

## Nicotine Dependent Inpatients (The Guide for the Management of)

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**Functional Sub group** Clinical/ Patient Services - Medical Treatment

**Summary** Provides a supportive environment for NSW Health to achieve its goals of reducing the harms associated with tobacco use and promoting health by the provision of smoke free environments and delivery of appropriate interventions to those who smoke.

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**Applies to** Area Health Services/Chief Executive Governed Statutory Health Corporation, Board Governed Statutory Health Corporations, Affiliated Health Organisations - Non Declared, Divisions of General Practice, Government Medical Officers, NSW Ambulance Service, NSW Dept of Health, Public Health Units, Public Hospitals

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**The 'Guide for the management of nicotine dependent inpatients'**

The 'Guide for the management of nicotine dependent inpatients' was developed for use in NSW Health hospitals by an intersectoral advisory group with representatives from a broad range of organisations with expertise in tobacco and health. These included ASH Australia; Area Health Services; National Heart Foundation- NSW Division; NSW Health Department; the Australian Medical Association; The Cancer Council of NSW; the NSW Nurses' Association and the Royal Australian College of General Practitioners.

Consultation with clinical staff in metropolitan and rural Area Health Services identified the need for brief, simple evidence-based guidelines to assist in the management of patients who smoke and are hospitalised in an environment where smoking is banned indoors and outdoors. Feedback on earlier drafts of the guide was received from a broad range of stakeholders.

The World Health Organisation recommends that all health care premises and their immediate surroundings be smoke free and that hospital staff should ask about patients' smoking status prior to or on admission; offer brief advice and pharmacotherapy to those who need it and assistance to those interested in quitting (WHO 2001).

The Guide was developed within the context of the NSW Health Smoke Free Workplace Policy 1999 (Circular 99/76). This policy provides a supportive environment for NSW Health to achieve its goals of reducing the harms associated with tobacco use and promoting health by the provision of smoke free environments and delivery of appropriate interventions to those who smoke.

The treatment guideline is based on international evidence in best practice for the treatment of nicotine dependence. The primary goal of the protocol is the treatment of nicotine dependent patients in NSW Health facilities. This includes the offer of pharmacotherapy for nicotine withdrawal and delivery of brief intervention for smoking cessation.

The Department recognises that individual wards, hospitals and Area Health Services will currently have differing protocols in place regarding the management of patients who smoke. It is recommended that Area Health Services develop specific protocols, based on this Guide, that are appropriate for their local settings to clarify role delineation to ensure prompt delivery of treatment to patients.

Distributed in accordance with circular list(s):

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It is further recommended that hospital pharmacies maintain adequate stocks of nicotine replacement therapies (NRT) in order to ensure swift delivery to patients. In situations where hospitals and/or wards are isolated from pharmacies or there may be a delay in provision of NRT to patients for any other reason, it is advisable that adequate stocks of NRT are maintained in hospital wards.

There are two parts to the printed *Guide*:

- A laminated flowchart (see attached) has been developed in consultation with doctors and nurses, as a practical reference tool intended for use on the wards in NSW Health facilities. It outlines the main steps in identification, treatment and referral for patients who smoke.
- A booklet, *Summary of evidence* (see attached) provides more detailed information including the pharmacology of nicotine, assessment of dependence, pharmacotherapy and referral.

Hard copies of the flowchart and 'Summary of evidence' booklet are available from the Better Health Centre Publications Warehouse, phone: (02) 9879 0443 or fax: (02) 9879 0994 and both are available online in downloadable PDF format from the NSW Health website:

<http://www.health.nsw.gov.au/public-health/health-promotion/pdf/Tobacco/patsmoke.htm>

Robyn Kruk  
**Director-General**

# Guide for the management of nicotine dependent inpatients – *Flowchart*

## 1 Identify every tobacco user on admission

- Use *Substance Use History* form or include smoking status on existing admission forms
  - **Ex-smokers** – Encourage continued abstinence
  - **Daily/occasional smokers** – Follow steps 2-5

## 2 Manage inpatient nicotine dependence

- Inform patient of the 'NSW Health Smoke Free Workplace Policy' and specify contraindications to their treatment regime if they leave the ward/facility to smoke
- Discuss options for management of nicotine dependence while in hospital such as:
  - abstinence
  - abstinence supported by nicotine replacement therapy (NRT), unless contraindicated
  - smoking offsite/in outdoor designated areas if available
- If a patient has a history of mental health problems consult with treating clinician

## 3 Prescribe nicotine therapy

- Arrange prescription for NRT (with patient consent)
- Record
  - type (patch/inhaler/gum) and dose on medication chart
  - 'nicotine dependent' in patient notes

## 4 Monitor patient's withdrawal symptoms

If patient is still experiencing withdrawal symptoms:

- review NRT dose/product (patient may benefit from combination therapy)

## 5 Discharge

Ask **all** smokers – *"Do you plan to smoke when you go home?"*

- **"Yes"**
  - Encourage future quit attempt *"The best thing you can do for your health is to stop smoking. When you're ready, phone the **Quitline** or talk to your doctor."*
- **"No"**
  - Arrange three day post discharge NRT
  - Include treatment summary in discharge plan
  - Advise patient to seek cessation support from GP/pharmacist/**Quitline** ☎ 131 848

**NSW Health Smoke Free Workplace Policy (1999)** – This Policy prohibits smoking in all buildings, vehicles and grounds controlled by NSW Health with the exception of approved designated outdoor areas. The rationale of the Policy is to reduce the harms of smoking, to prevent exposure to environmental tobacco smoke and to promote the message that smoking is a serious chronic condition that is lethal for one in two regular users. This flowchart is a companion to the *Guide for the management of nicotine dependent inpatients: summary of evidence*.

## Nicotine

Nicotine is the drug in tobacco that causes dependence. This dependence is reinforced by:

- the rapid delivery of nicotine to the brain which inhaled cigarette smoke provides (10-19 seconds)
- positive reinforcement linked to dopamine release in the brain
- relief of withdrawal symptoms by continued smoking

Nicotine dependence can be assessed using these two questions:

*Fagerstrom KO, Heatherton TF, Kozlowski LT. Nicotine Addiction and Its Assessment. Ear, Nose and Throat Journal 1990. Vol 69, No 11 . 763-765*

Question	Answer	Points	Scoring
1. How soon after you wake do you smoke your first cigarette?	Within 5 minutes	3	0-2 very low 3 low
	6-30 minutes	2	
2. How many cigarettes per day do you smoke?	10 or less	0	4 moderate 5 high 6 very high
	11-20	1	
	21-30	2	
	31 or more	3	

## Nicotine withdrawal symptoms

Symptoms include cravings plus four (or more) of the following within 24 hours of cessation – depressed mood, insomnia, irritability frustration or anger, anxiety, difficulty in concentrating, restlessness, decreased heart rate, increased appetite or weight gain. These symptoms cause clinically significant distress and are not due to a general medical condition and are not better accounted for by another mental disorder (DSM-IV).

## Nicotine Replacement Therapy (NRT)

NRT provides lower nicotine levels than those achieved by smoking and relief from physiological withdrawal symptoms. This helps resist the urge to smoke cigarettes. Delivery of nicotine via the oral mucosa (gum/inhaler) and transdermally (patch) is slower than delivery by smoking. NRT medications do not contain other toxic substances found in cigarettes such as carbon monoxide and tar, they do not produce dramatic surges in blood nicotine levels and they do not produce strong dependence.

The 'Cochrane Review' (Silagy *et al* 2001) found that:

- odds ratio for abstinence with NRT compared to control was 1.73 (patch 1.76, gum 1.66 and inhaler 2.08)
- these odds were largely independent of the intensity of additional support provided to the smoker
- in highly dependent smokers there is significant benefit of 4mg gum over 2mg gum (odds ratio 2.67)
- NRT increases quit rates approximately 1.5 to 2 fold regardless of setting

*"All of the evidence indicates that nicotine administered as a medication is always safer than that obtained by cigarette smoking."* (Benowitz 1998)

In Australia, NRT is currently contra-indicated for some patient groups and use by these patients requires special consideration.

## Contraindications to use of NRT (MIMS April/May 2001)

- Gum (S2)** Non tobacco users, pregnancy, lactation, children (<12 yrs).
- Patch (S2)** Non tobacco users, acute MI, unstable angina pectoris, severe arrhythmias, recent CVA, skin disease, children (<12 yrs), pregnancy and lactation.
- Inhaler(S3)** Non tobacco users, hypersensitivity to menthol, pregnancy, children (<12 yrs).

## Dose (MIMS April/May 2001)

- Gum (S2)** Maximum 40mg daily
- Patch (S2)** Healthy people, >10cigs/day, >45 kgs: one patch daily 21mg/24hr or 15mg/16hr  
Cardiovascular disease, <10cig/day, <45 kgs: one patch daily 14mg/24hr or 10mg/16hr
- Inhaler (S3)** 6-12 cartridges/day

## How to use NRT

- Gum** The gum is effectively a mouth patch and nicotine is absorbed through the oral mucosa. Chew till a peppery/tingling feeling, flatten and 'park' between the gum and the cheek. Chew and 'park' several times per piece. (Avoid coffee/soft drinks 15 minutes before and while using gum.)
- Patch** Place on clean, non-hairy site on chest or upper arm upon waking. Rotate site each day.
- Inhaler** Inhale air through cartridge for 20 minutes. Self-titrate dose according to withdrawal symptoms.
- Bupropion is not an appropriate medication for management of short-term nicotine withdrawal.**

## Resources available on [www.health.nsw.gov.au](http://www.health.nsw.gov.au)

**For patients** *Products to help you quit smoking.*

**For staff** *Guide for the management of nicotine dependent inpatients: summary of evidence.*

# Guide for the management of nicotine dependent inpatients

## Summary of evidence

NSW HEALTH DEPARTMENT

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January 2002

# Foreword

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## Guide for the management of nicotine dependent inpatients

This document has been developed to assist clinicians (doctors and nurses) manage nicotine dependence and treat nicotine withdrawal in patients admitted to NSW Health facilities.

Smoking is recognised as a leading preventable cause of morbidity and premature mortality particularly from cancer, cardiovascular disease and chronic obstructive pulmonary disease (COPD). Nicotine is the psychoactive drug within tobacco that affects mood and performance. Such are the addictive properties of nicotine absorbed through the pulmonary circulation that the World Health Organisation has recognised that smoking is a chronically relapsing condition warranting treatment and support from all health care systems.

The *Guide for the management of nicotine dependent inpatients – Flowchart* has been developed in consultation with doctors and nurses as a practical reference tool intended for use on the wards in NSW Health facilities. It outlines the main steps in identification, treatment and referral for patients who smoke. The *Summary of evidence* provides more detailed information including the pharmacology of nicotine, assessment of dependence, pharmacotherapy and referral.

The *Guide for the management of nicotine dependent inpatients* has been developed within the context of the 'NSW Health Smoke Free Workplace Policy'. This 'Policy' provides a supportive environment for NSW Health to achieve its goals of reducing the harms associated with tobacco use and promoting health by the provision of smoke free environments and delivery of appropriate interventions to those who smoke.

It is recommended that Area Health Services develop specific protocols that are appropriate for their local settings to clarify role delineation to ensure prompt delivery of treatment to patients.

This document provides a bold and innovative response to the issue of smoking and caring for smokers in public health facilities. I believe it is ground breaking in its scope and hope that it will encourage others to follow this approach. I commend this document to you.

Yours sincerely



**Dr Greg Stewart**

A/Deputy Director General Public Health  
and Chief Health Officer  
NSW Department of Health

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**For patients** *Products to help you quit smoking*

**For staff** *Guide for the management of nicotine dependent inpatients: summary of evidence*

# Rationale

## for the treatment of nicotine dependent inpatients

The primary goal of this protocol is the effective treatment of nicotine dependent patients in NSW Health facilities. This includes the offer of pharmacotherapy for nicotine withdrawal and delivery of brief intervention for smoking cessation.

Tobacco smoking is the greatest single preventable cause of premature death and disease in Australia. It is estimated that smoking kills more than 19,000 Australians each year, with thousands more suffering debilitating illness (*Ridolfo & Stevenson 2001*).

The World Health Organisation describes smoking as an epidemic that will cause one in three of all adult deaths by 2020 (*WHO 1999*). It recommends that all health care premises and their immediate surroundings be smoke free and that hospital staff should:

- ask about patients' smoking status prior to or on admission
- offer brief advice and pharmacotherapy to those who need it
- assistance to those interested in stopping (*WHO 2001*).

The recent report of the US Surgeon General regards tobacco dependence as a 'chronic disease with remission and relapse'. It states that nicotine use, in the form of 10 or more cigarettes a day, provides continuous neuroexposure resulting in tolerance and physical dependence which in turn produce withdrawal symptoms. Nicotine dependence warrants medical treatments as do other drug dependence disorders and chronic diseases (*US Dept Health & Human Services 2000*).

Many countries including the United Kingdom and the U.S.A. have developed clinical guidelines recommending recognition of smoking as a chronic relapsing disease and encouraging medical service providers to provide treatment.

The 'NSW Health Smoke Free Workplace Policy' (1999) (*NSW Health 1999*) provides a supportive environment for abstinence during hospitalisation and opportunities for brief intervention to increase a smoker's motivation to quit. This protocol proposes that hospital staff:

- identify nicotine dependent patients
- give patients information about the smoke free policy
- provide prompt and appropriate treatment to patients experiencing nicotine withdrawal
- provide brief intervention for smoking cessation
- advise patients at discharge on options for permanent cessation.

Incorporating these steps into routine patient care will significantly contribute to the health and well-being of our patient population, the provision of effective smoke free environments at health facilities and deliver a clear message to the public of the health consequences of smoking (lethal for one in every two users).

It is therefore recommended that Area Health Services incorporate this model for the treatment of nicotine withdrawal into their local 'Smoke Free Workplace Policy' implementation plans and develop specific protocols for delivery that are appropriate for their local settings.

## Smoke Free Workplace Policy (1999)

The NSW Department of Health is committed to ensuring the health, safety and welfare of all persons utilising its facilities and services. The Department has had a policy to reduce exposure to passive smoking on Department property since 1984. In 1988 this policy was amended to reflect concerns about the health effects of passive smoking and to incorporate the requirements of the *NSW Occupational Health and Safety Act 1983*. The 1988 policy focused on the obligations of the Department to provide a smoke free working environment following common law cases concerning the effects of passive smoking. The 1988 policy also acknowledged the Department's role in the promotion of healthy lifestyles and practices.

In addition, the *Area Health Services Act 1986* states a primary objective of an Area Health Service is (s.19) “to promote, protect and maintain public health”. The promotion of smoke free policies and other related health improvement strategies in health care facilities is an essential component in protecting the health of those who come into contact with these institutions.

The 1999 ‘Smoke Free Workplace Policy’ builds on the 1988 policy (which prohibited smoking in all buildings and vehicles) and has the goal of prohibiting smoking throughout all property controlled by NSW Health. There is the possibility of limited exempted outdoor areas during its staged implementation to meet the needs of specific patients and/or staff.

The rationale for updating of the Department's ‘Smoke Free Workplace Policy’ was to:

- reduce the risks to health associated with tobacco use amongst staff, patients, visitors and the community, especially exposure to passive smoking
- provide a clear and consistent message to staff, patients, visitors and the community about the health risks of smoking
- provide leadership in the community about reducing the harm associated with smoking.

A key component of the policy is the recommendation for provision of support to those patients who smoke by the use of brief intervention and nicotine replacement therapies as appropriate.

A recent study conducted by Central Sydney Area Health Service evaluated the satisfaction of hospitalised smokers with the management of their nicotine dependence. Of those smokers who had a length of stay of greater than one day, 33% reported that they smoked during hospitalisation. 23% of those that reported smoking during hospitalisation also reported that they had problems with “not being able to smoke”. Of those who did not smoke during hospitalisation, 4% reported problems with “not being able to smoke”.

The study also found that those patients who did smoke were more likely to have a length of stay of more than 2 days and significantly more likely to report smoking 10 or more cigarettes daily (*Boomer & Rissel unpublished*).

# Burden of disease

## caused by tobacco smoking

In New South Wales in 1998, cigarette smoking caused an estimated 4,519 male deaths and 1,806 female deaths (representing 19% and 9% of all male and female deaths, respectively). In 1997/98 active smoking caused an estimated 36,127 hospitalisations among males and 17,850 hospitalisation among females (4.2% and 1.7% of all hospitalisations for males and females, respectively) (*NSW Report of Chief Health Officer 2000*).

Tobacco is the risk factor associated with the greatest burden of disease in Australia. In 1996, it was responsible for about 9.7% (227,000) of Disability Adjusted Life Years (DALYs) – about 12% of the total burden of disease and injury in males and 7% in females (*Mathers et al 1999*).

Across Australia in 1998, 142,525 hospital separations were attributable to tobacco (as against 43,033 to alcohol and 14,471 to illicit drugs). The largest specific cause of hospitalisation attributable to tobacco for males is ischaemic heart disease (29%), cancer (21%) and chronic obstructive pulmonary disease (19%). The cancer category is dominated by lung cancer (50%) and bladder cancer (23%). The largest specific cause of hospitalisation attributable to tobacco for females is chronic obstructive pulmonary disease (22%), ischaemic heart disease (19%) and cancer (14%). The cancer category is dominated by lung cancer (59%) and bladder cancer (17%) (*Ridolfo & Stevenson 2001*).

Evidence now exists that inhalation of environmental tobacco smoke also has a significant impact on the health of non-smokers. Tobacco smoke contains approximately 60 known or suspected carcinogenic chemicals and studies indicate that sidestream tobacco smoke (drifting from the end of a burning cigarette) is more carcinogenic per unit weight than mainstream smoke (smoke exhaled by the smoker).

One quarter of cases of low birth weight are attributable to maternal smoking during pregnancy (*NHMRC 1997*).

# Prevalence

## Smoking and inpatient smoking

### Prevalence of smoking

In 1997/98 smoking prevalence for persons aged 18 years and over was 27% for males and 21% for females. Prevalence for secondary school students aged 12-17 years in 1996 was 19% for males and 21% for females (*NSW Report of Chief Health Officer 2000*).

Reported current smoking rates varied widely among Health Areas. These variations reflect the distribution of underlying social determinants of health with smoking more prevalent among NSW adults who are single, unemployed, have not finished high school, live in economically disadvantaged areas, and among men from non-English speaking backgrounds (*Harris et al 1999*).

### Prevalence of inpatient smoking

A recent study, over a six month period, in a pre-admission clinic of a major Sydney teaching hospital within Central Sydney Area Health Service identified an age-standardised smoking prevalence of 19% with a further 3% of patients identified as 'recent quitters'.

When including recent quitters, this study found that smoking prevalence was similar to the rates for the NSW adult population, but noted that there is likely to be some under-reporting of smoking in the clinical setting. Using the 'Fagerstrom Test for Nicotine Dependence', one in five (18%) smokers were identified as highly nicotine dependent (*Rissel et al 2000*).

An earlier study in the Hunter region of New South Wales found smoking prevalence of 16% with a further 8% identified as 'recent quitters'. Salivary cotinine assay found that 18% of the self reported non-smokers tested positive. Of those patients who reported smoking in the 3 months preceding admission, 56% reported abstaining from smoking during their hospital stay, yet 9 months post discharge 3% remained abstinent (*Nagle 1996*).

A more recent unpublished study in the Hunter region which surveyed 1,422 eligible consenting adult inpatients at admission in a large tertiary teaching hospital found self reported smoking rates (in the last week) of 23%, with a further 7% reporting smoking during the last year (*Nagle et al unpublished*).

# Relationship

## between tobacco use, substance-use disorders and mental health

An analysis of results from the 1997 'Australian National Survey of Mental Health and Well-being' showed that current tobacco users were more likely than never smokers to have a sedative, stimulant or opiate-use disorder (Odds Ratio [OR] 1.9), more likely to meet criteria for an alcohol-use disorder (OR 2.9) and more likely to meet criteria for a cannabis-use disorder (OR 5.0). They were also more likely than never smokers to have met criteria for an affective disorder (depression) within the past year (OR 2.3), to have met the criteria for an anxiety disorder (OR 2.5) and to have screened positively for psychosis (OR 5.5) (*Degenhardt and Hall 2001*).

Degenhardt and Hall argue that the stronger relationship between substance-use disorders and mental health disorders with tobacco use in more recent times in Australia suggests that with the decline in overall population rates of tobacco use, people with such conditions may be more likely to begin smoking, and/or less likely to quit once they have started.

The results of the 'National Survey of Mental Health and Wellbeing' also indicate that the association of smoking with affective, anxiety and substance use disorders is age specific. In smokers aged 18-39 the prevalence of any mental disorder was 35% in both men and women. Given this high prevalence it is pertinent for health care workers to assess the mental health in young patients who have difficulty in abstaining from smoking (*Jorm 1999*).

The treatment of tobacco dependence can be provided concurrent to treating patients for other chemical dependencies (alcohol and other drugs). Research has suggested that those who are abstinent from smoking are more likely to remain abstinent from alcohol and relapse to alcohol use is less likely among persons given a smoking cessation intervention (*Degenhardt & Hall 2001*).

# Identification

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## of smoking status

The first step in managing nicotine withdrawal is to identify smokers as this increases rates of intervention and guides appropriate treatments (*Fiore et al 1995*).

*The Alcohol and Other Drugs Policy for Nursing Practice in NSW: Clinical Guidelines (NSW Health Dept 2000)*, recommends the recording of a patient's substance use history (including tobacco) upon admission. In view of the relationship between tobacco use and substance-use disorders this is strongly recommended to guide appropriate clinical treatments, especially for highly dependent smokers.

It is also recommended that moderate to heavily nicotine dependent patients be screened and/or monitored for depression. Patients with depressed mood and a history of problematic drinking have been reported as more likely to be nicotine dependent and have an anticipated greater difficulty in refraining from smoking while hospitalised (*Cargill et al 2001*).

# Brief intervention

## for smoking cessation

The purpose of brief intervention for smoking cessation is to increase motivation to quit (*US Dept of Health and Human Services 2000*).

The World Health Organisation encourages provision of brief opportunistic interventions delivered by all health professionals in the course of their routine work and proposes that involvement in offering smokers help be based on factors such as access to smokers rather than professional discipline (*World Health Organisation 2001*).

The ‘Cochrane Review’ (*Silagy 2001*) concludes that brief advice by doctors, nurses and other health care workers is effective and that more intensive interventions only marginally increase the efficacy of brief advice. Overall the efficacy is low (2.5%), but because of wide reach this approach has the potential to influence smoking prevalence in whole populations.

Hospitalisation is a time when the adverse consequences of smoking may be especially highlighted for the individual (*Emmons 1992*) and it can provide the window of opportunity for a ‘teachable moment’ (*Lewis 1998*).

Patients will respond most favourably to personalised, non-critical information and feedback that help them understand the impact of smoking on their health. Motivational interventions are most likely to succeed when the clinician is empathetic, promotes patient autonomy (eg. supports patient’s choices), avoids arguments and encourages patient self-efficacy by identifying previous successes in behaviour change efforts (*Fiore et al 2000*).

Many clinicians report lack of relevant knowledge as a barrier to intervening with patients who smoke (*Fiore et al 2000*).

Health professionals who have received training are significantly more likely to intervene with smokers than those who have not been trained. Training needs to be a core health activity and supported by systems that ensure health professionals have access to it and to support them in using their new skills (*Raw et al 1999*).

# Nicotine

## Information and facts

### Pharmacology

Nicotine is a psychoactive drug affecting mood and performance and is the source of addiction to tobacco. Nicotine, found in tobacco, binds to nicotinic cholinergic receptors found on cell bodies and at nerve terminals in the brain and autonomic ganglia. Activation facilitates the release of neurotransmitters including acetylcholine, norepinephrine, dopamine, serotonin, B-endorphin and glutamate. Behavioural rewards from nicotine, and perhaps nicotine dependence as well, are linked to dopamine release.

It takes 10-19 seconds for nicotine, administered through the pulmonary circulation, to pass from the lung through the brain.

Nicotine levels in the brain decline between cigarettes providing an opportunity for resensitization of receptors so that positive reinforcement can occur with successive cigarettes. Nicotine is rapidly and extensively metabolised primarily in the liver. Its half-life averages 2 hours, therefore regular smokers begin to go into withdrawal and feel the need to 'top up' their nicotine levels every hour or so. Consistent with a 2 hour half-life, nicotine levels in the body rise during the first 6-8 hours, plateau for the remainder of the day during regular smoking and fall overnight.

Primary metabolites are cotinine and nicotine-N-oxide. Because of its long half-life (16-20 hours) cotinine is commonly used as a marker of nicotine intake.

Nicotine crosses the placenta freely and has been found in amniotic fluid and in the umbilical cord blood of neonates. It is found in breast milk but concentration is so low that the dose of nicotine consumed by an infant is unlikely to be of physiological consequence.

### Manipulation of dose

Cigarette smoking produces rapid dosing of nicotine. Benowitz advises that arterial blood nicotine concentrations may be as high as 100ng/ml and concentrations in the heart and brain may be as high as 200-300ng/ml immediately after a cigarette. Venous blood nicotine concentrations are typically 20%-30% of those of arterial concentrations.

A smoker can manipulate (titrate) the dose of nicotine from a cigarette to regulate a particular level of nicotine in the body. Intake of nicotine from a given product depends on factors such as puff volume, depth of inhalation, rate and intensity of puffing. Smokers tend to titrate higher levels of nicotine from 'light' cigarettes by breathing in deeper and holding the smoke in the lungs longer.

Similarly, smokers who reduce the number of cigarettes smoked per day will often increase their average intake of nicotine from each cigarette.

There is considerable peak-to-trough oscillation in blood levels from cigarette to cigarette. Regular cigarette smoking plateaus at daily plasma concentrations of 20 to 35 ng/mL (and 5% to 10% carboxyhemoglobin) (Benowitz 1998).

## Nicotine dependence

Tobacco use produces tolerance to nicotine, withdrawal symptoms and difficulty in controlling future use (*US Dept of Health and Human Services 2000*). The bolus of nicotine to the brain achieved by smoking is one of the key reinforcers of dependence (*Benowitz 1998*).

Human use of nicotine from tobacco meets the criteria for drug dependence as presented by the US Surgeon General and nicotine and smoking also meet the World Health Organisation's International Classification of Diseases (ICD-10) (*WHO1992*) criteria for substance dependence. The *American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)* (*American Psychiatric Assoc 1995*) states that nicotine dependence and withdrawal can develop with use of all forms of tobacco. Features of nicotine dependence include: smoking soon after waking, smoking when ill, difficulty refraining from smoking, reporting the first cigarette of the day to be the one most difficult to give up and smoking more in the morning than in the afternoon.

Smokers appear to be motivated by both positive reinforcement (including reported relaxation, reduced stress, alertness, improved concentration, mood regulation and lower body weight) and negative reinforcement (relief of nicotine withdrawal symptoms in the context of physical dependence). However, it is difficult to separate reported positive reinforcement from relief of withdrawal symptoms in smokers (*Benowitz 1998*).

## Assessment of nicotine dependence

Dependence on nicotine may be assessed using the 'Fagerstrom Test for Nicotine Dependence' (FTND) below which is based on criteria listed in the DSM-IV (*Fagerstrom et al 1990*).

When time and resources are limited, nicotine dependence can be assessed using the two questions in table 2 on page 10 as these consistently return higher biochemical indicators of smoking (*Heatherton et al 1989; Fagerstrom et al 1990*).

Consider a depression measure, for example CES-D (*NSW Government Action Plan. Mental Health for Emergency Departments 2001*) if there is a past history of depression.

**Table 1. Fagerstrom Test for Nicotine Dependence**

Question	Answer	Score
1. How soon after waking up do you smoke your first cigarette?	Within 5 minutes	3
	6-30 minutes	2
	31-60 minutes	1
2. Do you find it difficult to abstain from smoking in places where it is forbidden?	Yes	1
	No	0
3. Which cigarette would you hate to give up?	The first one in the morning	1
	Any other	0
4. How many cigarettes a day do you smoke?	10 or less	0
	11-20	1
	21-30	2
	31 or more	3
5. Do you smoke more frequently in the morning than in the rest of the day?	Yes	1
	No	0
6. Do you smoke even though you are sick in bed for most of the day?	Yes	1
	No	0
	<b>Total</b>	

**Score** 0-2 very low dependence      6-7 high dependence  
 3-4 low dependence      8+ very high dependence  
 5 medium dependence



# Nicotine

## Nicotine Replacement Therapy (NRT)

This treatment aims to replace some of the nicotine obtained from cigarettes, thus reducing withdrawal symptoms when stopping smoking. The principle is similar to the detoxification and treatment of heroin dependence using methadone.

Use of NRT (and other approved pharmacotherapy) is preferable to smoking with respect to health consequences because unlike smoking, these medications do not (a) contain non-nicotine toxic substances such as carbon monoxide and ‘tar’, (b) produce dramatic surges in blood nicotine levels (c) produce strong dependence (*Fiore et al 2000*).

NRT is available in Australia as gum, patch and inhaler.

The ‘Cochrane Review’ (*Silagy et al 2001*) states that:

- odds ratio for abstinence with NRT compared to control was 1.73 (patch 1.76, gum 1.66, inhaler 2.08)
- these odds were largely independent of the intensity of additional support provided to the smoker or the setting in which the NRT was offered
- in highly dependent smokers there is significant benefit of 4mg gum over 2mg gum (odds ratio 2.67)
- NRT increases quit rates approximately 1.5 to 2 fold regardless of setting.

NRT is safe and should be routinely recommended to smokers, the choice of product depending on practical and personal considerations (*Raw et al 1999*).

### Dosage

Therapy	Dosage
Gum (S2)	Maximum 40mg/day
Patch (S2)	Healthy people, >10 cigs/day, >45 kgs: one patch daily 21mg/24 hr or 15mg/16 hr  Cardiovascular disease, <10 cigs/day, <45 kgs: one patch daily 14mg/24hr or 10mg/16hr
Inhaler (S3)	Inhale air through cartridge for 20 minutes. Self titrate dose according to withdrawal symptoms. 6-12 cartridges/day.

(MIMS 2001)

A study by Hurt et al found that plasma nicotine levels were significantly lower in subjects using NRT than when they were smoking. This study on serum nicotine and cotinine levels in subjects with severe nicotine dependency during 22mg transdermal nicotine-patch therapy, found that both nicotine and cotinine levels reached steady state on about day 3. Median levels were significantly below that at entry and for day 3 and beyond, the median percentage of entry-level value ranged from 41% to 53% for nicotine and from 46% to 53% for cotinine. No subject had toxic levels or showed signs of nicotine toxicity. The steady-state levels of nicotine and cotinine achieved with a 22mg transdermal patch were much lower than the levels observed when the subjects were smoking prior to initiation of therapy. The study concluded that a fixed dose of transdermal nicotine will not be efficacious for all patients and may lead to underdosing in highly nicotine dependent patients. Underdosing is likely to result in persistent withdrawal symptoms that may make relapse to smoking more likely (*Hurt et al 1993*).

Regular cigarette smoking plateaus at levels of 20 to 35 ng/mL (and 5% to 10% carboxyhemoglobin) (Benowitz 1991). Peak plasma concentrations of nicotine achieved with the transdermal patch typically range from 10-15 ng/mL. Thus, the daily dose of nicotine and peak blood levels of nicotine are lower than those of a one-pack-per-day smoker.

Ad libitum use of nicotine 2mg and 4mg gum results in mean plasma nicotine levels of 11.8 ng/mL and 23.2 ng/mL respectively (McKendree et al 1982).

Ad libitum use of the ‘Nicorette’ Inhaler typically produces nicotine plasma concentrations of 8-10 ng/mL (Pharmacia Aust 2001).

The gum and inhaler permit more control over the dose and how quickly it is obtained.

The inhaler delivers a quick bolus of nicotine and resembles a cigarette. It may be useful for people who want a substitute for the act of smoking and have particular relevance for mental health/dementia patients.

### Combination therapy

Combining the nicotine patch with a self-administered form of nicotine replacement therapy (gum/inhaler) may be more efficacious than a single form of nicotine replacement and patients should be encouraged to use combined treatments if they are unable to remain abstinent, or if they are still experiencing withdrawal symptoms using a single type of pharmacotherapy. It appears that the increased success depends on the use of two distinct delivery systems: one passive and one ad libitum (Fiore 2000).

### Contraindications

In Australia, NRT is currently contraindicated for some patient groups and use by these patients requires special consideration.

Therapy	Patient group
Gum (S2)	Non-tobacco users, pregnancy, lactation, children (<12 yrs)
Patch (S2)	Non-tobacco users, acute MI, unstable angina pectoris, severe arrhythmias, recent CVA, skin disease, children (<12 yrs) pregnancy, lactation.
Inhaler (S3)	Non-tobacco users, hypersensitivity to menthol, pregnancy, children (< 12 years)

(MIMS 2001)

### Directions for use of NRT products

Therapy	Directions
Gum	The gum is effectively a mouth patch and nicotine is absorbed through the oral mucosa. Chew till a peppery/tingling feeling, flatten gum and ‘park’ between the gum and cheek, or under tongue. Chewing the gum continuously like ordinary chewing gum will inhibit uptake of nicotine. The nicotine will flow into the stomach with saliva and lead to feelings of nausea. Acidic beverages (coffee, soft drinks) inhibit buccal absorption of nicotine and are best avoided 15 minutes before and during use of gum.
Patch	Place on clean, non-hairy site on chest or upper arm upon waking. Rotating the patch to a new site each day will prevent skin reaction.
Inhaler	Inhale air through cartridge for 20 minutes. Self titrate dose according to withdrawal symptoms. 6-12 cartridges/day.

# Bupropion

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## Facts

Bupropion is the first non-nicotine medication available in Australia for smoking cessation and its mechanism of action is presumed to be mediated by its capacity to block neural re-uptake of dopamine and/or noradrenaline (*Fiore 2000*).

Because Bupropion is initiated approximately one week prior to the quit day, it will have limited practical application for inpatient settings. Bupropion may be an option for patients after discharge and patients can be referred to their GP to discuss their options. To date, it is the only pharmacotherapy available on Pharmaceutical Benefits Scheme.

## Contraindications

Bupropion is contraindicated in patients with a seizure disorder, a current or prior diagnosis of bulimia or anorexia nervosa, current or use of a MAO inhibitor within the previous 14 days. Precautions include lowered seizure threshold; renal hepatic impairment, bipolar disorder, latent psychosis, concomitant transdermal nicotine, elderly, pregnancy, lactation, children.

# Discharge and referral

## Plans and relapse

Every patient identified as a smoker should be assessed prior to discharge to determine interest in quitting.

In Australia around 80% of smokers have made attempts to quit (*Borland & Hill 1990*). The 1994 'Health Promotion Survey' found that 43% of smokers had made at least one quit attempt in the previous twelve months and figures from the 1998 'NSW Health Survey' indicated that around 50% of male and female current smokers were planning on quitting in the next six months (*NSW Health 1999*).

### Quit plan

For those patients ready to quit, a few key points can increase their chance of success:

- Set a date to stop and stop completely on that day
- Use pharmacotherapy (whichever product suits best)
- Review past periods of abstinence to determine what helped and what hindered
- Identify future problems and make a plan to deal with them (problem-solving)
- Enlist support (family, friends, colleagues) (*Fiore et al 2000*)
- Avoid alcohol
- Reduce caffeine consumption

Because of the high correlation between use of alcohol and relapse to smoking (*Garvey 1992*), it is recommended that alcohol be avoided, especially for the first two weeks of a cessation attempt.

Continuous caffeine consumption with smoking cessation has been associated with more than doubled caffeine plasma levels (*Swanson 1997*). It is therefore recommended that caffeine consumption be reduced during a cessation attempt.

An antidepressant used in the presence of a depression history may need to be continued for at least three months and reviewed by an appropriate clinician.

### Relapse

In Garvey's study of relapse across one year of follow-up of 235 adults attempting to quit unaided, approximately 62% had returned to smoking within 2 weeks and almost 80% had relapsed at 3 months. Those who smoked any cigarettes at all in the post-cessation period had a 95% probability of resuming their regular pattern of smoking. Predictors of relapse include: short periods of abstinence in previous quit attempts, low motivation to quit, low confidence in ability to quit, greater proportion of smokers in subject's environment and higher pre-cessation alcohol consumption. Common triggers for relapse include other people smoking, alcohol, stressful or negative events and depression (*Garvey 1992*).

Cannabis use would also predict relapse given the common practice of mixing marijuana with tobacco (*Burns et al 2000*).

Relapse prevention should include discussion of high-risk situations and developing coping strategies (eg. using pharmacotherapy, reducing alcohol consumption) and reinforcing total abstinence.

Many smokers cannot stop without more intensive help and these will usually be heavier smokers who are more at risk of smoking related disease. These people should be referred to a specialist treatment service, such as Area Health Drug and Alcohol Services, their General Practitioner or the Quitline for telephone counselling. Outpatient clinics also need to be advised of hospital treatment.

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## Frequently asked questions about patient groups and pharmacotherapy

### Is NRT suitable for cardiovascular patients?

There is no evidence of increased cardiovascular risk with NRT. NRT delivers plasma nicotine concentrations which are usually below those produced by smoking and does not expose the smoker to carbon monoxide or other harmful substances.

Despite early concerns regarding the safety of nicotine replacement therapy in smokers with heart disease, it is now clear that the health risks of using NRT to assist such patients to stop, or significantly reduce, smoking far outweigh any treatment-related risks (*Balfour et al 2000*).

Clinical trials of NRT in patients with underlying, stable coronary disease suggest that nicotine does not increase cardiovascular risk (*Benowitz 1997*).

There has been debate about the adverse affects of NRT on cardiac patients. Several studies have shown good tolerance to NRT (patches and gum) in patients with CAD. Trials have shown no change in angina frequency, overall cardiac symptoms, nocturnal cardiac events or ECG, despite some patients continuing to smoke (*Working Group for the study of transdermal nicotine in patients with coronary artery disease 1994*).

In a randomised controlled double blind placebo trial (n=584 outpatients with at least one cardiac diagnosis), it was found that at least one primary end point (ie. death, MI, cardiac arrest, admission to hospital with increased angina symptoms, arrhythmia or congestive heart failure) was reached by 5.4% of the active patch group compared to 7.9% in the placebo group (not significant, P=0.37). After 14 weeks of treatment, abstinence was 21% in the active patch group compared to 9% in the placebo group (p=0.001). They concluded that transdermal nicotine does not cause a significant increase in cardiovascular events in high risk outpatient cardiac patients (*Joseph et al 1996*).

NRT is currently contraindicated in patients with acute MI, unstable angina pectoris, severe arrhythmias and recent CVA (*MIMS 2001*).

## Is NRT safe for pregnant or lactating women?

Pharmacotherapy should be considered when a pregnant woman is otherwise unable to quit, and when the likelihood of quitting, with its potential benefits, outweighs the risks of the pharmacotherapy and potential continued smoking (Fiore et al 2000).

Benowitz states that NRT is likely to be less harmful than smoking during pregnancy because of a lower total nicotine dose and absence of exposure to carbon monoxide and other toxic substances. He concluded that the benefits of NRT substantially outweigh the risks of smoking or the risks of nicotine replacement per se, for pregnant smokers, but suggests that NRT only be offered to pregnant smokers if they cannot stop without it.

NRT is clearly beneficial to more highly dependent smokers as it is these who are more at risk for adverse reproductive outcome and who are less likely to stop smoking when becoming pregnant (Benowitz 1991).

If the clinician and pregnant or lactating patient decide to use NRT, clinicians should consider choosing delivery systems that yield intermittent, rather than continuous drug exposure (ie. inhaler/gum) due to potential neurotoxicity in the foetus of continuous exposure to nicotine (Fiore et al 2000, Benowitz 1991).

*“A maternal 10% blood carboxyhemoglobin level, which can be observed in a two-pack-per-day cigarette smoker, can be associated with a 10% to 15% higher carboxyhemoglobin level in the foetus than in the mother. This has been equated to a 60% reduction in foetal blood flow” (Benowitz 1991).*

A pregnant smoker should receive encouragement and assistance in quitting throughout her pregnancy.

The high rate of post-partum relapse may be decreased by continued emphasis on the relationship between maternal smoking and poor health outcomes in infants and children.

The nicotine inhaler is not contraindicated for lactating women.

## Is pharmacotherapy safe for patients with psychiatric comorbidity?

The finding that tobacco use is associated with affective disorders and depressive symptoms has potentially important clinical implications. Depression decreases the likelihood that attempts at abstinence will be successful and depressed mood is a common symptom of nicotine withdrawal. Antidepressants may therefore aid abstinence in persons who have symptoms of depression (Degenhardt & Hall 2001). It is also possible that smoking increases the risk of depression perhaps by affecting neurotransmitter systems (Jorm 1999).

A recent follow-up study of 76 participants with a history of major depression (excluding bipolar disorders) who stopped smoking found they were seven times more likely to have a recurrence of major depression than people who continued to smoke. Risk of depression did not generally arise immediately after cessation but was distributed across the entire study period of six months (Glassman et al 2001).

The ‘National Survey of Mental Health and Wellbeing’ found that current smokers also have higher rates of anxiety disorders and, as with depression, anxious persons may find it more difficult to remain abstinent. Evidence suggests that anxiolytics are not effective smoking cessation aids (Degenhardt & Hall 2001).

Current smokers were significantly more likely to screen positively for psychosis and this finding is in accord with the high rates of tobacco smoking observed in clinical samples of persons with psychotic illness, particularly schizophrenia. Studies indicate that 70% or more of schizophrenia patients smoke (Jorm 1999). It has been suggested that nicotine may be used to self-medicate some psychotic symptoms and evidence suggests that persons with psychosis smoke more heavily and use higher tar cigarettes.

Although psychiatric comorbidity places smokers at increased risk for relapse, such smokers can be helped by smoking cessation treatments. Stopping smoking may affect the pharmacokinetics of certain psychiatric medications (eg. anti-psychotic medications), therefore clinicians may wish to monitor closely the actions or side effects of psychiatric medications in smokers attempting abstinence (Fiore et al 2000).

A recent study of 55 patients hospitalised in a smoke-free ward demonstrated a definite preference for the nicotine inhaler over the transdermal patch (*D'Mello et al 2001*).

### **Is NRT safe for adolescents?**

Young people can become addicted to tobacco very quickly.

When treating adolescents, clinicians may consider pharmacotherapy when there is evidence of nicotine dependence. Factors such as degree of dependence, number of cigarettes per day and body weight should be considered (*Fiore et al 2000*).

Prescription guidelines from pharmaceutical companies recommend 21 mg patch if >45 kilos, 14 mg patch if < 45 kilos.

### **What is best to prevent weight gain?**

The body weight of smokers is on average 2.7 to 4.5 kg lower than that of non-smokers (*Benowitz 1998*). When a smoker stops, s/he typically gains weight (gaining an average of 2.3kg) in the subsequent year to approximately the level of those who have never smoked. This is of great concern to some smokers, especially women and adolescents, and can act as a motivator to start or continue smoking.

NRT (in particular gum) and bupropion delay, but don't prevent post-cessation weight gain (*Fiore et al 2000*).

If a person is concerned about weight gain after cessation of smoking you could:

- advise that the health risks of moderate weight gain are small compared to the risks of continued smoking
- advise patients to concentrate on cessation until they are confident they will not return to smoking
- recommend a regular exercise program and healthy eating to control weight.

# Resources

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## for patients

- A 10-minute video for patients is available to explain nicotine addiction, treatment, how to use nicotine patches and gum, problem solving and the quitting process. This was produced by ABC Television Productions for the Smoking Cessation Program, Royal Hobart Hospital, Department of Health and Human Services, Hobart 2001. This video can be ordered by contacting Ms Sylvia Cowles Tel.(03) 6222 8784.
- A leaflet titled *Products to help you quit smoking* explains pharmacotherapies, withdrawal symptoms and behavioural strategies to assist cessation. This leaflet is available in plain English and 13 community languages and can be downloaded from the NSW Health multi cultural communication tobacco website at:  
**[www.mhcs.health.nsw.gov.au](http://www.mhcs.health.nsw.gov.au)**
- **Quitkits** can be ordered in bulk from the Better Health Centre – Publications Warehouse:  
Tel. (02) 9879 0443  
Fax. (02) 9879 0994
- Information on these resources is available from the NSW Health Tobacco and Health Unit:  
Tel. (02) 9391 9000

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