The clinical case for smoking cessation for cardiovascular patients

What is the relationship between smoking and cardiovascular diseases?

Smoking is the most important modifiable risk factor for both the primary and secondary prevention of CVD.[1–6] Smoking is associated with processes that lead to both atherosclerosis and thrombosis.

Why intervene in secondary care?

Hospitalisation offers an opportune time to encourage patients to stop smoking for five main reasons:

- Firstly, this time is often a 'teachable moment' where patients are more receptive to intervention and are more motivated to quit.
- Secondly, abstaining from smoking at this time can lead to significant CVD and overall health benefits.
- Thirdly, the hospital's no smoking environment creates an external force to support abstinence.
- Fourthly, patients are ideally placed to be given information about treatment options, supported through withdrawal and signposted to specialist services.
- Finally, smoking cessation interventions are highly cost-effective and result in direct cost-savings to the NHS.

Processes leading to atherosclerosis[1–5]

- Increased availability of free radicals leading to oxidative stress.
- Decrease in vasodilatory function through reducing the availability of nitric oxide (NO).
- Increase in inflammatory response. Smoking has been associated with an increased level of peripheral blood leukocytes and multiple inflammatory markers including C-reactive protein, interleukin-6 and tumour necrosis factor alpha.
- Increase in serum cholesterol, triglyceride and low density lipoprotein (LDL) levels.
- Decrease in serum high-density lipoprotein levels.

Processes leading to thrombosis[1–5]

- Increased availability of free radicals leading to oxidative stress.
- Increased activation and spontaneous aggregation of platelets mediated by reduced sensitivity to NO.
- Alterations in antithrombotic and prothrombotic factors e.g. increase in fibrinogen levels, increase in tissue factor (TF) and decrease in TF pathway inhibitor-1.
- Alterations in fibrinolysis.

Main acute effects of smoking on the body
(estimated time of recovery, if known)

- Increase in sympathetic tone leading to an increase in blood pressure, heart rate and peripheral vasoconstriction leading to an increased demand for oxygen and cardiac function[7] **(24 – 48 hours)**
- Formation of carboxyhaemoglobin leading to a reduction in oxygen delivery to the tissues[8] **(8 – 24 hours)**
- Formation of carboxymyoglobin leading to reduction in oxygen storage in the muscles[9] **(8 – 24 hours)**
- Increase in red blood cell production, which leads to an increase in blood viscosity, a decrease in tissue perfusion, a decrease in oxygen delivery to the tissues and potentiation of thrombotic process[1,10]
- Hypersecretion of mucus, narrowing of the small airways, decrease in ciliary function and change in mucus rheology leading to a decrease in mucociliary transport[1,10] **(12 – 72 hours)**
- Changes in functioning of a range of immune cells (pro- and anti-inflammatory cytokines, white blood cells, immunoglobulins) which lead to decreased immunity and are associated with atherosclerosis[1,10] **(1 week – 2 months)**
- Induction of hepatic enzymes which increases drug metabolism through both pharmacokinetic and pharmacodynamic mechanisms[11,12] **(6 – 8 weeks)**

What are the health benefits of quitting for cardiovascular disease patients?

There is an abundance of evidence demonstrating the very powerful effect of smoking cessation on improving CVD outcomes which are summarised below.[1–3] Stopping smoking after acute coronary syndrome (ACS), myocardial infarction (MI), coronary artery bypass graft (CABG), percutaneuous coronary intervention (PCI) will dramatically reduce risk of additional procedures and improve survival.[3,13–16]

Heart disorders: smoking cessation has been associated with:

- 36% risk reduction of all cause mortality after an MI (RR 0.64 (95%CI 0.58 – 0.71)).[3,13]
- 21% risk reduction of all cause mortality in congestive heart failure (CHF) patients (RR 0.79 (95%CI 0.63 – 0.98)).[16]
- 21% risk reduction of re-hospitalisation in CHF patients due to MI (RR 0.79 (95%CI 0.69, 0.91)).[16]
- Decreased risk of re-hospitalisation and all cause mortality for patients with ACS or decompensation heart failure.[17]
- After one year, the excess risk of coronary heart disease (CHF) caused by smoking is reduced by half. After 15 years of abstinence, the risk is similar to a non-smoker.[2,18]

Vascular disorders: smoking cessation has been associated with

- Reduced risk of abdominal aortic aneurysm.[19]
- Improvement in ankle pressure, exercise tolerance and reduced risk of amputation in patients with intermittent claudication.[2,20]
- Reduced risk of progression to critical leg ischemia, MI and death from vascular causes in patients with intermittent claudication.[19]
- Reduced rate of re-stenosis after angioplasty.[15,21]
- Reduced risk of revascularisation and all cause mortality after a CABG.[14]
- Reduced risk of MI, revascularisation and angina pectoris after venous CABG surgery.[15,22]
- Reduced risk of MI and death after successful percutaneous coronary revascularisation.[15,23]

What do we know about how to help cardiac patients quit?

Smoking cessation interventions have been proven effective for hospitalised patients in general[24] and specifically for cardiac patients.[17,24–29] Smoking cessation interventions for hospitalised CVD patients increase the rate of long term quitting if they include: [24–28]

- **in-hospital behavioural support,**
- **stop smoking pharmacotherapy, and**
- **follow-up for at least 1 month after discharge**

All inpatient settings should introduce systems to address tobacco use with hospitalised patients and ensure best practice intervention is received to support this high-risk patient population with quitting.[27–30] These systems screen and document the smoking status of all patients and provide support with quitting as a priority during their admission including the initiation of a first line stop smoking pharmacotherapy including nicotine replacement therapy (NRT), varenicline or bupropion, with a referral system to link patients to specialised stop smoking support. There is strong evidence regarding the safety of stop smoking medications among patients with stable CHD and available evidence suggest they are also safe to use among patients with ACS.[5,31–33]

The facts:

- **If a CVD patient smokes, helping them to quit is one of the most important interventions we can provide to reduce their risk of future CVD events and CVD mortality.**[1–5]
- **Quitting smoking has a benefit that is equal to or greater than other available secondary prevention strategies including beta-blockers, aspirin, or renin-angiotensin-aldosterone system inhibitors.**[34]
- **Inpatient stop smoking interventions are highly cost-effective, in particular for CVD patients, and have been shown to reduce length of stay, 30-day and 2-year readmission and produce a return on investment for health systems such as the NHS.**[29,35]

Best practices for managing tobacco withdrawal in the inpatient setting

Most regular smokers will experience tobacco withdrawal symptoms within hours of their last cigarette and can range from mild to severe.[36] Withdrawal symptoms include aggression and hostility and can affect the care of the patient.

Recognising and managing withdrawal among hospitalised patients who smoke should be a priority. Providing NRT to a patient will ease tobacco withdrawal symptoms and can also support long-term quitting. A combination of the patch (NRT patch can take 20 – 40 minutes to reach therapeutic dose) with a short-acting oral NRT product (e.g. gum, inhaler, spray) is a recommended evidence-based practice.[30,37,38]

Tobacco withdrawal symptoms include:[36]

- Urges to smoke or cravings
- Restlessness or difficulty concentrating
- Irritability, aggression, anxiety, crying, sadness or depression
- Difficulty sleeping or sleeping disturbances
- Increased appetite and weight gain
- Coughing
- Mouth ulcers
- Constipation
- Light headedness

Vaping

E-cigarettes provide nicotine without combustion and are popular among UK smokers as an alternative to smoking. While electronic cigarettes are not risk-free, Public Health England estimates they are 95% safer than smoking cigarettes.[39] There is also evidence to indicate that e-cigarettes are effective in helping patients stop smoking.[40] Evidence on safety and the role vaping plays in supporting quitting is reviewed regularly. Policies related to the use of electronic cigarettes in inpatient settings will vary by trust and organisation.

Very Brief Advice on Smoking

How to approach smoking cessation with patients

The NHS Long Term Plan has committed that all people admitted to hospital who smoke will be offered NHS-funded tobacco treatment services by 2023/24.[41]

NICE outlines a care pathway for supporting smoking cessation that can be adopted for cardiovascular patients.[30,42,43] In essence, the care pathway incorporates a very brief intervention using the 3As:

ASK and record smoking status

ADVISE the patient:

- the best way of quitting is with a combination of support and stop smoking medication
- support with stopping smoking and/or managing any tobacco withdrawal symptoms (temporary abstinence) is available
- of the personal health benefits of stopping smoking

ACT on the patient's response:

- prescribe NRT to manage withdrawal symptoms
- monitor withdrawal and adjust pharmacotherapy accordingly
- refer to specialised stop smoking support (hospital-based, local stop smoking service)

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