The nicotine patch: guidelines for practical use

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Four nicotine transdermal patches are now or will soon be available in Australia and are a valuable aid to smoking cessation. This article reviews the latest information on nicotine patches, compares the patch to nicotine gum and provides medical practitioners practical guidelines for the use of nicotine patches in smoking cessation.

The role of nicotine replacement with nicotine gum is well established in smoking cessation. However, there are many difficulties associated with its use and it has been shown to be of questionable efficacy in the general practice setting. More recently, nicotine transdermal patches have been found to be an effective aid to smoking cessation in studies overseas and in Australia, and appear to offer a number of advantages over nicotine gum.

Smoking is a complex addiction with both pharmacological and psychosocial elements. Nicotine replacement therapy with the patch alleviates the addiction to the drug nicotine by delivering a fairly steady plasma concentration of nicotine. This provides constant protection from withdrawal symptoms and craving for cigarettes while the patient focuses on changing the behavioural aspects of the smoking habit.

Available patches

Nicabate and Nicotinell patches are already available in Australia; Prostep and Nicorette patches are expected to be approved for marketing during 1994 (see Table 1). All of the patches are self-adhesive and have been scheduled S4—that is, available on prescription only. Recommended courses of the nicotine patch consist of a number of weeks using the full strength treatment patch and a weaning period (except for Prostep) using one or two different strengths of weaker patches. The cost of the available patches is no more than the cost of cigarettes over the same time period.

Nicorette – provides constant protection from withdrawal symptoms and craving for cigarettes while the patient focuses on changing the behavioural aspects of the smoking habit. Nicorette is a 16-hour patch which is removed at bedtime to mimic more closely the nicotine intake pattern in the smoker. There are two types of delivery system which determine the rate of nicotine release. Nicabate uses a rate-limiting membrane, which provides a steady, predictable rate of nicotine release. The other three patches have a matrix layer from which nicotine diffuses directly into the skin at a rate determined to a large degree by the permeability of the skin. The rate of nicotine delivery of these patches may therefore vary more widely from one patient to another depending on the skin type and the location of the patch.

Nicotinell and Prostep – deliver nicotine over a full 24 hours and are designed to provide continuous protection from nicotine withdrawal. Nicorette – a 16-hour patch which is removed at bedtime to mimic more closely the nicotine intake pattern in the smoker.

Pharmacokinetics of the nicotine patch

After each application, plasma nicotine levels rise to a peak over several hours and then slowly decline over the period of application (see Figure 1). The time to reach peak plasma concentrations of nicotine is fastest for Nicabate at four hours and is about eight to nine hours for the other patches. Twenty-four-hour patches provide moderate protective levels the next morning. The 16-hour patch results in low plasma concentrations of nicotine throughout the night and subtherapeutic levels on waking.

The average plateau nicotine levels for the larger patch sizes are approxi-
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Nicotine replacement therapy with the patch alleviates the addiction by delivering a fairly steady plasma concentration of nicotine.

Table 1. Nicotine transdermal patches in Australia

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Application period per patch</th>
<th>Patch size</th>
<th>Nicotine absorbed in application period (mg)</th>
<th>Recommended duration of patch use</th>
<th>Delivery system</th>
<th>Pack size</th>
<th>Average retail price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nicabate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>(Marion Merrell Dow)</td>
<td>24</td>
<td>22</td>
<td>21</td>
<td>6</td>
<td>10</td>
<td>Rate-limiting</td>
<td>7</td>
</tr>
<tr>
<td>Nicotinell</td>
<td>24</td>
<td>30</td>
<td>21</td>
<td>4</td>
<td>12</td>
<td>Matrix</td>
<td>7/28</td>
</tr>
<tr>
<td>Prostep</td>
<td>24</td>
<td>33</td>
<td>22</td>
<td>6 to 8</td>
<td>6 to 8</td>
<td>Gel</td>
<td>14</td>
</tr>
<tr>
<td>Nicorette</td>
<td>15</td>
<td>30</td>
<td>15</td>
<td>12</td>
<td>16</td>
<td>Adhesive matrix</td>
<td>N/A</td>
</tr>
</tbody>
</table>

* Based on 'list price' to wholesaler plus average wholesale markup of 13% plus average pharmacy markup of 50%.
† Both patch strengths for treatment use. Weaning period not recommended.
‡ This information was provided at the time of writing but may change.
§ Recommended duration of use overseas — Australian recommendations were not available at time or writing.
N/A = Not available at time of writing.

Efficacy

The use of the nicotine patch approximately doubles the success rate of smoking cessation interventions at six and 12 months, compared with the use of a placebo patch. An analysis of 10 placebo-controlled studies of the nicotine patch shows that at six months, 22.6% of active patch users were abstinent compared with 11% of placebo users.

Success rates are higher when the patch is combined with a more comprehensive smoking cessation programme. Six month abstinence rates for active patch users average 25% when they are participating in a comprehensive programme, compared with 19.6% when they are only given brief advice.

It is not possible to say whether one patch is more effective than the others because of the differences in the design of the trials. No studies directly comparing the different patches have yet been conducted.

Nicotine craving and withdrawal

Most studies have demonstrated a significant reduction in cigarette craving, especially in the first few weeks after quitting. Morning craving may be more effectively relieved by 24-hour patches than by 16-hour patches because of the higher plasma concentrations of nicotine on rising.

Withdrawal symptoms are also reduced, although certain symptoms are helped more than others. The nicotine patch is most effective in relieving negative mood states (such as...
as irritability, anger, frustration, and anxiety), as well as difficulty in concentrating and thinking about cigarettes. However, there is little effect on non-mood related withdrawal symptoms, such as hunger or constipation.

**Side effects**

Generally, the nicotine patch is well tolerated and compliance is high. The most common side effects are skin reactions: transient itching, burning and tingling occur in up to 50% of subjects. This is usually minor and requires no treatment. Mild to severe erythema with or without oedema of the skin occurs in one of every four or five patients and can be minimised by rotating application sites. A small percentage of people experience contact dermatitis or skin sensitisation which may require cortisone cream or cessation of therapy. Skin reactions tend to occur after three or four weeks of use.

The most common systemic side effects with 24-hour patches are disturbed sleep (up to 30% of patients) and vivid dreams (up to 26% of patients). These do not appear to occur with the 16-hour patch. If they persist, the 24-hour patch may be removed at bedtime, or a lower strength patch can be used. Other adverse effects represent the pharmacological effects of nicotine and are uncommon because these patients were accustomed to higher nicotine levels from smoking.

**Contraindications and safety**

The risks of nicotine from the patch must be weighed against the considerable adverse effects of smoking. The nicotine patch results in lower plasma concentrations of nicotine (Figure 1) than smoking and does not introduce carbon monoxide and the many chemicals and tars that are contained in cigarette smoke. Therefore, correct use of the nicotine patch is safer than continuing to smoke.

Contraindications to the use of the patch are listed in Table 2. While the use of the nicotine patch in patients with absolute contraindications may be associated with increased risk, the level of risk is less than for smoking. Nonetheless, prescription of the patch in these situations is not approved at present.

The nicotine patch may be used cautiously where relative contraindications apply. It is especially important to select smokers who are motivated and to consider starting with a patch with a low dose of nicotine. A study of 156 patients with stable coronary artery disease with a 14 mg patch reported no increase in cardiac symptoms or complications among the active patch users. 

Transdermal nicotine probably has a low risk of dependence although there is no research evidence to support this. Plasma concentrations of nicotine rise more slowly and are lower than with smoking. There are no reinforcing peaks of nicotine and the craving-reward cycle is broken.

**Comparison of the nicotine patch with the gum**

The nicotine patch is compared with nicotine gum in the box on page 108. The major benefit of the patch is its ease of use and higher patient com-
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continued

The use of the nicotine patch approximately doubles the success rate of smoking cessation interventions at six and 12 months.

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The use of the nicotine patch (n = 3,096). By comparison, in a meta-analysis of nicotine gum trials, the active gum group was found to be only 1.3 times more effective than placebo at six months follow up (n = 1,756).

Of further importance is the finding that the use of nicotine gum in the subgroup of general practice trials is of doubtful value. This may be because of the lack of time available to provide adequate instructions on the correct use of the gum in general practice. Therefore, because it is so simple to use, the nicotine patch may prove to be even more effective than the gum in the general practice context.

Nicotine gum

Advantages

Flexible dosage - can be adjusted according to needs

More rapid response to unexpected or occasional triggers

Provides a substitute oral activity

Disadvantages

Questionable evidence that it works in general practice

Poor compliance - tends to be underused by patients

Special chewing technique required

Chewing related side effects (e.g. sore jaw, nausea)

Unpleasant taste

Difficulties with dentures

Less socially acceptable

Reduced effectiveness while drinking and eating

For best results from the gum, a fixed dosage schedule (e.g. hourly) is preferred to the ad lib method. Careful instructions should be given to smokers and the 4 mg gum should be used for the more dependent smoker.

Although the nicotine patch will probably replace the gum for most smokers requiring nicotine replacement therapy, nicotine gum will continue to have a role in certain situations:

- for patients who are intolerant of the patch, especially those with skin sensitivity
- for patients requiring occasional doses to cope with specific triggers, such as an acute, stressful situation
- to increase nicotine levels when using the patch, for example, on rising from sleep
- for relapse prevention. After quitting smoking, patients can carry nicotine gum with them and use it as a safety valve to help prevent 'slips'.

Selection of patients for the nicotine patch

Not all smokers should be given the nicotine patch. Suitable candidates are those who are motivated to quit, those who are dependent on nicotine and those who are free from important contraindications. We suggest the following steps to assess whether patch use is appropriate (see Table 3).

- Step 1. Identify patients who smoke - actively seek this information and raise the subject in a nonconfrontational way.
- Step 2. Assess the patient's motivation to quit. Although most smokers (80 to 90%) want to quit, only 10% are actually motivated and ready to quit at any time, 30% are unsure or ambivalent ('contemplators') and 60% are not ready ('precontemplators'). Use of the patch should only be considered for the group that is...
The most common systemic effects are disturbed sleep and vivid dreams with the 24-hour patch, but not the 16-hour patch.

Table 2. Contraindications to the nicotine transdermal patch

**Absolute**
- Recent acute myocardial infarction
- Unstable angina
- Severe cardiac arrhythmia
- Recent cerebrovascular disease
- Pregnancy and lactation

**Relative**
- Stable ischaemic heart disease, peripheral vascular disease or cerebrovascular disease
- Psoriasis, eczema, urticaria
- Hyperthyroidism, insulin dependent diabetes mellitus, phaeochromocytoma
- Liver or renal disease
- Peptic ulcer

Table 3. Practical guidelines for intervention using the nicotine patch

**Patient selection**
- Identify patients who smoke
- Assess the patient's motivation to quit
- Assess the patient's dependence on nicotine
- Consider contraindications to the nicotine patch

**Intervention**
- Explain rationale of the patch
- Provide instructions and discuss side effects
- Select patch strength and duration of course
- Provide brief behavioural advice, such as that contained in the Smokescreen for the 1990s programme
- Follow up

Practical guidelines for nicotine patch intervention

We recommend the following practical guidelines for assisting smoking patients to quit using the nicotine patch (see Table 3).
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continued

Continuing to smoke while using
the patch may increase the risk
of nicotine toxicity and adverse
cardiac events.

**Explain the rationale for the use
of the patch**
The nicotine patch is only an aid to
smoking cessation and will only relieve
craving and withdrawal symptoms. It
is important that patients do not have
unrealistic expectations and do not
see the patch as a 'magic cure'.

**Provide instructions and
discuss side effects**
Patients must stop smoking first
Patients must stop smoking before
using the patch. Continuing to smoke
while using the patch may increase
the risk of nicotine toxicity and adverse
cardiac events, especially for patients
with established (or silent) cardiac
disease.

Describe correct application
Patients should apply the patch on
the morning of 'quit day' to a clean,
dry, non-hairy area of skin, generally
on the upper chest or back or the outer
upper arm. Twenty-four-hour patches
should be replaced at the same time
every day. Sixteen-hour patches are
removed at bedtime. The site of
application for all patches should be
rotated each day. Patches can be
worn while bathing or swimming.

Discuss possible side effects
Side effects should be discussed,
especially skin reactions and sleep
disturbances.

Select patch strength and
duration of course
Patch strength
While the standard patch doses will
be appropriate for most smokers,
certain patients may require individu-
alised dosing. Nicabate delivers
the highest blood nicotine level and
may be more effective for the more
dependent or obese smokers. (Obese
men.) These patients may
also need multiple patches or the
addition of nicotine gum, especially
when withdrawal symptoms are not
relieved by the full strength patch.
On the other hand, a weaker starting
patch may be more appropriate
for people who smoke less than 15
cigarettes a day, smokers weighing
less than 45 kg or where relative con-
traindications apply, such as stable
cardiac disease.

Duration of course
Recommended treatment courses
range from four to 12 weeks with
weaning periods of four to eight
weeks, depending on the patch used
(see Table 1). A weaning period is
not recommended for Prostep. While

**Have I had my complete course?**

A complete immunisation course is the
best protection against Hib infection.

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anti-PRP levels even after the first dose in most infants; a booster immunisation at 2 12
months of age results in significantly increased antibody levels. This would possibly be
adequate to protect children for the rest of the at-risk period for Hib disease."

Medicare covers children who started a PedvaxHib course between 1 April and 31
August 1993 inclusive.

References
1. LACR, Vol 40 / No. RR-1 pages 1-7
2. Akabori, V.J. et al. Clinical experience with PedvaxHib, a conjugate vaccine of Haemophilus influenzae type b polysaccharide -
Neisseria meningitidis type B meningococcal protein conjugate. Vaccine, Vol 9, Supplement June 1991 S18-21
3. Registered trademark of Merck & Co., Whitehouse Station, N.J., USA.

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The optimal duration of treatment is at present unclear, the course should provide adequate time for the withdrawal symptoms to abate and for the patient to learn coping strategies to maintain abstinence. More dependent smokers may require a longer course.

Provide brief behavioural advice

The nicotine patch is an adjunct to advice and counselling and only assists in alleviating the pharmacological addiction. The doctor can help the smoker address the psychosocial aspects of the smoking habit by: setting a quit day, identifying smoking triggers; discussing alternatives and substitutes to smoking; addressing the patient's concerns about quitting (such as weight gain); discussing health issues; and providing written materials. These steps are part of the Smokescreen for the 1990s programme.

Follow up

Arrange further follow up visits to issue the patient further prescriptions and to assess the patient's progress, beginning one week after the quit day. It is important to review any side effects from patch use and to assess the adequacy of nicotine replacement. Increase the dose of nicotine if required. Those who attend follow up visits are more likely to be long term abstainers.

Conclusion

Medical practitioners can help smoking patients who are motivated and dependent on nicotine to quit by using nicotine transdermal patches and behavioural advice. Use of the patch doubles the cessation rate of smoking interventions when compared with placebo. Correct use of the patch is safe and well tolerated, and reduces craving for cigarettes and withdrawal symptoms. The patch has many advantages over the nicotine gum and probably has greater efficacy, especially in general practice. It is likely to supersede nicotine gum for those quitters who require nicotine replacement therapy.

A list of reference is available on request to the editorial office.