The clinical case for smoking cessation for diabetic patients

What is the relationship between smoking and diabetes?

Cigarette smoking is a major independent risk factor for the development of type 2 diabetes mellitus.[1,2] Among patients with type 2 diabetes, smoking is associated with significantly increased risk and progression of microvascular and macrovascular complications, and increased mortality.[1,3–6] Smoking is associated with 35 – 54% greater risk of cardiovascular events and mortality than non-smoking diabetes patients.[7–10] There is a dose-response relationship with risk increasing based on the number of cigarettes smoked per day.[1,9]

Evidence suggests both oxidative stress and inflammation are related to an increased risk of diabetes and diabetes complications.[1,11] Additionally, high levels of nicotine can lessen the effectiveness of insulin, requiring higher insulin doses to regulate blood sugars.[1,12]

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 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.

Compared to non-smoking diabetic patients, smoking patients have been associated with the following:[1,4,12]

- Decreased insulin sensitivity, possibly due to increased circulating levels of insulin antagonistic hormones e.g. catecholamines, cortisol and growth hormone[1]
- Impaired beta-cell function and insulin secretion, and lipid metabolism[1]
- Chronic low-grade inflammation[1]
- Endothelial dysfunction[1]
- Increased risk of hypoglycaemia in type 1 diabetes[1]
- Increased risk nephropathy in both type 1 and type 2 diabetes[1,13–15]
- Increased risk of neuropathy[1,16,17]
- Increased diabetic retinopathy[1,18]
- Increased risk of coronary heart disease, stroke and peripheral vascular disease in type 2 diabetes[1,9,10]
- Increased risk of cardiovascular and all-cause mortality in type 1 and type 2 diabetes[1,9,10]

What are the health benefits of quitting for diabetic patients?

Quitting smoking is one of the most powerful interventions for reducing disease progression and complications among diabetic patients (see overleaf).[1,9] Of particular importance is the effect of stopping on both short and long-term cardiovascular disease (CVD) risk.[1,9,10]

While there is a significant reduction in risk associated with stopping smoking among diabetic patients, evidence from meta-analysis has shown that former smokers are still at increased risk of CVD events, CVD mortality and all-cause mortality compared to patients who never smoked.[9,10,19] This risk is reduced with time since quitting, with data indicating the maximum benefits are seen when patients quit for 10 or more years.[9,10,20]

While the evidence is clear in terms of the risk reduction associated with quitting smoking on macrovascular complications, further evidence is needed in terms of micro-vascular complications.[20]

Health benefits for diabetic patients that have been found to be associated with smoking cessation:

- Within eight weeks of quitting smoking insulin becomes more effective at lowering blood sugar levels.[11,12]
- Slows the progression of nephropathy in type 2 diabetics.[14,21]
- Decreased risk of developing coronary heart disease, within 11 years the risk decreases to that of non-smoking diabetics.[9,10,22]
- Decreased risk in all-cause mortality, cardiovascular and cancer mortality, within 11 years the risk decreases to that of non-smoking diabetics.[9,22]

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[23] **(24 – 48 hours)**
- Formation of carboxyhaemoglobin leading to a reduction in oxygen delivery to the tissues[24] **(8 – 24 hours)**
- Formation of carboxymyoglobin leading to reduction in oxygen storage in the muscles[25] **(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[26,27]
- Hypersecretion of mucus, narrowing of the small airways, decrease in ciliary function and change in mucus rheology leading to a decrease in mucociliary transport[26,27] **(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[26,27] **(1 week – 2 months)**
- Induction of hepatic enzymes which increases drug metabolism through both pharmacokinetic and pharmacodynamic mechanisms[28,29] **(6 – 8 weeks)**

What do we know about how to help diabetes patients quit in secondary care settings?

Smoking cessation interventions have been proven effective for hospitalised patients regardless of reason for admission,[30] and smoking cessation rates have also been improved by smoking cessation interventions in the diabetic population.[31–35] Smoking cessation interventions for hospitalised patients increase the rate of long term quitting if they include:

- **in-hospital behavioural support,**
- **stop smoking medication (nicotine replacement therapy or varenicline), and**
- **follow-up for at least 1 month after discharge**

While there is limited research to guide best practice, available evidence suggests **more intensive stop smoking interventions are necessary to support cessation among diabetic patients.**[20,30] This may be because diabetic patients tend to have greater tobacco dependence compared to the general population of smokers.[4,30] The significant risk of complications posed by smoking among diabetic patients makes an investment in supporting patients with quitting justified, as well as **highly cost-effective.**[30,36]

Glycaemic control and weight gain in patients who have stopped smoking

In type 2 diabetics, smoking cessation is associated with deterioration in glycaemic control that may last for up to 3 years and is unrelated to weight gain.[37,38] In a large UK study, HbA1c increased on average 2.34 mmol/L (95% CI 1.91 – 2.77) within the first year after quitting after controlling for other factors, with HbA1c then decreasing over time.[37] For patients who quit smoking, close monitoring of glycaemic control and adjustment of anti-diabetic medications as needed is recommended in this period.[1,37–38] Weight gain can be expected following cessation and this can also be a reason some patients do not want to stop smoking.[1,39] It is important to note that the reduced risk associated with stopping smoking is magnitudes greater than the risk associated to the weight gain following quitting.[1]

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.[40] There is also evidence to indicate that e-cigarettes are effective in helping patients stop smoking.[40,41] 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.

Best practices for managing tobacco withdrawal in hospital

For patients who have recently quit, or who did not quit before their surgery, you can expect that they will experience tobacco withdrawal if they are unable to smoke during the post-surgical period. These symptoms begin within hours of their last cigarette and can range from mild to severe.[42] Withdrawal symptoms include aggression and hostility and can affect the care of the patient. Recognising and managing tobacco withdrawal among hospitalised patients who smoke should be a priority.

Providing nicotine replacement therapy (NRT) to a patient will ease withdrawal symptoms and can also support long-term quitting. Given the effect of smoking on post-surgical recovery, patients should be supported at the bedside with stop smoking support including the initiation of NRT. For many patients this can be anticipated in advance and ideally as part of the patient s post-surgical recovery plan. 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.[43,44]

Tobacco withdrawal symptoms include:[42]

- 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

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.[45]

Both inpatient and outpatient settings involved in the care of diabetics should introduce **systems to address tobacco use and ensure best practice intervention** is delivered to support this high-risk patient population with quitting.[44,45] 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 first line stop smoking pharmacotherapy with a referral system to link patients to specialised stop smoking support.

NICE outlines a care pathway for supporting smoking cessation that can be adopted for diabetic patients.[44,46] In essence, the care pathway incorporates 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 to the management of their diabetes and risk of complications

ACT on the patient response:

- prescribe stop smoking medication (e.g. NRT) for patients in withdrawal
- monitor withdrawal and adjust pharmacotherapy accordingly
- refer to specialised stop smoking support (hospital-based, local stop smoking service)

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