

## The clinical case for smoking cessation before surgery

### What is the relationship between smoking and post-operative outcomes?

Compared to non-smoking patients, patients who smoke have been shown to experience twice the rate of post-surgical complications as non-smokers and 38% increased risk of mortality.<sup>1-4</sup>

Smoking has been associated with higher risk of impaired wound healing, pulmonary and cardiac complications, an increased need for post-operative intensive care and longer periods of hospitalisation.<sup>4-6</sup> Specifically, poorer outcomes have been associated with gastrointestinal, hernia, orthopaedic, cancer, cardiovascular, day care and plastic surgery.<sup>1,7,8</sup> Smoking has also been implicated in a need for increased anaesthetic dosage and increased experience of post-operative pain.<sup>9,10</sup>

### Why support surgical patients with quitting?

**The pre-surgical period is 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 significantly better surgical outcomes and long-term 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, support through withdrawal and signposted to specialist services.
- Finally, stop smoking interventions are highly cost-effective and result in direct cost-savings to the NHS.

**Smoking is associated with:**<sup>1,4-6</sup>

- impaired wound healing
- increased risk of post-operative infection
- increased risk of lung and heart complications
- longer hospital stays and higher drug doses
- higher rates of admission to an intensive care unit
- increased risk of emergency re-admission
- increased risk of post-operative mortality

**What are the health benefits of quitting for patients undergoing surgery?**

Quitting smoking is the best thing any patient who smokes can do to improve their surgical outcomes and future health. Successful quitting will not only benefit a patient's long-term health by reducing the risk of smoking-related illness and progression of existing disease,<sup>11,12</sup> but there is also very strong evidence that quitting smoking before surgery improves surgical outcomes.<sup>1-4,13</sup>

**Specifically, quitting is associated with a 41% reduction in post-operative complications.**<sup>2</sup>

The largest effects of quitting are seen in terms of a reduction in lung, heart and wound related complications.<sup>2</sup>

**Post-operative health benefits associated with smoking abstinence**<sup>1,2</sup>

- Reduced risk of pulmonary complications such as respiratory failure, need for post-operative respiratory therapy or admission to intensive care<sup>14</sup>
- Decreased risk of graft failure<sup>15</sup>
- Decreased wound healing time and wound-related complications such as dehiscence and infection<sup>5,14</sup>
- Increased rate of bone healing<sup>16-17</sup>
- Reduced length of admission<sup>18</sup>
- Permanent smoking cessation reduces the risk of heart disease, stroke, cancer and premature death<sup>11</sup>

## Quitting weeks before surgery provides greatest benefits

To gain maximum benefit, a quit attempt needs to begin at least **4 to 8 weeks before surgery** and continue into the **post-operative period**.<sup>1,4,19-22</sup> However, temporary abstinence beginning immediately around the time of surgery and lasting until a patient has recovered may still have worthwhile benefits.<sup>14,23</sup> Ideally, patients will stop smoking long-term.

### Quitting smoking:<sup>1,20,21</sup>

- 2–6 weeks improves immune response
- 3–4 weeks improves wound healing
- 6–8 weeks improves pulmonary function
- 4+ weeks reduces respiratory complications

### 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<sup>16</sup> **(24–48 hours)**
- Formation of carboxyhaemoglobin leading to a reduction in oxygen delivery to the tissues<sup>24</sup> **(8–24 hours)**
- Formation of carboxymyoglobin leading to a reduction in oxygen storage in the muscles<sup>25</sup> **(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<sup>8</sup>
- Hypersecretion of mucus, narrowing of the small airways, decrease in ciliary function and change in mucus rheology leading to a decrease in mucociliary transport<sup>18</sup> **(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<sup>18</sup> **(1 week–2 months)**
- Induction of hepatic enzymes which increases drug metabolism through both pharmacokinetic and pharmacodynamic mechanisms<sup>26-27</sup> **(6–8 weeks)**

## What do we know about how to help surgical patients quit?

Stop smoking interventions have been proven effective for hospitalised patients in general<sup>28</sup> and specifically for surgical patients.<sup>1,29</sup> Evidence shows that pre-operative quit smoking interventions that include high-intensity behavioural support and pharmacotherapy increase short-term smoking cessation and can lead to long-term quitting.<sup>1,29</sup>

Available evidence suggest that interventions are more likely to both assist smokers with quitting and have an impact on surgical outcomes that:<sup>1,29</sup>

- **Begin 4–8 weeks before surgery**
- **Include weekly contacts and**
- **Use Nicotine Replacement Therapy (NRT) or varenicline**

Stop Smoking medication is a fundamental part of treating tobacco use and managing withdrawal. Among pre-surgical patients NRT has been studied most and its use is associated with greater quit rates.<sup>1,29</sup> There is no strong evidence to suggest that NRT impacts healing or cardiovascular complications.<sup>30,31</sup> This is because NRT delivers nicotine by the venous system and rates of delivery are much lower than that delivered via a cigarette and without carbon monoxide (CO) and other toxins. Two studies have examined the effect of varenicline to support cessation and showed a significant effect on cessation and no adverse events.<sup>32,33</sup>

## 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.<sup>4,34</sup> There is also evidence to indicate that e-cigarettes are effective in helping patients stop smoking.<sup>35</sup> 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.<sup>36</sup> 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 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 patients 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.<sup>37,38</sup>

#### **Tobacco withdrawal symptoms include:**<sup>36</sup>

- 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.<sup>39</sup>**

NICE guidance and the **Enhanced Recovery after Surgery Guidelines** recommends that smoking cessation interventions should be offered to surgical patients, and health professionals are encouraged to access training, deliver brief advice, offer pharmacological support and refer patients to available specialist stop smoking support at the hospital or via local stop smoking services.<sup>4,22,40,41</sup>

In essence, the care pathway incorporates a 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 importance of stopping smoking for improved surgical outcomes and overall health

#### ACT on the patient's response:

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

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