the abuse and misuse of prescribed and over-the-counter medicines

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This month’s special feature gives a comprehensive guide to the range of medicines which can be abused and misused. The hospital pharmacist can play a significant role in the detection and prevention of such abuse and misuse.

The problem of illicit drug use in Britain is on the increase and the literature abounds with articles on identification and management of abuse.1,2 Misuse and abuse of prescription and over-the-counter medicines is probably even more widespread,3,4 much less well documented, and is a major public health problem that is associated with numerous acute and chronic medical problems. The terms abuse and misuse are often used synonymously but they can be individually defined as “to use to bad effect” (abuse) and “to use wrongly or to apply to the wrong purpose” (misuse). Abuse can also describe the use of medication “recreationally,” in larger amounts than prescribed, in greater frequency, for different indications or by different routes, usually resulting in adverse consequences.

It may be difficult to determine when misuse becomes abuse. The spectrum of misuse may vary from over-consumption of a codeine or a morphine containing preparation to produce a relaxation effect (which the patient believes is pain relief), to excessive use of laxatives preparations to control

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weight. Many patients would not be aware that they are considered to be misusing their medicines.

**Addiction**

Addiction and dependence result in loss of control and development of an obsessive-compulsive pattern that can become a primary illness. Physiological homeostatic changes leading to tolerance, withdrawal symptoms or sensitisation may occur and cognitive changes are common. Dependence is a physiological process, which is a predictable event in the prescription of opioids, benzodiazepines, barbiturates and, to some degree, stimulants. Dependence is dose, time and potency related, and may result in tolerance to side effects and therapeutic effects. Psychological dependence is not necessarily addiction.

**General**

Drug users abuse over-the-counter products and prescription medicines when they are unable to obtain their usual illicit street drugs. Abuse of some prescription-only medicines, such as dihydrocodeine, is well known, and these medicines will have a “street” value. However, almost any substance can be misused.

Misuse and abuse of prescription and over-the-counter medicines may result in a hospital admission or be a contributory factor to the clinical presentation of the patient. It is usual to categorise the drug misuser or abuser as young, often male, and aged between 17 and 30 years. However, there are no social classes or age divisions among drug misusers.

The results from a survey of community pharmacists who were asked to identify patients they believed were buying over-the-counter medicines for misuse showed that slightly more women (57 per cent) than men (43 per cent) were believed to be involved. Of these, the pharmacists estimated that 55 per cent were in the 25 to 50 age group, 20 per cent under 25 and 25 per cent over 50 years of age.

These figures have been borne out subsequently in a similar study. Some abusers and misusers of medicines suffer from a mental illness, and either a psychiatric condition or an obsessive-compulsive disorder that contributes to their problem. It is important that pharmacists are aware of the potential for abuse or misuse of medicines, and the potential effects on patients that could be contributing to physical or mental conditions.

Overuse of a prescribed medication can be the result of underestimating the magnitude of a patient’s symptoms. Patients may be undertreated because of the doctor’s or patient’s misplaced fear of addiction or the doctor’s lack of knowledge about pharmacokinetic properties such as half-life. However, if a pattern of overuse or escalation of use develops and additional drug-seeking behaviours emerge, a more detailed addiction assessment is necessary.

The degree of misuse and abuse of over-the-counter and prescription medicines may range from patients who exceed the quantity of medication prescribed by the doctor to treat a recognised condition (for example, doubling the dose of a hypnotic in chronic insomnia), to those who buy these medicines, either legally or illegally, to support an addiction to other “harder” illicitly obtained street drugs.

In elderly patients admitted to the Mayo inpatient addiction programme the rate of prescription drug abuse alone (16 per cent) was far less common than alcohol abuse alone (72 per cent). Twelve per cent of patients abused both alcohol and prescription medicines. This group of patients had high levels of morbidity related to mental disorder and 44 per cent had a referral initially to psychiatric services.

**Behaviour**

Patients who become addicted to medication will usually show some form of drug-seeking behaviour. This might include:

- Implying that the only possible solution to a medical problem is a prescription for a controlled (addictive) medication
- Describing symptoms that markedly deviate from objective evidence or the physical examination findings
- Claiming that non-addictive medications “don’t work” or cannot be taken because of an allergy to them, that they have a high tolerance to drugs, that they have lost a prescription, or that they have run out early
- Manipulating the situation by pitting the opinion of one doctor on treatment against that of another. For example, threatening to get the requested drug from a “smarter” or “more caring” doctor
- Resisting non-pharmacological treatment recommendations, such as, behavioural training or psychotherapy
- Offering bribes or sex, or even making threats of harm to person or property

Patients may often sell or forge prescriptions. They may also use the prescriptions intended for others, such as family members and friends.
General Symptoms

It may be quite difficult for the hospital pharmacist to establish whether a patient has been abusing/misusing prescription or over-the-counter drugs. A detailed drug history may indicate a potential problem, as may the examination of medicines brought into hospital. In addition to the specific indicators for each class of drug, there are a number of other indicators which may help identify a problem. These may be:

- Sudden unexplained mood changes
- Irritability or aggression
- Abnormal fluctuation in concentration and energy
- Tendency to become confused
- Loss of short term memory
- Loss of interest

Users who inject drugs carry not only the added risk of contracting HIV or hepatitis B or C but can cause significant damage to veins and soft tissue, such as thrombosis, cellulitis and gangrene.

Opioids

Almost all the opioids available medically have been abused to some extent. Examples are given in Panel 1. The heroin sold on the street is only rarely obtained from legitimate (prescribed) sources, but other opioids, such as dihydrocodeine and Diconal, are largely obtained through prescriptions. Other opioids, such as dextropropoxyphene and codeine, often in combination with either aspirin or paracetamol, are not as popular at street level, since they are a risk of overdose of aspirin or paracetamol before a sufficient dose of opioid can be obtained. However, drug users will take these weaker opioids when the more potent opioids are not available. Methadone can be diverted by users on drug treatment programmes. However, steps taken to increase the number of drug users consuming methadone on pharmacy premises has greatly reduced the abuse potential.

Studies evaluating the abuse potential of various opioid medications clearly indicate that controlled-release formulations (for example, modified-release morphine sulphate) and agents with a long half-life (for example, methadone, levacetylmethadol) have lower abuse potential and less street value than high-peaking, rapid-onset opioid formulations.

A survey of over-the-counter medicines that were considered by community pharmacists to be abused by customers indicated that the three medicines most commonly involved were GEc’s lintuc, codene tablets or lintuc, and kao lin and morphine mixture. Misuse or abuse of prescription opiates in patients with chronic pain is much harder to define. Patients who may display opiate abuse behaviours may be receiving inadequate dosages to control their pain, or may have an opiate resistant neuropathic pain.

Intravenous administration While almost all opioids can be administered orally, a greater “rush” is experienced if given by intravenous injection. As a consequence, tablets containing an opioid are often crushed then mixed with water and the resultant solution injected intravenously. Liquid preparations and dissolved soluble co-codamol and co-dydramol tablets are also injected. Ascorbic or citric acid can be mixed with these tablets to aid dissolution of the opioid.

Actions The euphoria attributable to opioids is mediated through the endogenous opioid systems in the brain. The opioid β-endorphin stimulates the μ receptors, thereby producing a sensation of well being. Opiates act as agonists at the μ receptor, and abuse can lead to repetitive use and subsequent tolerance and addiction. These drugs also inhibit the firing rate and release of noradrenaline in the locus caeruleus. After repetitive opiate abuse the β-endorphin system becomes functionally deficient. As a consequence, opioid suppression of the locus caeruleus activity is weakened. Opiate withdrawal results in hyperactivity of the locus caeruleus and subsequent increased noradrenergic release acts as a negative reinforcer of withdrawal. Receptors outside the CNS facilitate some of the peripheral effects, such as constipation.

Side effects The side effects of opioids, like sedatives, depress nervous system activity to produce reflex reactions such as coughing. They will dilate blood vessels, giving a feeling of warmth, and depress bowel activity, resulting in constipation. The user often feels physically and mentally calm; at higher doses they can become drowsy and fall asleep. Euphoria is the major effect that most users are seeking in the first instance, but tolerance to this effect occurs quite quickly and the dose is repeatedly increased by users seeking to achieve this effect again. For those who become addicted and cannot tolerate the psychotropic effects, the driving force for repeated use becomes the need to stave off withdrawal symptoms. Opioid use can cause nausea, vomiting, drowsiness and mental confusion, dry mouth, itching and constipation. Chronic opiate use tends to depress sexual performance and as a consequence there is now a street value for sildenafil (Viagra) which is also used by opioid-abusing drug addicts. Opiate overdose may result in miosis, dysphoria, hypothermia, bradycardia, respiratory depression and coma. Arrhythmias and pulmonary oedema may also occur. The use of naloxone can reverse most of these effects except the arrhythmias and pulmonary oedema. The half-life of naloxone is shorter than most opioids and repeated doses are necessary, especially when treating an overdose of an opioid which has a long half-life, for example, methadone or dextropropoxyphene.

Withdrawal symptoms Signs of opioid withdrawal can start to occur within four to six hours after the last dose, depending on the half-life of the opioid that has been abused. Maximum effects occur normally after 36 to 72 hours, but this will vary according to opioid; if untreated, effects will take five to 10 days to subside.

The severity of the withdrawal symptoms increases with the size of the opioid dose and duration of dependence. The symptoms of opiate withdrawal start initially with anxiety, craving, restlessness, lacrimation, yawning, sweating and rhinorrhea. A reliable early sign of withdrawal is a respiratory rate greater than 16 breaths per minute. Other symptoms include mydriasis, piloerection, tremors, muscle twitch, hot and cold flushes, aching muscles and anorexia. In severe cases, tachycardia, hypertension or hypotension may occur.

Lofexidine is used for the alleviation of symptoms in patients undergoing opioid withdrawal. It appears to act centrally to produce a reduction in sympathetic tone. Reduction in blood pressure is less marked than with clonidine, which has also been used, although unlicensed for this purpose. Methadone can be substituted for opioids and will prevent the onset of withdrawal symptoms. However, methadone is addictive and should only be prescribed for those who are physically dependent on opioids. It is administered in a single daily dose, usually as methadone mixture 1mg per ml. The dose is adjusted according to the degree of dependence, with the aim of gradual reduction.

Sympathomimetics

Sympathomimetics are used as anxiolytics and depres- sive agents and as a substitute for opioids. They are used in the treatment of withdrawal symptoms and for the treatment of opioid overdose. The most commonly used sympathomimetics are amphetamines, methylphenidate and the anorectic agents diethylpropion, fenfluramine and phentermine.
Actions These drugs mimic the action produced by stimulation of post-ganglionic receptors of noradrenergic nerves. Sympathomimetic agents which act on the central nervous system are stimulant. They exert their effect on dopamine neurotransmission and in this respect resemble the stimulant action of cocaine.

Dexamfetamine is now the only prescribed amphetamine and its clinical use is limited to the treatment of attention deficit hyperactivity disorder (ADHD) and narcolepsy. Street amphetamine (“speed” or “whizz”) is usually illegally produced amphetamine sulphate powder which is sniffed or dabbed on to the tongue, but may also be smoked or injected.

Methylphenidate is increasingly prescribed for the treatment of ADHD in children and adolescents. It has a similar mode of action to amphetamine, activating the brain stem arousal system and cortex. Methylphenidate not only has a street value but also has the potential for over-use by those not considered as substance misusers.

Although less potent in their action, the nasal decongestants also have properties which stimulate the central nervous system, particularly in high doses. Abuse and misuse of decongestant remedies and cough mixtures has been reported. Sullivan14 reported a case of acute psychosis following intravenous injection of 60mg pseudoephedrine by an 18-year-old male, suggesting that, used intravenously, pseudoephedrine was sufficiently psychoactive to produce a psychosis through increased psychostimulation in the same way as amphetamine. Use of oral pseudoephedrine in high dose can produce symptoms of hyperalertness and euphoria but chronic use may cause paranoia, hostility and aggression. Commenting on a report of mania induced by a cough mixture containing phenylpropanolamine, Clovis15 cited the case of a female with bouts of paranoia associated with the use of pseudoephedrine.

Beta2 adrenergic stimulants (for example, salbutamol, terbutaline) are the safest and most effective beta stimulants for asthma but are frequently overused. Dette et al16 reported that 16 per cent of patients with moderate or severe asthma admitted to overuse (above eight inhalations a day). Where appropriate, patients presenting with symptoms of anxiety or panic should be questioned about inhaler use, as a vicious circle can develop. This occurs where anxiety accompanied by shortness of breath, induced by overuse of beta2 adrenergic agonists, leads to increasing use of the prescribed inhaler.

The effects of sympathomimetic toxicity are the same as would be expected from the side effects of this class of drug. They include nervousness, insomnia, loss of appetite, nausea, vomiting, dizziness, palpitations and headaches. Also possible are changes in heart rate and blood pressure, skin rashes, itching, abdominal pain, weight loss, digestive problems, toxic psychosis and psychotic episodes. Withdrawal can lead to severe depression.

### Stimulants

This section includes a range of medications (other than sympathomimetic agents) which act on central nervous system neurotransmission with a resultant stimulant effect. This produces a sense of well-being leading to potential misuse/abuse with consequent adverse effects.

#### Anticholinergics

Anticholinergic drugs, examples of which are given in Panel 3, act by antagonising muscarinic and nicotinic cholinergic receptors. Nicotinic receptors are located on sympathetic ganglia and voluntary muscle. Muscarinic neuro-transmission is associated with wakefulness, memory, expressions of emotion and co-ordination. Antimuscarinics (benzhexol, orphenadrine and procyclidine) are widely used in psychiatric practice to relieve the extrapyramidal effects associated with the use of conventional antipsychotics. They are frequently abused by patients with severe mental illness. Marken et al17 reviewed 110 published cases of anticholinergic abuse and found three subgroups of users. These comprised subjects with substance dependence and no medical indication for anticholinergic use, substance abusers with valid indications for anticholinergic prescriptions, and those who are not known to abuse other substances but over use their prescribed anticholinergic medication. Effects ranged from mild euphoria and increased sociability to hallucinations and toxic psychosis.

#### Antihistamines

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#### Antihistamines

Antihistamines are the safest and most effective antihistamines. They are generally classified according to their chemical structure, it may be more useful to consider them as first generation (classic) and second generation (non-sedative) histamine H1 receptor antagonists.20 Classic H1 receptor antagonists possess anticholinergic activity and also a central nervous system depressant action, whereas the second generation agents penetrate poorly into the central nervous system and lack central H1 and cholinergic blocking activity.

The first generation antihistamines have a potential for abuse and misuse as a result of their effects on the central nervous system. On the one hand, they produce a feeling of euphoria and wakefulness with the patient experiencing a “buzz” and, on the other hand, they have a short term sedative effect in those with chronic sleep disturbance. This sedative effect is usually short-lived and the patient then takes escalating doses with resultant adverse effects.

In a study to investigate the extent of non-prescription drug abuse, Hughes et al21 identified 112 products perceived by pharmacists as being abused. Antihistamines (together with opioids and laxatives) were among the most frequently reported products suspected of being abused.

Cyclizine, either alone or in combination with opioids, is taken for its euphoric effect and a trend of increasing use was noted in the mid-1980s.22 A retrospective review23 of patients under the age of 18 who had intentionally ingested cyclizine, taken from the records of the poisons control centre in Utah (US), concluded that abuse accounted for 89 per cent of cyclizine ingestions. Hallucinations (70 per cent) and confusion/disorientation (40 per cent) were the most notable symptoms. Tachycardia and systolic hypertension were also frequently reported. Buckley et al24 compared toxicity and use of pheniramine with other antihistamines in Newcastle, Australia, and found pheniramine to account for 33.9 per cent of...
antihistamine self-poisoning but only 3 per cent of antihistamines dispensed, and concluded that pheniramine is more likely to be abused than any other antihistamine.

Dinndorf described children and adolescents with chronic illness exhibiting drug-seeking behaviour or symptoms attributable to the anticholinergic properties of prescribed diphenhydramine. Martindale lists a wide range of products containing diphenhydramine either as the sole constituent or in multi-ingredient preparations. Given their availability in such diverse treatments as anti-allergic, cough/cold and travel sickness agents, the overuse and misuse of antihistamines may be underestimated. Side effects may include sedation/loss of concentration, tachycardia, hypertension, confusion/disorientation and anticholinergic effects.

Caffeine Caffeine is probably the most widely available stimulant, being present in a range of commercially available beverages including tea, coffee, cola, many soft drinks and chocolate, as well as in non-prescription analgesics and “tonic” preparations such as Panadol Extra, Pro-Plus and some Anadin products. It is a central nervous system stimulant inhibiting phosphodiesterase and antagonising the effect of central adenosine receptors. In this respect it is similar in action to the sympathomimetic agents. Martindale lists a wide range of products containing diphenhydramine either as the sole constituent or in multi-ingredient preparations.

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**Antidepressants** Antidepressants act on central nervous system serotonergic and noradrenergic neurotransmission, either by inhibition of monoamine-oxidase or by inhibition of neurotransmitter re-uptake into presynaptic vesicles. As a result, they may have a stimulant effect similar to that of the sympathomimetic agents.

Published evidence of antidepressant abuse is limited and Haddad argued that the pharmacodynamic profile and absence of acute desirable effects made antidepressant abuse theoretically unlikely. However, case reports of antidepressant abuse include fluoxetine, mianserin and tranylcypromine.

The recently developed selective neuro-transmitter re-uptake inhibitors, which are relatively free of the undesirable, distressing side effects of the older tricyclic antidepressants, are likely to be misused as they have a definite alerting effect and can produce the “buzz” sought by the substance abuser.

Adverse effects of antidepressants include restlessness, agitation, sleep disturbance, nausea, hallucinations and psychoses.

**Combination products** Panel 5 lists some multi-ingredient preparations which contain a mixture of sympathomimetic agents and antihistamines, with or without caffeine, which are readily available as non-prescrip-

**Panel 5: Examples of combination products**

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<th>Product</th>
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<td>Some Benylin preparations</td>
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<td>Contac 400</td>
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<td>Day nurse</td>
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<td>Dimotane</td>
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<td>Dimotapp</td>
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<td>Eskornade</td>
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<td>Feminax</td>
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<td>Galpseud Plus</td>
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<td>Haymine</td>
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<td>Robitussin Night-time</td>
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<td>Some Tixylyx preparations</td>
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<td>Vicks medimute</td>
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Laxatives

Laxative abuse is found in approximately 4 per cent of new patients evaluated for chronic diarrhoea and in 15 to 20 per cent of patients referred to tertiary centres. The majority of laxative abusers are female. Patients who abuse laxative preparations are either attempting to control their weight or have an obsession to defecate regularly. The majority of people who purchase laxatives do so because they have constipation due to lack of sufficient fibre and fluid in their diet and/or lack of exercise, which could be addressed by non-pharmacological methods. Those laxatives most commonly abused are either stimulant or osmotic laxatives, examples of which can be found in Panel 6. Stimulant laxatives, such as senna and bisacodyl, stimulate nerve endings in the colon in order to induce peristalsis to expel faecal material. Osmotic laxatives, such as phosphate enemas and lactulose, induce bowel movement by retaining fluid in the bowel by osmotic or by changing the pattern of water distribution in the faeces.

Those patients with eating disorders, such as anorexia nervosa and bulimia nervosa, who abuse laxatives do so in the belief that this will remove food from their body and prevent absorption of calories. This belief is often ill-founded, as by the time remnants of food reach the colon only indigestible fibre and other non-nutritive material is left. However, laxatives remove water in addition to food residues from the colon, which will indicate a false weight loss after a laxative-induced bowel movement. The ounces or pounds return as the body rehydrates after liquid consumption. This is seen as weight gain and serves to re-inforce the need to continue laxative use. Patients with eating disorders who abuse laxatives often demonstrate more perfectionism and avoidant personality features than non-abusers; other indications of psychopathology are also often present.

Patients with a bowel obsession tend to be older than those with eating disorders. Beliefs may have been instilled from childhood that a regular, frequent bowel habit is needed for good health. In many, poor diet and insufficient exercise may make this impossible and patients will resort to laxatives to achieve this ideal.

When laxatives are taken regularly for a long period of time, one or more adverse effects may occur. These include abdominal cramping and pain, diarrhoea and vomiting which can lead to dehydration, electrolyte, fluid and mineral imbalances, weak muscles, metabolic acidosis, tetany and, in some of the worst cases, heart failure. Electrolyte imbalance can lead to renal failure and statorrhoea is often reported. Excessive laxative...
use can impair absorption of vitamin D and calcium, which can cause osteomalacia. Gastrointestinal damage can occur, resulting in weakening of intestinal musculature, loss of gastrointestinal protein and cathartic colon. The resultant inability to have a bowel movement without a laxative will cause intractable constipation and periodic faecal impaction. Refractory diarrhoea, abnormal electrolytes and an associated neurosis or psychiatric illness are often strong indicators of laxative abuse. A probing drug history may reveal this.

A nabolic steroids

Anabolic steroids have been used to increase muscle mass in conjunction with rigorous training. It is believed that there may also be a psychological benefit which makes people feel they are stronger or faster. However, the use of anabolic steroids such as stanozolol and nandrolone is now recognised as widespread, addictive and dangerous. The steroids are no longer recognised as widespread, addictive and dangerous. The steroids are no longer recognised as widespread, addictive and dangerous. The steroids are no longer recognised as widespread, addictive and dangerous. The steroids are no longer recognised as widespread, addictive and dangerous. The steroids are no longer recognised as widespread, addictive and dangerous. The steroids are no longer recognised as widespread, addictive and dangerous. The steroids are no longer recognised as widespread, addictive and dangerous. The steroids are no longer recognised as widespread, addictive and dangerous. 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drowsiness, poor concentration, ataxia, dysarthria, motor inco-ordination, diplopia, muscle weakness, vertigo and mental confusion. Benzodiazepines slow reaction time and impair driving skills. Patients may therefore present as a consequence of a road traffic or other accident. An association has been noted between benzodiazepine use and depressive symptoms and, in some cases, the emergence of suicidal intention.\textsuperscript{6}

Benzodiazepines induce amnesia, which accounts in part for the beneficial effects of the drugs. This effect appears to be separate from sedation. Episodic memory is impaired and this is more marked in heavy alcohol drinkers who also use benzodiazepines. Specific deficits in visuospatial ability and sustained attention have also been described in patients who have taken therapeutic doses of benzodiazepines regularly for longer than one year.\textsuperscript{6}

Patients who are addicted to any tranquilliser or sedative should not have treatment stopped suddenly. Withdrawal should be very gradual and withdrawal periods may range from six weeks to several months. Changing from a shorter to a longer acting benzodiazepine, for example, diazepam is often helpful.

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**INHALANTS**

The increasing use of inhalants, their widespread availability and the risks involved with their use indicate a need for more focused attention on this public health problem.\textsuperscript{7,8} Although it can persist into adulthood, inhalant abuse is seen predominantly in adolescents and young adults.\textsuperscript{8,9,10} In part because inhalants are readily available and inexpensive. Significant social, economic and medical consequences are associated with their use.\textsuperscript{11,12} Examples are shown in Panel 8.

**Action** When a relatively high concentration of inhaled substance reaches the brain quickly, it produces a “high” that may last from a few seconds to several minutes. Inhalants commonly cause euphoria, hallucinations and perceptual disturbances, and can heighten the emotions prevalent at the time. The chronic abuser can sustain these effects for several hours by repeated inhalations as the effects of previous exposure begin to wear off. Tolerance may develop over time.

**Side effects** Initial effects include nausea, sneezing, coughing, nosebleeds, feeling and looking tired, bad breath, loss of appetite and a lack of co-ordination. Solvents and aerosols also decrease the heart and breathing rates and affect judgment. The strength of these effects depends on the experience and personality of the user, how much is taken and the specific substances inhaled. Deep breathing of the vapour or inhaling a lot over a short period of time may result in losing touch with one’s surroundings, a loss of self-control, violent behaviour, unconsciousness or death. Nausea or vomiting can occur and death may result from aspiration.

Sniffing highly concentrated amounts of solvents or aerosol sprays can produce heart failure and instant death. This may occur the first time or any time. Fatilities may also occur through suffocation, by displacing oxygen in the lungs or depression of the central nervous system to such an extent that breathing slows down until it stops. Death from inhalation is usually caused by a very high concentration of inhalant fumes. Deliberately inhaling concentrated fumes from a limited space and re-breathing until a high is achieved, through use of a plastic or paper bag, greatly increases the chance of suffocation. In identifying inhalant misusers, signs of intoxication, sudden changes in mood, lifestyle or appetite may be apparent. There may be facial erythema and reddening around the mouth and nose, regular signs of headaches, drowsiness or repeated sore throats, coughs or colds.

In the long term, chronic abuse may be associated with a decreased ability to concentrate, insomnia and nightmares. Weight loss, fatigue, electrolyte imbalance and muscle fatigue may also result from long-term use. Repeated sniffing of concentrated vapours over a number of years can cause permanent damage to the nervous system, resulting in reduced physical and mental capabilities. In addition, over time, certain inhalants, particularly solvents, can damage the liver (for example, carbon tetrachloride and chloroform), kidneys (for example, toluene) and bone marrow.

**Use with other products** Using inhalants while taking other products, such as hypnotics, antipsychotics or alcohol, increases the risk of loss of consciousness, coma or death. Prescribed and over-the-counter drugs will be less implicated in inhalant abuse than other products. Combinations may be used. Mason\textsuperscript{13} indicated that users who sniffed heroin or “crack” cocaine frequently used products containing menthol and camphor to heighten the effect. Weintraub et al.\textsuperscript{14} reported a case of medical complication related to mothball (naphthalene and paradichlorobenzene) abuse.

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**NITRITES**

Nitrite inhalant abuse (poppers) causes vasodilation and increased heart rate. The effect is transitory and can cause dizziness, facial flushing and a pounding headache. These products are sometimes used during anal sex as they relax smooth muscle tissue. Inhalation exposure to the nitrites produces a non-specific cytotoxicity, depleting many cells of the immune system. In addition, the inhalant-increased production of tumour necrosis factor-alpha, an inflammatory cytokine, can directly stimulate HIV replication and can also stimulate the growth of Kaposi's sarcoma cells. Thus, nitrite inhalants may impair immune resistance to infection and actively promote viral replication and tumour growth.\textsuperscript{15}

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**MISCELLANEOUS**

Although most prescription and over-the-counter drugs that are abused or misused fall into one of the above categories, almost any drug has the potential to be abused or misused. Often these are only documented by a few case reports or are generally acknowledged as current “street” trends. The reasons for misuse or abuse can be many and varied, as can be seen in the following examples.

**Alcohol-containing products** Some products contain alcohol in high concentrations, for example, surgical spirit, methylated spirit, and may be requested by alcoholics.

**Sildenafil** Due to the restrictions for prescribing sildenafil under the NHS, the use of this drug in some cases has spread outside the control of the doctor. In some instances supply is sourced via the internet, but it can be bought “on the street”. Chronic opiate use tends to depress sexual performance. Sildenafil is therefore seen by opioid abusing drug users. Sildenafil is also used by healthy men, who have no medical or psychological need, in the belief that it will enhance sexual performance.

**Salbutamol inhalers** Salbutamol inhalers are currently in vogue with cannabis smokers. Although inhalation of smoke containing cannabinoids produces bronchodilation, the smoke can be an irritant and can trigger bronchoconstriction in asthmatics. Chronic use is associated with increased airways resistance and can cause bronchitis. Salbutamol inhalers are therefore used after smoking to help restore airway function.

**Sumatriptan** Misuse of the 5HT\textsubscript{1} agonist sumatriptan has been reported to be a problem\textsuperscript{16,17} with some people using more than 29 defined daily doses per month. Rebound headache has been postulated as a cause for this but the incorrect use of sumatriptan as a prophylactic agent may also be a problem. Over-use of sumatriptan has serious economic consequences but the long-term health effects are unknown at the present time.

**Insulin** Insulin omission by diabetic teenage girls in order to lose weight has been reported\textsuperscript{18} as another type of medicine misuse. Eleven per cent of teenage girls in one study reported that they were currently taking less than their prescribed dose of insulin in order to lose weight. Among girls with diabetes...
and an eating disorder, 42 per cent reported insulin misuse.

**Conclusion**

Prescription and over-the-counter medicines can be misused and abused by a wide ranging group of patients from diabetic girls trying to lose weight to hardened drug users seeking to support their habit when illicit “street” drugs are unavailable. Hospital pharmacists need to be aware of the abuse potential of prescribed medication and the warning signs and symptoms.

Many patients may not be aware that they are misusing or abusing their medicines. In these cases a detailed drug history, including use of the over-the-counter medicines, may highlight the problem in some patients. Other patients who are aware of their problem may choose to provide false answers to questions in order to hide their degree of abuse or misuse.

In cases where there is a strong suspicion of abuse or misuse, further information may need to be obtained from the GP or from friends or relatives. Treatment and rehabilitation of patients may require the intervention of the Specialist Service for Drug Misuse. However, in some cases, patients may refuse the offer of help or support and deny any problem.

As well as recognising medicine abuse and misuse, it is equally important for the hospital pharmacist to prevent the creation of new abusers. The British National Formulary details the three main responsibilities of the prescriber in order that creation of dependent patients is minimised.

1. To avoid creating dependence by introducing drugs to patients without sufficient reason. In this context, the proper use of the morphine-like drugs is well understood. The dangers of other Controlled Drugs are less clear because recognition of dependence is not easy and its effects, and those of withdrawal, are less obvious. Perhaps the most notable result of uninhibited prescribing is that a very large number of patients in the country take tablets which do them neither much good nor much harm, but are committed to them indefinitely because they cannot readily be stopped.

2. To see that the patient does not gradually increase the dose of a drug, given for good medical reasons, to the point where dependence becomes more likely. This tendency is seen especially with hypnotics and anxiolytics. The prescriber should keep a close eye on the amount prescribed to prevent patients from accumulating stocks that would enable them to arrange their own dosage or even that of their families and friends. A minimal amount should be prescribed in the first instance, or when seeing a new patient for the first time.

3. To avoid being used as an unwitting source of supply for addicts. Methods include visiting more than one doctor, fabricating stories, and forging prescriptions.”

Hospital pharmacists can help prevent the creation of potential drug users by ensuring that inpatient medication use is appropriate. In addition, medication for potentially abusable medicines, for example, benzodiazepines, should either be discontinued on discharge, or only a short course supplied, and the patient made aware of the short-term nature of the medicine.

In conclusion, hospital pharmacists have a significant role to play in the detection and prevention of drug misuse and abuse of prescription and over-the-counter medicines.

**References**

6. Hughes GF, McElney JC, Hughes CM, McKenna P. Abuse/misuse of non-