
Luxembourg (1993)	25	8	16
Malta (1993)	5	4	4
Mauritius (1993)	18	9	13
Mexico (1992)	4	1	3
Netherlands (1995)	11	6	9
New Zealand (1992)	24	6	14
Norway (1994)	17	6	12
Poland (1995)	25	4	14
Portugal (1995)	9	3	6
Republic of Korea (1991)	10	4	7
Russian Federation (1995)	73	11	41
Singapore (1992)	12	9	11
Slovenia (1995)	41	10	25
Spain (1993)	9	3	6
Sweden (1995)	19	8	13
Switzerland (1994)	25	10	17
Tajikistan (1992)	8	3	5

Table 7. Continued

Country ^b	Suicide rate by sex ^c		Overall suicide
	Male	Female	rate ^c
Trinidad and Tobago (1991)	19	5	12
Ukraine (1992)	38	9	23
United Kingdom (1995)	11	3	7
Uruguay (1990)	17	4	10
USA (1991)	20	5	12
Uzbekistan (1995)	15	4	9
Venezuela (1989)	8	2	5

[&]quot; Source: reference 10 and WHO databank.

antecedents, such as unemployment or loss of work, there seems to be considerable overlap between the two populations.

These data clearly demonstrate that suicide is a serious public health problem and that effective preventive strategies need to be developed to prevent people from committing this dramatic and deadly act.

Risk factors

The presence of a psychiatric disorder (including alcohol and drug abuse) is the strongest risk factor for suicide, so that the prevention and treatment of psychiatric disorders would undoubtedly have a significant effect on the number of suicides. It is widely accepted that over 90% of those in the USA and Europe who succeed in committing suicide have a psychiatric illness at the time of death, and that two disorders, depression and alcohol dependence, are associated with 80–85% of suicides. These findings are supported by a number of other studies. For instance, in a follow-up study in which patients with depression, mania or schizophrenia were compared with normal controls, 9–11% of the patients with psychiatric disorders who had died had committed suicide in the intervening three or four years, but none of the normal controls (11). In another study, of 5412 hospitalized psychiatric patients, the risk of suicide was between 11 and 67 times

^b Year of latest available figures indicated in brackets.

^c Per 100 000 population, all age groups.

Table 8. Psychiatric diagnoses in 5588 cases of suicide

Diagnosis	Number of diagnoses ^a	Percentage of total number of diagnoses
Organic brain syndrome	308	5%
Substance abuse	947	16%
Schizophrenia	612	10%
Affective disorders	1400	24%
Neurotic and personality disorders	13 4 0	22%
Other mental disorders	1259	21%
No psychiatric diagnosis	137	2%

^a The number of diagnoses is greater than the number of cases because of multiple diagnoses in some cases.

higher for patients with acute or chronic schizophrenia, affective disorders or a problem with alcohol or other drug abuse than would be expected in a control population (12). It is therefore very important to stress that psychiatric morbidity is central to both the occurrence and the prevention of suicide.

There are some indications, however, that the predominance of depression and substance abuse over other psychiatric diagnoses among those who commit suicide may not be as overwhelming as was previously thought. A review of the data from 13 major studies (12–27) which analysed the psychiatric diagnosis made in cases of suicide, from both the general population and populations of mental patients, reveals a less clear picture (Table 8). Some of these studies cover series of patients from a single hospital over many years, while others cover all cases of suicide in a specific country, again over several years.

Affective disorder is the most frequently observed diagnosis (in 24% of the cases), closely followed by neurotic and personality disorders (22%) and other mental disorders (21%). These figures do not confirm previous reports in which depression was diagnosed in 60–80% of people who committed suicide, and suggest a lower contribution to the total pool of mental disorders associated with suicide. Treatment for depressed people may be beneficial for those people, but it cannot be

expected to lead to a drastic reduction in global mortality rates from suicides. Simple epidemiological reasoning suggests that even if the treatment for depression had an efficacy of 100% and reached all people suffering from depression in a given general population (that is, it had an efficiency of 100%), it would only be expected to reduce rates of mortality due to suicide by 30%. Assuming that, generally speaking, less than 50% of depressed patients receive proper treatment, and that the treatment is effective in no more than 70% of cases, the expected reduction in rates of mortality due to suicide is around 10%. This impression is confirmed by the findings of Goldstein et al. (28), who, in a follow-up study of a sample of almost 2000 high-risk hospitalized patients with affective disorders, demonstrated the impossibility of identifying any of the 46 who committed suicide from the baseline clinical data.

Other risk factors for suicide include being male, being over 50 years old, living alone and having a physical illness. For alcohol-dependent people, the recent loss of someone close is a risk factor (29). Previous suicide attempts are associated with an increased risk of suicide in psychiatric patients (28, 30). It has also been found that the loss of a parent when a child is between the ages of 6 and 14 is an especially common risk factor in later suicides (31).

Access to instruments of suicide can account for some differences in suicide rates. For instance, the detoxification of domestic gas in Switzerland was correlated with a decrease in the suicide rate as well as with a decrease in the use of domestic gas to commit suicide (32). Suicide rates were found to fall among people aged between 15 and 24 when access to handguns was restricted (33, 34). A recent study found that the presence of one or more guns in the home was associated with an increased risk of suicide (35). The same study showed that people who committed suicide were more likely to have lived alone, to have taken psychotropic medication or to have been arrested for drug or alcohol abuse; these findings are consistent with known risk factors for suicide.

A recent study to assess the effect of access to lethal methods of injury on suicide rates found that differences in suicide rates between communities were largely related to differences in accessibility (36). Almost all the differences in overall suicide rates between counties in New York State were explained by the fact that different methods of injury were available in the counties. The methods included jumping from high places, taking overdoses of legally prescribed drugs and inhaling carbon monoxide.

Finally, there are several groups with a higher than normal risk of suicide; they include immigrants, indigenous groups (such as American Indians), those whose spouses or partners have committed suicide and inmates of prisons.

Preventive measures

Preventive measures need to identify vulnerable groups (see above) and limit access to specific methods of suicide. It is possible that early intervention might prevent some suicides in vulnerable groups (37). For example, preventive interventions involving immigrants would be aimed at helping them to adapt to the host country; language courses, educational opportunities and employment can all facilitate the process of integration and generally improve the psychological well-being of immigrants. Similar measures could be envisaged for indigenous groups.

It has already been pointed out that limiting access to instruments of suicide can reduce the suicide rate (36, 38–40). Oliver & Hetzel (41) first raised the question of the relation between the availability of means (sedatives, in the case they studied) and suicide rates. The issue remained controversial for a while, with some claiming that in the absence of one specific means suicidal subjects would simply shift to another, and others maintaining that this shift would not occur to the majority of subjects and that suicide rates would fall in proportion to the contribution of the method that had been eliminated (42). According to the concept of accessibility, access to the means often foretells the

end; for instance, as the use of a firearm is one of the most efficient means of committing suicide, it is not difficult to see how the ready availability of a gun can facilitate suicide (39).

Steps to prevent suicide can be taken in the following areas:

- psychiatric treatment
- gun control
- gas detoxification
- control of toxic substances
- responsible media reporting.

Psychiatric treatment

Since the presence of a psychiatric disorder, especially depression and alcohol abuse, is a significant risk factor associated with suicide, the early recognition and treatment of such disorders is undoubtedly an important strategy in the primary prevention of many cases of suicide. Educational programmes to train practitioners and primary care personnel in the diagnosis and treatment of depressed patients can be particularly important. In one study, the suicide rate dropped significantly in the year after such an educational programme was introduced (43). More recent studies have identified a reduction in suicide rates in populations of depressed patients receiving maintenance treatment (3–5). Primary prevention should also focus on providing good general mental health services for communities. There is also a need for society at large to seek ways to remove the stigma still sometimes attached to people with mental disorders.

Gun control

Several studies have shown an association between the possession of handguns at home and suicide rates (e.g. 35, 44). Legislation restricting access to handguns may therefore have a beneficial effect on suicide rates. Those who make laws are in a position to regulate everything from arms production and sales to personal possession and

the carrying of guns; the police authorities are instrumental in monitoring the enforcement of any laws, while civic associations can promote compliance.

Gas detoxification

Two lines of action can be envisaged in this area: the detoxification of domestic gas and the detoxification of car emissions. The detoxification of domestic gas in some countries (e.g. Japan, Switzerland, the United Kingdom) has been shown to be correlated with a decrease in the suicide rate as well as with a decrease in the use of domestic gas to commit suicide (32, 42, 45). There are also indications that a reduction in the carbon monoxide content of car emissions is associated with a reduction in suicide rates (39, 46, 47). The main role of the health sector in this area is to offer support to pressure groups advocating gas detoxification. The authorities responsible for licensing, inspecting and providing domestic gas are in a position to ensure that it is free of toxic substances which can cause death when inhaled, and manufacturers and traffic and environmental authorities can take action to reduce the carbon monoxide content of car emissions.

Control of toxic substances

In many places, the ingestion of a toxic substance (e.g. pesticides, herbicides) is the preferred method for committing suicide (18). In such places, suicide rates can be reduced by limiting the availability of these substances. In other places, alcoholic beverages or other psychoactive substances are frequently combined with other substances, either deliberately or inadvertently, to create lethal mixes.

The main role of the health sector in this area is to inform the relevant authorities about specific risks and to monitor suicides due to intoxication. They are also responsible for clearly warning patients about the risks of mixing alcohol or other psychoactive substances with

prescribed medicines. The authorities responsible for agriculture and the environment are usually responsible for the control of pesticides, herbicides and similar substances. The responsibility for alcohol sales and advertising varies from place to place, but those responsible for them should consider pertinent measures to reduce the risk of abuse.

Since Oliver & Hetzel (41) first called attention to the association between suicide mortality rates and the availability of sedatives, other drugs have been found to be associated with suicide. Variations in mortality rates have been associated with overdoses of antidepressants, suggesting that greater care must be taken when prescribing medication to patients who may become suicidal. Alternatively, patients at risk of committing suicide should not be prescribed more than small amounts of potentially lethal drugs, such as tricyclic antidepressants (48). Nevertheless, a safe compromise must be reached between convenience for the patient (which depends on the patient's access to medical supplies and repeat prescriptions, for instance) and the safety of a given prescription. The pharmaceutical industry can contribute greatly to reducing the risk of overdose by producing appropriate dosage units and packages.

Responsible media reporting

Minimizing the unnecessary reporting of suicides in the popular media may be helpful in reducing suicide rates, particularly with regard to "copycat" suicides. Newspaper reports of suicides in the subway system in Vienna have been correlated with subsequent suicide rates (49), thus confirming studies done in Canada, the Netherlands, the United Kingdom, the USA and other countries (50, 51). Clearly, behavioural changes in a community can make a difference to suicide rates: simply calling attention to some suicides may lead to others. The media can therefore behave responsibly by limiting graphic and unnecessary depictions of suicide and by deglamorizing news reports of suicides.

Physical barriers

In addition to the measures already described, whose efficacy is attested to by the scientific literature, it is thought that other measures, such as the use of fencing on high buildings and bridges, could also contribute to a reduction in suicide rates, although there is no definite evidence to support this idea. In places where jumping from high places is a frequently used method of committing suicide, any such measures to limit access to them may be worthwhile.

Action to prevent suicide

- Identify and treat people suffering from depression.
- Restrict access to guns.
- Detoxify domestic gas and car emissions.
- Control the availability of toxic substances and medicines.
- Deglamorize reports of suicide in the media.
- Erect physical barriers to deter jumping from high places.

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CHAPTER 5

Burnout

Freudenberger (1) first used the term "staff burn-out" to describe a syndrome of exhaustion, disillusionment and withdrawal in voluntary mental health workers. The concept has aroused considerable interest in all the caring professions since then, and the publication of a large number of articles and books on the subject suggests that burnout is a major problem in health services today. Indeed, with the general trend towards community-based care in many parts of the world, burnout is now a problem faced by all care-givers, including the relatives of people suffering from chronic disorders.

There is no single accepted definition of burnout; however, there is general agreement that the syndrome has three major characteristics, which are observed in various care-givers, particularly health workers and family members. They are:

- emotional exhaustion
- depersonalization
- a reduced feeling of personal accomplishment.

Moreover, it is widely accepted that burnout can occur at the individual or collective level, that it is a psychological experience that involves feelings, attitudes, motives and expectations and that it is a negative experience which highlights problems, distress, discomfort, dysfunction or negative consequences. Burnout produces physical, emotional and mental signs and symptoms. Physical exhaustion is evidenced by low energy, chronic fatigue, weakness, weariness, increased susceptibility to illness, frequent headaches, nausea, muscle tension, back pains, various somatic complaints and sleep disturbances. Emotional exhaustion may involve feelings of depression, helplessness or hopelessness,

increases in tension and conflicts at home, increases in negative affective states (e.g. anger, impatience, irritability) and decreases in positive affective states (e.g. friendliness, considerateness, courteousness). Mental exhaustion may involve dissatisfaction and negative attitudes towards oneself, towards work and towards life in general. Finally, an increase in work-withdrawing behaviours, such as absenteeism, and in staff turnover has also been noted.

Burnout is a developmental process which "begins with excessive and prolonged levels of job stress. This stress produces strain in the worker (feelings of tension, irritability and fatigue). The process is completed when the workers defensively cope with the job stress by psychologically detaching themselves from the job and becoming apathetic, cynical, or rigid" (2).

An important but so far neglected area of study is the possible long-term implications of burnout. Only one study up to now has explored the relationship between the degree of burnout experienced during the first year of a career and career adaptation during the following decade (3). Twenty-five professional care-givers were studied during the first year of their career and again 12 years later. The results suggest that early career burnout does not necessarily have significant, negative, long-term consequences, but burnout occurring later in a person's career might have more serious effects. One of the most important implications of this study is that health service workers can recover from early career burnout. Interestingly, some of the factors which helped care-givers to recover from burnout are the same ones which help prevent burnout, namely, new work situations which provide more autonomy, organizational support and interesting work.

The extensive research into psychological burnout has produced a much greater understanding of the problem, and many suggestions for addressing it. However, it has produced little evidence of effective intervention strategies. This lack of evidence is to a large extent due to the difficulty in differentiating burnout from other forms of

occupational stress; stress itself is an individual problem which ultimately requires individual attention. The main reasons for considering burnout as a distinct syndrome are its specificity as a three-part syndrome encountered by professional care-givers, and its definition as being primarily an organizational problem (4). The literature on occupational stress has identified intervention strategies which are primarily built around relaxation and health programmes. Programmes focused on the individual are easier to implement and to assess, and are entirely consistent with published studies on occupational stress.

The task of implementing and assessing interventions aimed at work groups or organizational policies presents formidable challenges in terms of conceptualizing the intervention, enlisting the support of management, identifying specific, measurable goals for intervention and measuring these constructs. Furthermore, it is difficult to design standardized interventions which can be adapted to the local conditions of each organization and which reflect the interests of its primary stakeholders. A variety of interventions must be tried in many settings before the general principles governing burnout intervention can be identified. While researchers wrestle with these problems, designing an effective burnout intervention will require a high degree of creativity and a willingness to extrapolate from general research findings.

Size of the problem

It is difficult to make a precise estimate of the magnitude of the burnout phenomenon, as it depends on the interplay of a variety of organizational, environmental and individual factors. However, it has been claimed to affect up to 40% of doctors at a level sufficient to affect their personal well-being or professional performance (5). Other health workers may also suffer from high rates of burnout. In a survey carried out among 1176 employees of all occupational groups within one large health authority in the United Kingdom, health workers

reported significantly greater pressure at work than workers from non-health care sectors (6). There were no differences in measures of job satisfaction or physical ill-health, but, contrary to expectations, the health workers reported fewer symptoms of mental ill-health. Approximately 1 in 12 of the health workers showed levels of either mental or physical ill-health that matched the average level of patients with neurotic disorders attending outpatient departments. In general, among the various professional groups, those at the bottom of the hierarchy, especially nursing staff, tended to have the highest levels of symptoms.

In one of the largest studies, stress symptoms, burnout and suicidal thoughts in 2671 Finnish physicians were studied using a questionnaire (7). In male specialists, the highest burnout indices were found in general practice and occupational health, psychiatry and child psychiatry, internal medicine, oncology, pulmonary diseases, dermatology and venereology. In female specialists, they occurred in general practice and occupational health, radiology, internal medicine, neurology, pulmonary diseases, dermatology and venereology. Non-specialists of both sexes had higher burnout scores than specialists. The highest burnout scores in both men and women occurred in those working in municipal health centres. The lowest scores occurred in those working in private practice, universities, research institutes and public offices and organizations. The results indicate a polarization between "higher burnout specialities", often dealing with chronically ill, incurable or dying patients (e.g. oncology, pulmonary diseases, psychiatry), and "lower burnout specialities", often dealing with curable diseases (e.g. favourable prognoses obstetrics and gynaecology, otorhinolaryngology, ophthalmology).

Burnout was studied among a representative sample of 1840 physicians specializing in infectious diseases in the USA (8); 43% of the physicians reported high scores on emotional exhaustion, and 40.3% scored high on depersonalization. Personal accomplishment scores remained high, despite burnout levels, with 91.8% reporting high personal accomplishment. Contrary to the outcome of other studies, the

highest percentage of burnout occurred among physicians in private practice (55%), followed by government settings (39%) and academia (37%).

Burnout also seems widespread among general practitioners. For instance, South Australian general practitioners (n = 966) provided information in a questionnaire on four indicators of job stress, namely, emotional exhaustion, depersonalization, personal accomplishment and a three-item measure of job dissatisfaction (9). About one-third of the respondents reported significant levels of job stress, which varied according to age and sex as well as attitudes to general practice.

Another study has compared the levels of work-related stress and depression reported by doctors-in-training in emergency medicine at three survey sites in Australia, the United Kingdom and the USA, and has tried to determine the effects of sex and marital status on stress and depression among these doctors (10). Significant differences in stress by survey site and sex and in depression for all three independent variables were found. Respondents from the United Kingdom reported significantly higher levels of stress than did respondents from the USA, and women reported significantly higher levels than men. Respondents from the USA reported significantly higher levels of depression than did respondents from the other countries, women reported higher levels than men, and unmarried respondents reported higher levels than married respondents. In another study, carried out among 488 doctors-in-training in emergency medicine, the mean levels of stress and depression were higher for women and the unmarried (11).

In a survey comparing 291 general practitioners, 379 nurses and 387 pharmacists, nurses reported the highest level of stress, especially in terms of work overload, meeting patients' needs and on-the-job conflicts (12). A survey of Swiss nurses and doctors revealed the major stressors to be ethical conflicts about appropriate patient care, team conflicts, role ambiguity, workload and organizational deficits (13). In doctors, workload and shortage of time, combined with decision-

making responsibilities, are the major sources of stress. Nevertheless, job satisfaction is still high in both professions. The specific "role strain" on female doctors (due to conflict between professional and domestic duties) is responsible for health risks which reduce life expectancy by an alarming 10 years in comparison with the general population.

Relations between working conditions and the mental health status of female hospital workers were studied in a sample of 1505 women: 43% were nurses, 32% auxiliaries and 7% ancillary staff; 13% were other qualified health care staff, mainly head nurses; 5% had occupations other than direct health care; and 63% worked in the morning, 20% in the afternoon and 17% on the night shift (14). Five health indicators were considered: a high score on the general health questionnaire; fatigue; sleep impairment; use of antidepressants, sleeping pills or sedatives; and diagnosis of psychiatric morbidity at clinical assessment. Four indices of stress at work were defined: job stress, mental load, inadequacy of internal training and discussion, and strain caused by the work schedule. For all indicators of mental health impairment, especially high scores on the general health questionnaire, the adjusted relative risk increased significantly with the levels of job stress, mental load and strain due to the work schedule.

A survey carried out among a representative sample of social workers in the USA in 1989 found that a quarter of the respondents reported feelings of emotional exhaustion, although they reported little depersonalization (15). Burnout has also been described among psychotherapists: it has been suggested that between 2% and 6% of psychotherapists can be considered burned out (16), with the problem appearing to occur more frequently among institutional therapists.

Etiology and risk factors

Most authors see stress, in one way or another, as the key factor in the development of burnout (17). It is, however, useful to analyse the

causes of staff burnout according to the locus at which preventive action can take place, i.e. the individual, job features and the organizational environment.

The individual

It has been suggested that some health workers have personality characteristics that make them more prone to burnout. In particular, burnout has been associated with neurotic anxiety, unrealistic goals and expectations, and low self-esteem. Another important characteristic which affects reaction to stress is flexibility; flexible people tend to experience more stress associated with role conflict than do more rigid people, because the more flexible find it difficult to set limits and say no to extra demands.

A study has addressed the question of whether vulnerability to burnout among physicians is associated with certain long-standing, maladaptive personality tendencies that predate entrance into medical training and subsequent exposure to the intrinsic stresses of medical practice (18). The subjects were 440 practising physicians whose personality traits and psychological adjustment had been assessed with the Minnesota Multiphasic Personality Inventory shortly before entering medical school. The assessment was followed up with a mail questionnaire about 25 years later to evaluate current symptoms of burnout. Results revealed that higher burnout scores were significantly correlated with a number of standard and special scales devised for the Inventory to measure low self-esteem, feelings of inadequacy, dysphoria and obsessive worry, passivity, social anxiety and withdrawal from others. In contrast, burnout scores exhibited no significant associations with demographic or practice characteristics, including sex, age, medical speciality, practice arrangement, hours worked per week or percentage of work time spent in direct contact with patients. Together, these findings suggest that subjective perceptions of work may be more important than objective work conditions in influencing burnout.

In another study, among 49 psychiatrists, burnout was found to be positively associated with anxiety and a tendency to be particularly sensitive to problems, and negatively related to learned resourcefulness (19). Burnout was negatively, although not significantly, correlated with tenure and years in place of employment.

Job features

Burnout is very common in the caring professions, although it is not restricted to them; specific factors related to these professions may be responsible for this phenomenon. Perhaps the most important factor is the need for a sense of efficacy, which is one of the major job-related goals shared by health workers. For example, in a survey of 215 psychiatrists, psychologists and social workers, 74% of the respondents cited "lack of therapeutic success" as the single most stressful aspect of their work (16). Other important factors were "inability to help an acutely distressed client" and "lack of observable progress with clients". The very nature of work with chronic, incurable or dying patients, such as the chronic mentally ill (20) or AIDS patients (21), is particularly conducive to burnout.

Organizational environment

A wide range of factors associated with an occupation may lead to stress within an individual. Although none of them, taken in isolation, can be considered as a source of burnout, their interplay and the simultaneous presence of several of them (which is very often the case) can significantly contribute to causing burnout among health professionals. The following environmental and organizational factors in health services may cause stress:

- role or case overload with few structured breaks
- institutional disregard for the needs of clients in favour of administrative, financial or bureaucratic needs

- inadequate leadership, supervision or both
- · lack of training and orientation specific to the job
- lack of a sense of impact on and control over one's work situation
- · lack of social interaction and support among staff
- case-loads consisting predominantly of extremely difficult clients
- majority of time spent on administration and paperwork tasks.

Perceived lack of control seems a particularly important risk factor for burnout (22). Some research has shown that therapists in institutional settings more frequently admitted to feelings of disillusionment than did therapists in non-institutional settings, including private practice (16). In a study carried out among two samples of social workers, one in full-time private practice and the other in full-time institutional practice, it was found that workers in private practice fared significantly better in all measures of personal well-being than their colleagues in institutional settings (15). However, the differences may have been related to differences in the characteristics of practitioners who choose to enter private practice, differences in the psychosocial aspects of private practice and public agencies, and differences in the kinds of clients served, with the clients of private practitioners less likely to be poor, unemployed, old and uneducated.

Lack of social support is also a contributing factor to the development of burnout. Chemiss & Dantzig (23) have described the following obstacles to the establishment and development of social support networks in the workplace:

- differing theoretical perspectives
- differing degrees of resources, status and power
- organizational structure (e.g. front-line workers organizationally alienated from management)
- · personal commitments outside the job which limit social support
- organizational protocol that limits social contact
- high staff-turnover rates.

A study has evaluated the effects of social support on reducing or mitigating the relationship between negative aspects of the work environment and burnout in nurses (24). The data were collected from a sample of nurses employed at a United States military medical centre. The major determinants of burnout were found to be low job enhancement (autonomy, task orientation, clarity, innovation and physical comfort), work pressure and lack of supervisory support. These predictors, in conjunction with demographic and job-related variables, explained 53% of the variance in emotional exhaustion, a central component of the burnout syndrome. It therefore seems that many health personnel may be more susceptible to burnout when working in areas where there is a lack of encouragement to be self-sufficient, tasks are not clearly defined, rules' and policies are not explicitly communicated, there is a lack of variety and new approaches, and the work environment is not very attractive or comfortable.

Organizational climate, supervisor behaviour and relations within the work group have a direct influence on the job satisfaction of nurses (25). In particular, an environment which allows the expression of views is favourable and leads to more open and supportive relations among nurses, which in turn reduces role ambiguity.

Role conflict was identified by 62% of 214 community mental health psychiatrists as the most important critical factor in deciding whether to leave health centres (26).

Preventive measures

There is little scientific evidence on the efficacy of measures to prevent burnout, but some promising strategies have been identified on the basis of careful observation of the daily routine of care-givers and experience with techniques used to treat burnout. Many of the strategies set out below are adapted from Cherniss (2) and Cherniss & Dantzig (23) and are broadly in line with suggestions by Jenkins on how to prevent mental illness in the workplace (17). Their success will depend greatly on a favourable organizational environment and

cooperation at every level of the organization. For practical purposes, the strategies can be grouped according to whether they focus on the individual worker, job structure or the organization.

Strategies focusing on the individual at staff level

- Reduce demands workers impose on themselves by encouraging them to adopt more realistic and gratifying goals.
- Help workers develop and use monitoring and feedback mechanisms sensitive to short-term gains.
- Provide frequent opportunities for in-service training designed to increase role effectiveness.
- Teach staff coping strategies such as time-management techniques.
- Orient new staff by providing them with a booklet that realistically describes typical frustrations and difficulties that occur in the job.
- Provide periodic "burnout check-ups" for all staff.
- Provide work-focused counselling or consultation to staff who are experiencing high levels of stress in their jobs.
- Encourage the development of support groups and resource exchange networks.

Stress management

Approaches to treating or alleviating burnout rely heavily on techniques derived from the field of stress management, which have been found to be effective in preventing burnout. Cherniss (3) has suggested that individuals should be taught what he calls "organizational negotiation skills", which enable the individual to resolve stressful interpersonal conflicts, overcome bureaucratic constraints and secure support for new initiatives. They involve "a way of thinking about organizational barriers and conflicts that encourages a certain degree of analytical detachment and thoughtful reflection — a problem-solving attitude towards organizational difficulties".

Employees in settings which offer few opportunities to exercise

personal control over their environment must resort to individual coping methods in the first instance. If they are not in a position to control the balance of demands and resources inherent in the job, coping means developing a greater capacity to endure; timemanagement techniques and relaxation exercises (see below) can help them do this.

A supportive work group can be invaluable in helping individuals to cope with stress; together, employees can develop more effective procedures for coping with occupational demands, and mutual support within a group helps replenish exhausted emotional energy. A supportive work group can also counter the impoverishment of personal relationships which can undermine the capacity of health workers to sustain therapeutic relationships (27).

Pines & Aronson (28) identified team-building as a useful way to avert or mitigate burnout. Social support networks, comprising coworkers from within the organization and employees of similar occupational groups employed by other organizations, are a medium for exchanging innovative ideas on managing tasks, coping with stress and developing a career.

Cherniss & Dantzig (23) have summarized the key principles for conducting successful mutual-aid groups which bring together people with similar jobs or interdependent jobs as follows:

- Ensure that potential participants understand and agree to the reasons for forming such a group.
- Ensure that group members will participate actively in its development.
- Ensure that group members select a leader they are willing to support in maintaining a productive focus.
- Limit the size of the group to between 8 and 12 members.
- Promote a structured-group, rather than a process-group, format.

The same authors point out that even when all the above conditions are met, research suggests that: "... the mutual aid or social support

group may not be as effective in reducing stress as more focused and structured cognitive—behavioral interventions. Positive social support can be helpful, however, and mutual aid groups sometimes do succeed in fostering such support among their members."

Strategies focusing on the individual at managerial level

- Create management training and development programmes for current and potential supervisory personnel, emphasizing those aspects of the role that administrators have most difficulty with.
- Create monitoring systems for supervisory personnel, such as staff surveys, and give supervisory personnel regular feedback on their performance.
- Monitor "role strain" in supervisory personnel and intervene when strain becomes excessive.

Supervisor training

Supervisors can be trained to develop a more consultatory style and to become more responsive and open to workers' suggestions. One simple way to make workers feel that their opinions and suggestions are valued is to collect feedback from them by means of regular anonymous surveys.

Strategies focusing on job structure

Modifying the job is one of the simplest and most powerful ways of reducing stress.

- Limit the number of clients for whom staff are responsible at any one time.
- Spread the most difficult and unrewarding work among all staff so that no one person or group of people has to shoulder all the burden, and require staff to work in more than one role and programme.

- Arrange each day so that the rewarding and unrewarding activities alternate.
- Set aside time during the day for activities that will help staff to continue their work feeling refreshed and with renewed energy.
- Structure roles in ways that allow workers to take a break whenever necessary.
- Use auxiliary personnel (such as volunteers) to allow staff to take breaks.
- Encourage workers to take frequent vacations, at short notice if necessary.
- Limit the number of hours that staff work.
- Encourage part-time employment, which allows individuals to have more flexible schedules.
- Give every staff-member the opportunity to propose new activities, to foster spontaneity and creativity and relieve boredom.
- Build in career ladders for all staff.

Strategies focusing on the organization

Many proponents of organizational strategies view individual-based techniques as a way of "blaming the victim" by concentrating on problems within individuals, while overlooking stressors beyond individual control. A number of organizational strategies have been suggested for overcoming job stress and burnout among professional care-givers, as summarized below.

Policy and goals

- Make goals as clear and consistent as possible.
- Develop a strong, distinctive guiding philosophy.
- Make education and research a major focus of activities.
- Share responsibility for care and treatment with the client, the client's family and the community.

Problem-solving and decision-making

- Create formal mechanisms for group and organizational problemsolving and conflict resolution.
- Provide training in conflict resolution and group problem-solving for all staff.
- Maximize staff autonomy and participation in decision-making.

"[P]ermanent, formal mechanisms to monitor [the] internal work climate and deal with problems when they first emerge" (23) are an important component of quality improvement activities. Regular meetings between management and employees, with the focus on problem-solving, help to reduce the sense of powerlessness, role ambiguity and conflict felt by some employees, while improving communication within the organization. Evidence to support this is provided by Jackson's study of nursing and clerical staff (29), in which subjects in the group benefiting from increased participation were found to experience lower levels of job dissatisfaction, absenteeism, desire to leave, role conflict and ambiguity. These positive outcomes were still evident during a follow-up six months later. However, the development of strategies for improving organizational problem-solving through employee participation is only effective with the support of top management.

Organizational health

Cox & Leiter (30) have discussed the impact of work environments on individuals from an organizational health perspective. They identified three organizational environments which have an impact on the psychological state of employees: the task environment, the problem-solving environment and the development environment. The task environment comprises issues of task design and meaningfulness, which Hackman (31) has identified as critical for the development of job satisfaction and peak performance. Cox & Leiter (30) argue that poor task environments often aggravate emotional exhaustion by wasting employees' energy on meaningless tasks. The problem-solving

environment comprises the systems through which people work together to address problems and make decisions. Healthy problemsolving environments require the means for inclusive decision-making and for effective communication. Impoverished problem-solving environments weaken the social environment of the organization and contribute to the experience of depersonalization as well as further aggravating emotional exhaustion. The development environment comprises organizational systems for enhancing the skills and career development of employees, including both the learning intrinsic to the job and formal training opportunities. A strong development environment enhances feelings of professional efficacy and personal accomplishment; a weak environment engenders hopelessness and lethargy.

From the organizational health perspective, addressing burnout requires management involvement in enhancing the quality of these environmental domains. In general, goal-setting and organizational planning exercises contribute to the enhancement of task environments. Improving the problem-solving environment requires team-building interventions which enhance the capacity of group members to work together, and supervisor training to develop supervisors' capacity to delegate authority effectively. Improving the development environment requires an examination of the organization's explicit and implicit attitude towards skill development. Developing these organizational environments requires management to reassess its fundamental values and practices. Only if burnout is recognized as a reaction to aspects of the organizational environment will the commitment and resources be forthcoming to allow the problem to be tackled.

Educational interventions

Educational interventions include a variety of techniques which are designed to increase the coping skills of individual employees. Those

designed to cope with stress and burnout often include progressive muscle relaxation (32–35). The main objective of the relaxation exercises is to increase the capacity of employees to tolerate the strains arising from their job. Not only will they then experience the job as being more pleasant, they will also be more relaxed and able to cope more effectively. Relaxation is particularly relevant to burnout in that it alleviates exhaustion and increases the capacity to interact effectively with clients.

Educational interventions come in many forms: they vary in duration, from a few hours to a few days, and content; they may be purely didactic, or a combination of a lecture and experiential learning (e.g. relaxation exercises, assertiveness training, group discussions to raise awareness and promote networking); and they can be implemented within a single organization or bring together the same occupational groups from different organizations. The advantages of educational interventions are that they are relatively inexpensive as compared to one-on-one strategies, they serve as a good motivational tool for individual change and bonding within the work group, and they encourage networking similar occupations employees in working organizations. Their disadvantages are that they focus more on the "victim" rather than the organization (opponents see educational interventions as a form of "victim blaming" that relieves the organization of its responsibilities), and their effectiveness may be shortlived (providing what Cherniss (2) calls the "temporary workshop high").

Educational interventions intended to increase an individual's tolerance of occupational strains also include cognitive approaches such as autogenic training (36), biofeedback, systematic desensitization (the process of pairing increasingly anxiety-producing stimuli with a relaxed state) and "stress inoculation" (in which the subject is trained to cope with low levels of stress and thereby becomes more immune to higher levels of stress (37)).

Action to prevent burnout

- Avoid making unrealistically high demands of care-givers.
- Ensure that all workers have some rewarding tasks.
- Train care-givers in time-management and relaxation techniques
- Modify jobs that are proving too stressful.
- Encourage the formation of support groups.
- Consider the possibility of part-time employment.
- Encourage workers to participate in decisions which affect them.

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Classification of preventive measures

Primary prevention		Secondary prevention		Tertiary prevention
Health promotion	Specific protection	Early diagnosis and treatment	Disability limitation	Rehabilitation
Health education Good standard of nutrition Attention to personality development Provision of adequate housing, recreation and agreeable working conditions Marriage and genetic counselling and sex education	Use of specific immunizations Protection from accidents Use of cuvironmental sanitation Use of specific nutrients Protection against occupational and environmental hazards	Case-finding measures Screening surveys Selective examinations	Adequate treatment to arrest the disease process and to prevent further complications and sequelae Provision of facilities to limit disability and to prevent death	Provision of hospital and community facilities for retraining and education for maximum use of remaining capacities Education of the public and industry to utilize the rehabilitated As full employment as possible Selective placement Work therapy in hospitals

Adapted from Leavell HR, Clark EG. Preventive medicine for the doctor in his community: an epidemiological approach, 3rd ed. New York, McGraw Hill, 1965. Used by permission of The McGraw-Hill Companies.

ANNEX 2

The AUDIT questionnaire (Alcohol Use Disorders Identification Test)

Circle the number that comes closest to the patient's answer.

1.	How often	do	you have a	drir	ık containing a	lcol	nol?			
	(0) Never	(1)	Monthly or less	(2)	Two to four times a month		Two to three times a week	(4)	Four or more times a week	
2.	How many are drinkin		nks* contair	ning	alcohol do yo	u ha	ve on a typica	ıl da	y when you	
	(0) 1 or 2	(1)	3 or 4	(2)	5 or 6	(3)	7 or 8	(4)	10 or more	
3.	How often	do	you have si	x or	more drinks	on o	ne occasion?			
	(0) Never	(1)	Less than monthly	(2)	Monthly	(3)	Weekly	(4)	Daily or almost daily	
4.	4. How often during the last year have you found that you were not able to stop drinking once you had started?									
	(0) Never	(1)	Less than monthly	(2)	Monthly	(3)	Weekly	(4)	Daily or almost daily	
5.	5. How often during the last year have you failed to do what was normally expected from you because of drinking?									
	(0) Never	(1)	Less than monthly	(2)	Monthly	(3)	Weekly	(4)	Daily or almost daily	
6.	6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?									
	(0) Never	(1)	Less than monthly	(2)	Monthly	(3)	Weekly	(4)	Daily or almost daily	
7.	How often drinking?	du	ring the last	yea	r have you had	a fe	eling of guilt	or r	emorse after	
	(0) Never	(1)	Less than monthly	(2)	Monthly	(3)	Weekly	(4)	Daily or almost daily	

			st year have you e because you ha		o remember what ?
		Less than monthly	(2) Monthly	(3) Weekly	(4) Daily or almost daily
9. Have	you or s	someone else	e been injured as	a result of your	drinking?
(0) N	o (2)	Yes, but not	in the last year	(4) Yes, during	the last year
10. Has a	a relative t your di	or friend or rinking or su	r a doctor or othe iggested you cut o	er health worker down?	been concerned
(0) N	o (2)	Yes, but not	in the last year	(4) Yes, during	the last year
alcohol. from 10	In countr g, the res	ies where the a ponse categorie	alcohol content of a s es should be modifie	standard drink diffe	rink contains 10 g of ers by more than 25%
Record su	am of inc	lividual item	scores here:		
Health availabl	Organiz e on re	zation, 199 equest fror	2 (unpublishe	d document \ on Substance	Geneva, World WHO/PSA/92.4; Abuse, World