Component 3 "Smokefree Secondary Care Settings"

Review 6
A review of the effectiveness of smokefree strategies and interventions in secondary care settings

To inform the NICE guidance on:
'Smoking cessation in secondary care: acute and maternity services'
'Smoking cessation in secondary care: mental health services'

Draft 4 - 16th July 2013

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November 2021: NICE guidelines PH45 (June 2013) and PH48 (November 2013) have been updated and replaced by NG209.
The recommendations labelled [2013] or [2013, amended 2021] in the updated guideline were based on these evidence reviews.
See www.nice.org.uk/guidance/NG209 for all the current recommendations and evidence reviews.

Acknowledgements

The authors wish like to thank Antonia Simon and Jenny Woodman (EPPI-Centre), and Elena Ratschen and Leah Jayes (University of Nottingham) for their assistance with this review. For administrative support, our thanks to Diane Dixon and Aileen Paton (University of Stirling) and the NHS Centre for Smoking Cessation and Training. Finally, our thanks to Peter Shearn, Tricia Younger and Linda Sheppard of the NICE Project Team for their guidance.

Abbreviations

AMA	against medical advice
CI	confidence interval
CO	carbon monoxide
CPHE	Centre for Public Health Excellence (in NICE)
EPPI-Centre	Evidence for Policy and Practice Information and Co-ordinating Centre
ER4	Eppi-Reviewer version 4.0 software
ETS	environmental tobacco smoke
FT	full text
GP	general practitioner
HR	human resources
IARC	International Agency for Research on Cancer
IQR	interquartile ranges
ISM	Institute for Social Marketing
NA	not applicable
NCC-NSC	National Collaborating Centre for Nursing and Supportive Care
NCSCT	National Centre for Smoking Cessation and Training
NICE	National Institute for Health and Clinical Excellence
NHS	National Health Service (UK)
NGRI	not guilty by reason of insanity
NR	not reported
NRT	nicotine replacement therapy
OR	odds ratio
PRN	*pro re nata* – as required (used as a direction in prescriptions)
Rev 6	Review 6
Rev 7	Review 7
SAR	special administrative region (of China)
SD	standard deviation
SHS	second-hand smoke
UBA	uncontrolled before and after (study design)
UK	United Kingdom
UKCTCS	UK Centre for Tobacco Control Studies
USA	United States of America
VA hospital	United States Department of Veterans Affairs hospital
WHO	World Health Organization

Executive Summary

The National Institute for Health and Clinical Excellence (NICE) commissioned this review to inform two separate pieces of complementary guidance on smoking cessation in secondary care, one relating to acute and maternity services and the other to mental health services. The guidance will address smokefree policies and smoking cessation and make recommendations on approaches to help secondary care commissioners, professionals and managers working in these two areas of healthcare.

The Health Act 2006 was passed on 16th July 2006 and required that all indoor and substantially enclosed outdoor workplaces and public places in England and Wales became smoke-free by 1st July 2007, specifically banning smoking tobacco. In March 2007, residential mental health settings were given a temporary one year exemption from the implementation date, thus were required to become smoke-free by 1st July 2008. There is no legislative requirement for smokefree grounds in England and Wales, although some individual institutions and Trusts have introduced and trialled policies requiring smokefree grounds.

The aim of this review was to systematically review the effectiveness of smokefree strategies and interventions in secondary care settings (acute, maternity and mental health settings). The initial search and screening stages were combined with a parallel review of the barriers to and facilitators for implementing smokefree strategies and interventions in secondary care settings conducted by members of the same research team.

The review aimed to address the following questions:

Question 1: How effective are strategies and interventions for ensuring compliance with smokefree legislation and local smokefree policies in secondary care settings?

- **Subsidiary question:** How does the effectiveness vary for different population groups, health status or speciality care services?

Question 2: Are there any unintended consequences from adopting smokefree approaches in acute and maternity care settings?

Question 3: Are there any unintended consequences from adopting smokefree approaches in mental healthcare settings?

As the extent of evidence on the effectiveness of smokefree strategies was limited to two studies for Question 1, the data are also presented from identified effectiveness studies with a comparative design to measure indicators of compliance in settings which had a smokefree policy with at least one supporting strategy covering the whole estate or an indoors-only policy.

Sensitive search strategies were developed by an information specialist in conjunction with the research team and peer-reviewed by information specialists at NICE. Searches were run in February 2012 across 22 databases and 26 selected websites. All of the literature searches were conducted for papers published in English from 1990 onwards.

All study data were uploaded and managed using the EPPI-Centre's online review software. Initial inclusion criteria were refined using four rounds of pilot screening to identify 229 papers for full-text screening from 17,000 title and abstract records. Papers were then re-screened in full-text for relevance and applicability and 27 studies (28 papers) identified for data extraction. Data were extracted and assessed for quality using recommended NICE templates and critical appraisal checklists. At all stages of the screening and rating process two or more members of the research team conducted independent assessments and a third member adjudicated on any unresolved disagreements.

Twenty-six of the included studies were published in academic or practitioner journals and one was an unpublished report. Only one of the studies identified was an experimental design (Kempf 1996 [USA +]). One study was a randomised controlled trial; the remainder were quantitative observational studies, two of which had a concurrent control group. Only two studies evaluated the effectiveness of a supporting strategy in ensuring compliance with smokefree legislation: one the effectiveness of the introduction of 'No Smoking Outdoors' signs (Nagle 1996 [Australia +]), the other nursing staff intervening to address a patient's urge to smoke (Erwin 1991 [USA -]). The majority of studies were conducted in the USA, with only two conducted in a UK setting (Cormac 2010 [UK +], Shetty 2010 [UK +]) and a small number in Europe and the rest of the world. Around half of the studies were published before 2000. The methodological quality of studies varied from low to moderate, with most rated as 'moderate'.

Sixteen of the studies were conducted in a mental healthcare setting. These studies were from four countries (France, Switzerland, UK and USA) and were published from 1991 to 2010; with the early studies all from the USA and those from 2008 onwards from European countries also. Eleven studies were conduced in an acute and/or maternity healthcare setting. These studies were from five different countries (Australia, Canada, Israel, Spain and USA) and were published from 1990 to 2010.

Thirteen of the studies were in secondary care settings that were implementing smokefree grounds; a step beyond the current smokefree legislative requirements of the UK. Seven of these were conducted in a mental healthcare setting (Cormac 2010 [England +], Haller 1996 [USA +], Hempel 2010 [USA +], Joseph 1993 [USA +], Kempf 1996 [USA +], Patten 1995 [USA +], Quinn 2000 [USA -], Shetty 2010 [England +]) and six in an acute and/or maternity healthcare setting (Gadomski 2010 [USA +], Hudzinski 1990 [USA +], Kvern 2006 [Canada -], Nagle 1996 [Australia +], Ripley-Moffitt 2010 [USA +], Wheeler 2007 [USA -]).

Briefly, some of the main findings of the review were:

- An examination of proxy indicators of compliance appear to show that smokefree legislation can be effective.
- There is no strong evidence from well-conducted trials, and there were limitations in the available evidence concerning which strategies best support compliance with smokefree policy. As a result, there are limitations to the advice that the review can give in this area.
- The review was unable to provide conclusive evidence of the effectiveness of the impact of different supporting strategies. Despite the requirement for at least one supporting strategy to be reported for the study to be included, there was a lack of clarity regarding the effects of multiple strategies, or the effects of individual strategies where more than one was reported.
- Findings in mental health settings showed that the expected adverse consequences have not been realised.
- For acute and maternity settings the largest positive effects appear to be in relation to staff smoking behaviour, with fewer negative effects found.
- Although much of the available evidence on effectiveness is relatively recent, there is limited evidence from the UK, which limits the review's applicability. However, all the included studies were conducted in similar high income countries.

The review presents 34 evidence statements.

Evidence Statements

Effectiveness of Supporting Strategies and Interventions for Ensuring Compliance: Acute and Maternity Settings

Evidence statement 1.1: There is **weak** evidence from one before and after study in Australia (**Nagle 1996 [+]**) in an **acute and maternity setting** that 'no smoking outdoors' signage decreases compliance with state indoor (hospital buildings and vehicles) smokefree legislation in New South Wales and a local (hospital board's) outdoor partial smokefree policy. Comparing use of the outdoor sites selected to become smokefree 2 weeks before implementation of the smokefree outdoor signage, with usage 1 month after its implementation, there was a significant increase in the proportion of outdoor smokers who smoked in those areas at the intervention hospital ($p<0.001$, Chi-square=11.71, df=1). ***Other supporting strategies*** *were: an implementation committee (formed by occupational health and safety team with reps from NSW Cancer Council, National Heart Foundation, hospital management, unions, and study's lead author), the policy launch incorporated into the World No Tobacco Day activities, staff newsletters, bulletin boards and information by supervisors*.

UK Applicability: This evidence was conducted outside the UK, however the policy covers outdoor smokefree (a local policy similar to the UK context) and there is no reason to believe the strategy's effect is not applicable to the UK setting.

Effectiveness of Supporting Strategies and Interventions for Ensuring Compliance: Mental Healthcare Settings

Evidence statement 1.2: There is **weak** evidence from one interrupted time series in the USA (**Erwin 1991 [-]**) in a **mental healthcare setting** that staff aiding inpatients' compliance through strategies such as encouraging patients to participate in smoking cessation groups and addressing patients' urge to smoke increases patient compliance a local (US Department of Veterans Affairs') smokefree buildings policy. One week post-implementation, nursing staff ratings of their own overall individual effectiveness using policies listed above to help inpatients comply with smokefree on the wards by addressing their urge to smoke increased four weeks post-implementation (no p values calculated). ***Supporting strategies*** *were based around nursing interventions, including encouraging patients to participate in smoking cessation groups and addressing patients with the urge to smoke.*

UK Applicability: This evidence was conducted outside the UK and the policy covered (indoor smokefree) is already national legislation in the UK. However there is no reason to believe the strategy's effect is not applicable to the UK setting.

Staff Compliance with Smokefree: Smoking Behaviour (Acute & Maternity)

Evidence statement 1.3: There is **moderate** evidence from two cohort studies in the USA **(Stillman 1990 [+])** and Canada (**Kvern 2006 [-])**, one before and after study from Israel (**Donchin 2004 [I+]**) and one interrupted time series from Spain that (**Martinez 2008 [+])** the implementation of local-level policy and national legislation for smokefree implementation in an **acute and maternity setting** decreases the number of staff smoking.

UK Applicability: This evidence was conducted outside the UK and the policy or national legislation covered in most (indoor smokefree) is already national legislation in the UK however one recent study's policy covers smokefree grounds (a local policy similar to the UK context); there is no reason to believe the effect is not applicable to the UK setting.

(a) Observed Smoking Behaviour: There is evidence from two cohort studies in the USA (**Stillman 1990 [+])**, and Canada (**Kvern 2006 [-]**) that the implementation of local smokefree policies in an **acute and maternity setting** decreases the number of staff observed smoking. In the USA, **Stillman 1990 [+]** reported a significant decrease in observed staff smoking in hospital cafeterias and lounge areas at 1 and 6 months after the local (hospital board's) smokefree buildings policy was introduced ($p<0.0001$). ***Supporting strategies*** *included written policies, an implementation committee, cessation support, an internal media and educational campaign and free health checks for employees*. **Kvern 2006 [-]** in Canada reported that the number of contacts security personnel had with staff smokers on hospital grounds decreased over 1, 2 and 3 months post-implementation of a local (regional health authority's) smokefree grounds policy. ***Supporting strategies*** *included written policies, an implementation committee, signage, staff meetings, notices in staff payslips, cessation support, pharmacotherapies, temporary abstinence support for inpatients, moving of ashtrays and shelters to the site periphery, staff training, media campaigns, bilingual information sheets for patients and the public and information on health organisations' websites.*

(b) Self-reported Smoking Behaviour: There is evidence from one before and after study in Israel (**Donchin 2004 [+]**) and one interrupted time series in Spain (**Martinez 2008 [+]**) that local-level policy and national legislation for smokefree implementation with supporting strategies decreases staff self-reported smoking during working hours in an **acute and maternity setting**. **Donchin 2004 [+]** in Israel reported a significant increase in staff smokers reporting they always usually leave their workstation to smoke following the implementation of a local (hospital board's) smokefree buildings policy, measured 3 months before and 6-9 month after implementation ($p<0.0001$). ***Supporting strategies*** *included an implementation committee, cessation support, smoking shelters erected outside the hospital building, bans on the sale of tobacco products on site, an information campaign 2 months before the policy was introduced, a press conference launch and fines for violations*. **Martinez 2008 [+]** reported that in 2001 "few smokers" (no data given) reported to have smoked inside the nursing rooms and, following the implementation of national indoor smokefree legislation in Spain in 2005, no employee respondents reported smoking inside the nursing rooms in 2006. In 2004 and 2006, no employees reported smoking in the smokefree cafeteria and the employees' rest areas. ***Supporting strategies*** *included the closure of smoking rooms and tobacco control training for nurses*.

Visitor Compliance with Smokefree: Smoking Behaviour (Acute & Maternity)

Evidence statement 1.4: There is **weak** evidence from two cohort studies, one in the USA **(Stillman 1990 [+])** and one in Canada **(Kvern 2006 [-])**, in an **acute and maternity setting** that implementation of local smokefree policies with supporting strategies decreases hospital visitor smoking.

UK Applicability: This evidence was conducted outside the UK, however one of the two studies' policy covers smokefree grounds (a policy implemented in parts of the UK) and there is no reason to believe the effect is not applicable to the UK setting.

In the USA, **Stillman 1990 [+]** reported a significant decrease in observed visitor smoking in hospital cafeterias and lounge areas at 1 and 6 months after the local (hospital board's) smokefree buildings policy was introduced ($p<0.0001$). ***Supporting strategies*** *included written policies, an implementation committee, cessation support, an internal media and educational campaign and free health checks for employees*. **Kvern 2006 [-]** in Canada reported that the number of contacts security personnel had with visitor smokers on hospital grounds decreased over 1, 2 and 3 months

post-implementation of a local (regional health authority's) smokefree grounds policy. ***Supporting strategies*** *included: written policies, an implementation committee, signage, staff meetings, notices in staff payslips, cessation support, pharmacotherapies, temporary abstinence support for inpatients, moving of ashtrays and shelters to the site periphery, staff training, media campaigns, bilingual information sheets for patients and the public and information on health organisations' websites*.

Patient Compliance with Smokefree: Smoking Behaviour (Acute & Maternity)

Evidence statement 1.5: There is **weak** evidence from one before and after study in Canada (**Kvern 2006 [-]**) about the impact of local smokefree policies with supporting strategies on inpatient smoking behaviour in an **acute and maternity setting**.

UK Applicability: This evidence was conducted outside the UK, however the policy covers smokefree grounds (a policy implemented in parts of the UK) and there is no reason to believe the effect is not applicable to the UK setting.

There is **weak** evidence from one cohort study in Canada (**Kvern 2006 [-]**) that the number of inpatients challenged about smoking on hospital grounds by security personnel decreased over 1, 2 and 3 months post-implementation of a local (regional health authority's) smokefree grounds policy with supporting strategies. ***Supporting strategies*** *included written policies, an implementation committee, signage, staff meetings, notices in staff payslips, cessation support, pharmacotherapies, temporary abstinence support for inpatients, moving of ashtrays and shelters to the site periphery, staff training, media campaigns, bilingual information sheets for patients and the public and information on health organisations' websites*.

All Hospital Users' Compliance with Smokefree: Smoking Behaviour (Acute & Maternity)

Evidence statement 1.6: There is **weak** evidence from two before and after studies in Canada (**Kvern 2006 [-])** and Israel **(Donchin 2004 [+]**) in an **acute and maternity setting** that local smokefree policy implementation with supporting strategies decreases observed smoking amongst all hospital users as a whole (patients, staff and visitors).

UK Applicability: This evidence was conducted outside the UK, however one of the two studies' policy covers smokefree grounds (a policy implemented in parts of the UK) and there is no reason to believe the effect is not applicable to the UK setting.

In Israel, **Donchin 2004 [+]** reported a significant reduction in observed smoking ($p<0.001$), frequently observed smoking (p value not reported) and occasionally observed smoking (p value not reported) by employees of other employees, patients, or visitors in unauthorized areas in the hospital following the implementation of a local (hospital board's) smokefree buildings policy, measured 3 months before and 6-9 month after implementation. ***Supporting strategies*** *included an implementation committee, posters/signage, staff letters/payslip notes, incorporating the policy launch with World No Tobacco Day, notices on staff bulletin boards and notification by supervisors*. **Kvern 2006 [-]** in Canada reported that the number of people observed smoking on facility grounds had reduced between 1 month pre-implementation of a local (regional health authority's) smokefree grounds policy and 1 month post-implementation. ***Supporting strategies*** *included written policies, an implementation committee, signage, staff meetings, notices in staff payslips, cessation support, pharmacotherapies, temporary abstinence support for inpatients, moving of*

ashtrays and shelters to the site periphery, staff training, media campaigns, bilingual information sheets for patients and the public and information on health organisations' websites.

Air Quality in Acute & Maternity Settings

Evidence statement 1.7: There is evidence from two before and after studies, one in the USA **(Wheeler 2007 [-])** and one in Spain **(Fernandez 2008 [+]**), one interrupted time series in Spain **(Martinez 2008 [+])** and one cohort study in the USA **(Stillman 1990 [+])** about the impact of local-level policy and national legislation for smokefree on air quality in an **acute and maternity setting**.

UK Applicability: This evidence was conducted outside the UK and the policy or national legislation covered in most (indoor smokefree) is already national legislation in the UK, however one study's policy covers smokefree grounds and buildings (a policy implemented in parts of the UK); there is no reason to believe the effect is not applicable to the UK setting.

(a) There is **moderate** evidence from one before and after study in Spain (**Fernandez 2008 [+]**) and one cohort study in the USA (**Stillman 1990 [+]**) using objective measures that local-level policy and national legislation for smokefree implementation with supporting strategies decreases atmospheric nicotine vapour measurements. **Fernandez 2008 [+]** in Spain reported that median nicotine concentration levels declined significantly in all seven locations measured across the 44 hospitals over the 4 months pre-implementation to the same period 1 year post-implementation of national indoor smokefree legislation in Spain. The overall median nicotine concentration level significantly declined from pre- to post-implementation ($p<0.01$). There were no sub-group differences in median nicotine concentrations before and after indoor smokefree legislation implementation by the type or size of hospital and number of employees. ***Supporting strategies*** *included cessation support to professionals, patients and visitors, staff training in tobacco control and guaranteeing common follow up and evaluation*. In the USA, **Stillman 1990 [+]** reported a significant decrease in median levels of nicotine concentrations 8 months after the local (hospital board's) smokefree buildings policy was implemented, compared with 8 months before implementation: in visitor/patient waiting areas and in cafeterias (both $p<0.001$); in staff lounges and in offices (both $p<0.01$); in corridors and elevators and in patient areas (both $p<0.05$). ***Supporting strategies*** *included written policies, an implementation committee, cessation support, an internal media and educational campaign and free health checks for employees*.

(b) There is **weak** evidence from one before and after study (**Wheeler 2007 [-]**) in the USA and one interrupted time series (**Martinez 2008 [+]**) in Spain that local-level policy and national legislation for smokefree implementation with supporting strategies decreases perceived or actual exposure to environmental tobacco smoke (subjective measures). **Wheeler 2007 [-]** in the USA reported significantly fewer employees claiming that they had to walk through cigarette smoke on campus 10 months after the implementation of a local (university hospital board's) smokefree indoors and outdoors policy, than 3 months before the policy ($p<0.0001$). ***Supporting strategies*** *included written policies, an implementation committee, posters, staff meetings, letters in staff payslips, patient appointments letters, cessation support, pharmacotherapies and announcements in local media*. In Spain, **Martinez 2008 [+]** reported the proportion of employees who claimed to work in a smokefree environment increased significantly from 2 years pre- to 1 year post-implementation of national indoor smokefree legislation in Spain, 95% CI: 26.2-39.7 in 2001 to 95% CI: 87.3-94.6 in 2006. The proportion who reported they were exposed for <1 hour and for 1-4 hours decreased significantly from pre to post ban. ***Supporting strategies*** *included the closure of smoking rooms and staff training*.

Other Indicators of Smokefree Compliance (Acute & Maternity)

Evidence statement 1.8: There is **inconsistent** evidence from one cohort study in the USA (**Stillman 1990 [+]**) in an **acute and maternity setting** that implementation of the local smokefree buildings policy with supporting strategies decreases the presence of cigarette butts in ashtrays. In the USA, **Stillman 1990 [+]** found a significant reduction in counts in indoor locations: the elevator lobby areas ($p<0.01$) and waiting lounges ($p<0.01$) in the 6 months after smokefree implementation of the local (hospital board's) smokefree buildings policy compared with the 6 months before. There was a non-significant increase in the number of butts recorded in ashtrays at the hospital entrances at the parking garages and the change was only significant ($p<0.05$) for the morning count in this location. ***Supporting strategies*** *included written policies, an implementation committee, cessation support, an internal media and educational campaign and free health checks for employees*.

UK Applicability: This evidence was conducted outside the UK and the policy covered (indoor smokefree) is already national legislation in the UK. However there is no reason to believe the effect is not applicable to the UK setting.

Evidence statement 1.9: There is **weak** evidence from one cohort study in the USA **(Stillman 1990 [+])** in an **acute and maternity setting** that implementation of the local (hospital board's) smokefree buildings policy with supporting strategies decreases fire incidents due to negligent smoking between the total 4 years before implementation to the total 1 year after implementation. ***Supporting strategies*** *included written policies, an implementation committee, cessation support, an internal media and educational campaign and free health checks for employees.*

UK Applicability: This evidence was conducted outside the UK and the policy covered (indoor smokefree) is already national legislation in the UK. However there is no reason to believe the effect is not applicable to the UK setting.

Inpatient Compliance with Smokefree: Requests to Terminate Smoking (Mental Healthcare)

Evidence statement 1.10: There is **weak** evidence from one interrupted time series in the USA **(Erwin 1991 [-])** and one before and after study in the USA (**Patten 1995 [+]**) that implementation of local smokefree policies, one indoors only **(Erwin 1991 [-]**) and one indoors and outdoors (**Patten 1995 [+]**, both in the USA), with supporting strategies may increase inpatient smoking violations in a **mental healthcare setting.**

UK Applicability: This evidence was conducted outside the UK and the policy covered in one (indoor smokefree) is already national legislation in the UK however the other study's policy covers smokefree grounds and buildings (a policy implemented in parts of the UK); there is no reason to believe the effect is not applicable to the UK setting.

One interrupted time series in the USA (**Erwin 1991 [-]**) reported an increase in nursing staff requesting inpatients cease smoking a lit cigarette, between 1 week post-implementation and 4 weeks post-implementation of a local (US Department of Veterans Affairs) smokefree buildings policy (no p values calculated). ***Supporting strategies*** *were based around nursing interventions, including encouraging patients to participate in smoking cessation groups and addressing patients with the urge to smoke*. One before and after study in the USA (**Patten 1995 [+]**) found that the frequency of smoking in the hospital room according to chart reports increased significantly between 3 months pre- and 3 months post-implementation of a local (hospital board's) smokefree buildings and smokefree grounds policy ($p<0.05$). ***Supporting strategies*** *included an implementation*

committee, weekly patient cessation support groups, pharmacotherapies, written information for patients and staff education sessions on the treatment of nicotine dependence.

Inpatient Compliance with Smokefree: Smoking-Related Contraband (Mental Healthcare)

Evidence statement 1.11: There is **weak** evidence from one before and after study in the USA (**Matthews 2005 [-]**), one interrupted time series in the USA **(Erwin 1991 [-])** and one cohort study in the USA **(Rauter 1997 [+])** in **mental health settings** that local policies for smokefree implementation indoors with supporting strategies increases occurrences of inpatient's smoking related contraband, although this is not maintained.

UK Applicability: This evidence was conducted outside the UK and the policy covered (indoor smokefree) is already national legislation in the UK. However there is no reason to believe the effect is not applicable to the UK setting.

Matthews 2005 [-] in the USA reported that 3 months after the implementation of a local (hospital's) smokefree buildings policy, there was a rise in nursing staff respondents reporting a *perceived* increase in male inpatients' smoking-related contraband post-implementation compared with respondents *anticipating* an increase in male inpatients' smoking-related contraband 3 months pre-implementation (p=0.05). No significant differences were found between the total number of recorded instances of contraband related to the 3 months before and 3 months after the smokefree policy was implemented. ***Supporting strategies*** *included patient education about nicotine addiction and withdrawal and pharmacotherapies*. **Erwin 1991 [-]** in the USA reported a decline in nursing staff reporting that they had discouraged family or significant others from "smuggling" cigarettes to inpatients, between 1 week post-implementation and 4 weeks post-implementation of a local (US Department of Veterans Affairs) smokefree buildings policy (no p values were calculated). ***Supporting strategies*** *were based around nursing interventions, including encouraging patients to participate in smoking cessation groups and addressing patients with the urge to smoke*. **Rauter 1997 [-]** in the USA reported instances of possession of unauthorised cigarettes and matches were raised in the 3 months before a local (hospital's) smokefree buildings policy was initiated in the psychiatric hospital's buildings, and in the first 3 months of smokefree. For the same period 1 year later, recorded incidents of contraband possession had dropped by two-thirds (no statistical analysis reported). *Patients wishing to participate in smoking reduction workshops were urged to do so, but no other supporting strategies for the policy were reported*.

Air Quality in Mental Healthcare Settings

Evidence statement 1.12: There is **moderate** evidence from two before and after studies, one in Switzerland **(Etter 2008 [+]** and one in France **(Vorspan 2009 [+])**, about the impact of local-level policy and national legislation for smokefree implementation on air quality in a **mental healthcare setting**. Both studies found that indoor smokefree implementation with supporting strategies decreases perceived or actual exposure to environmental tobacco smoke, whereas the Swiss study (**Etter 2008 [+])** also reported that non-smoking inpatient and staff reports of annoyance from environmental tobacco smoke also decreased after the implementation of the local indoor smokefree policy.

UK Applicability: This evidence was conducted outside the UK and the policy or national legislation covered (indoor smokefree) is already national legislation in the UK however there is no reason to believe the effect is not applicable to the UK setting.

(a) Impact on Hospital Staff: From 2 years pre- to 1 year post-implementation of a local (hospital administration's) smokefree buildings policy, **Etter 2008 [+]** in Switzerland found there was a significant increase in the percentage of non-smokers staff reporting that they were 'absolutely not' annoyed by ETS in their unit in dining rooms ($p<0.001$) and corridors ($p=0.023$). Between 2003 (no indoor smokefree policy) and 2006 (total indoors smokefree), there was a significant increase in the proportion of non-smoker staff reporting that they were 'never' exposed to ETS in their unit in bedrooms ($p=0.041$), dining rooms ($p=0.004$) and corridors ($p=0.006$). Non-smoker staff reported more exposure to ETS than patients across all surveys. ***Supporting strategies*** *included signage, cessation support, pharmacotherapies, closure of smoking rooms and staff training*. **Vorspan 2009 [+]** in France reported that in a sub-sample of staff classified as "exposed" [to ETS] non-smokers pre-ban, 1 month after the implementation of national indoor smokefree legislation in France there was a significant decrease in mean cotinine level ($p=0.045$). ***Supporting strategies*** *included pharmacotherapies for patients and staff, closure of smoking rooms and evaluation of patients for smoking breaks*.

(b) Impact on Inpatients: From 2 years pre- to 1 year post-implementation of a local (hospital administration's) smokefree buildings policy, **Etter 2008 [+]** in Switzerland found there was a significant increase in the percentage of non-smoker inpatients reporting that they were 'absolutely not' annoyed by ETS in their unit in dining rooms ($p=0.007$). Between 2003 (no indoor smokefree policy) and 2006 (total indoors smokefree), there was a non-significant increase in the percentage of non-smoker inpatients reporting that they were 'never' exposed to ETS in their unit in corridors ($p=0.029$). ***Supporting strategies*** *included signage, cessation support, pharmacotherapies, closure of smoking rooms and staff training*.

Other Impacts on Patients: Hospital Utilization and Inpatient Retention (Acute & Maternity)

Evidence statement 2.1: There is **weak** evidence from two uncontrolled before and after studies in the USA **(Gadomski 2010 [+], Wheeler 2007 [-]**) about the impact of local policy implementation for smokefree buildings and grounds with supporting strategies on hospital inpatient admissions in an **acute and maternity setting**.

UK Applicability: This evidence was conducted outside the UK, however the policies include smokefree grounds and buildings (a policy implemented in parts of the UK), the papers were published in the last 5 years, and there is no reason to believe the effect on patients is not applicable to the UK setting.

(a) There is **weak** evidence from two uncontrolled before and after studies in the USA (**Gadomski 2010 [+], Wheeler 2007 [-]**) in an **acute and maternity setting** that local smokefree buildings and grounds policy implementation with supporting strategies does not adversely change the number or characteristics of inpatients admitted to hospital. **Gadomski 2010 [+]** in the USA observed no adverse effects on inpatient volume in the 18 months before implementation of the local (hospital's) smokefree buildings and smokefree grounds policy, and in the 23 months post-implementation and there was little variation in the proportion of inpatients who smoked before and after implementation. ***Supporting strategies*** *included pharmacotherapies, cessation support, a campus map detailing smokefree borders, and staff, community and patient education*. **Wheeler 2007 [-]** in the USA reported that the 12-month mean licensed bed occupancy and the 12-month mean staffed bed occupancy increased slightly from pre-to post-implementation of a local (university hospital board's) policy for smokefree indoors and outdoors with supporting strategies. ***Supporting strategies*** *included written policies, an implementation committee, posters, staff meetings, letters in*

staff payslips, patient appointments letters, cessation support, pharmacotherapies and announcements in local media.

(b) There is **weak** evidence from one uncontrolled before and after study in the USA (**Gadomski 2010 [+]**) in an **acute and maternity setting** that implementation of a local (hospital's) smokefree buildings and smokefree grounds policy with supporting strategies does not change the number of inpatients signing out against medical advice (AMA) due to 'having to smoke' in the 6 months before and 6 months after implementation (no p values given). Smoking amongst all inpatients signing out AMA increased between 6 months pre-smokefree and 6 months post-smokefree but returned to the pre-smokefree baseline 1 year later (no statistical analysis presented). ***Supporting strategies*** *included pharmacotherapies, cessation support, a campus map detailing smokefree borders, and staff, community and patient education*.

Other Impacts on Patients: Inpatient NRT Prescriptions and NRT Use (Acute & Maternity)

Evidence statement 2.2: There is **weak** evidence from two uncontrolled before and after studies with different samples, one in the USA (**Gadomski 2010 [+])** and one in Canada (**Kvern 2006 [-]**), that **local smokefree policy implementation** with the supporting strategies of cessation support and pharmacotherapies/NRT provision increases the use of NRT by inpatients who smoke in an **acute or maternity care setting**.

UK Applicability: This evidence was conducted outside the UK, however the policies include smokefree grounds (a policy implemented in parts of the UK), and there is no reason to believe the effect on patients is not applicable to the UK setting.

Gadomski 2010 [+] in the USA reported that NRT prescriptions for inpatients increased in the 18 months before and 23 months after implementation of a local (hospital's) smokefree buildings and smokefree grounds policy, with a significant increase in prescriptions 1 month prior to implementation (p=0.008). ***Other supporting strategies*** *included cessation support, a campus map detailing smokefree borders, and staff, community and patient education*. **Kvern 2006 [-]** in Canada reported that NRT usage for inpatient support increased between before implementation of a local (regional health authority's) smokefree grounds policy and 3 months post-implementation. ***Other supporting strategies*** *included written policies, an implementation committee, signage, staff meetings, notices in staff payslips, cessation support, temporary abstinence support for inpatients, moving of ashtrays and shelters to the site periphery, staff training, media campaigns, bilingual information sheets for patients and the public and information on health organisations' websites*.

Other Impacts on Staff: Staff Smoking (Acute & Maternity)

Evidence statement 2.3: There is evidence from five before and after studies, four in the USA **(Hudzinski 1990 [+], Gadomski 2010 [+], Wheeler 2007 [-], Daughton 1992 [+])**, and one in Israel **(Donchin 2004 [+])**, one cohort study in the USA (**Stillman 1990 [+]**) and one interrupted time series in Spain (**Martinez 2008 [+]**) about the impact of local-level policy and national legislation for smokefree implementation on staff smoking in an **acute and maternity setting**.

UK Applicability: This evidence was conducted outside the UK, however nearly half the studies test smokefree grounds and buildings (a policy implemented in parts of the UK); the others test indoor smokefree already national legislation in the UK. There is no reason to believe the effect on staff is not applicable to the UK setting.

(a) Staff Smoking Rates: There is **moderate** evidence from three before and after studies in the USA (**Hudzinski 1990 [+], Gadomski 2010 [+], Wheeler 2007 [-]**), one cohort study in the USA (**Stillman 1990 [+]**) and one interrupted time series in Spain (**Martinez 2008 [+]**) to suggest that local-level policy and national legislation for smokefree implementation with supporting strategies **decreases** smoking rates amongst staff in an **acute and maternity setting**.

Hudzinski 1990 [+] in the USA reported that the proportion of hospital staff who self-reported that they smoked significantly decreased from 6 months pre- to 6 months post-implementation of a local (medical foundation's) smokefree (campus) buildings and grounds policy (Chi-square=11.53, p<0.003). ***Supporting strategies*** *included a Smoke-Free Task Force (with clinicians, psychologists, and administrative personnel from public affairs and employee relations departments)*. **Gadomski 2010 [+]** in the USA reported a decrease in employee smoking prevalence from 1 year pre- to 1 year post-implementation of a local (hospital's) smokefree buildings and smokefree grounds policy (p<0.001). ***Supporting strategies*** *included pharmacotherapies, cessation support, a campus map detailing smokefree borders, and staff, community and patient education*. **Wheeler 2007 [-]** in the USA reported significantly fewer employees reporting that they were a current smoker 10 months after the implementation of a local (university hospital board's) policy for smokefree indoors and outdoors than 3 months before implementation (p<0.0001). ***Supporting strategies*** *included written policies, an implementation committee, posters, staff meetings, letters in staff payslips, patient appointments letters, cessation support, pharmacotherapies and announcements in local media*. **Stillman 1990 [+]** in the USA reported a significant decline in staff smoking prevalence from 8 months pre- to 6 months post-implementation of a local (hospital board's) smokefree buildings policy (p=0.0001). ***Supporting strategies*** *included written policies, an implementation committee, cessation support, an internal media and educational campaign and free health checks for employees*. Following implementation of national indoor smokefree legislation in Spain in 2005, **Martinez 2008 [+]** in Spain found a non-significant decrease in employee smoking prevalence from 4 years before the smokefree legislation (95% CI: 27.7-41.2) to 1 year after the legislation (95% CI: 24.7-36.4). ***Supporting strategies*** *included the closure of smoking rooms and staff training*.

(b) Staff Smoking by Number of Cigarettes: There is **moderate** evidence from three before and after studies, two in the USA (**Hudzinski 1990 [USA +], Daughton 1992 [-]**) and one in Israel (**Donchin 2004 [+]**), and one interrupted time series in Spain (**Martinez 2008 [+]**) to suggest that local-level policy and national legislation for smokefree implementation with supporting strategies **decreases** the number of cigarettes smoked by staff both during working hours and overall in an **acute and maternity setting**. **Hudzinski 1990 [+]** in the USA reported a decrease in the number of cigarettes staff reported smoking from 6 months pre- to 6 months post-implementation of a local (medical foundation's) smokefree (campus) buildings and grounds policy (data not reported). ***Supporting strategies*** *included a Smoke-Free Task Force (with clinicians, psychologists, and administrative personnel from public affairs and employee relations departments)*. **Donchin 2004 [+]** in Israel reported no change in the mean number of cigarettes smoked, either in during work hours or in total following the implementation of a local (hospital board's) smokefree buildings policy, measured 3 months before and 6-9 months after implementation. ***Supporting strategies*** *included an implementation committee, cessation support, smoking shelters erected outside the hospital building, bans on the sale of tobacco products on site, an information campaign 2 months before the policy was introduced, a press conference launch and fines for violations*. Following implementation of a local (hospital's) smokefree buildings policy, **Daughton 1992 [-]** in the USA reported a significant decrease in mean cigarette consumption during work hours (p<0.0001), during workdays (p<0.001) and during non-workdays (p<0.01) by staff between 5 months and 17 months post-implementation. The significant decrease in mean cigarette consumption mostly occurred amongst staff self-reported as moderate to heavy smokers (≥10 cigs/day) (p<0.001); Light smokers (<10 cigs/day) day) showed

only a slight decrease in mean daily cigarette consumption (p<0.05). ***Supporting strategies*** *included an implementation committee, employee bulletins and newsletters, cessation support and an in-house media campaign*. After the implementation of national indoor smokefree legislation in Spain in 2005, **Martinez 2008 [+]** in Spain reported a non-significant increase in the number of employees self-reporting they smoked <10 cigs/day after the implementation 1 year after the legislation (95% CI: 35.3-60.7) compared with 4 years before (95% CI: 24.8-51.19). There was a non-significant decrease in the number of employees who smoked 10-20 cigs/day and a non-significant increase in those who smoked >20 cigs/day 1 year after the legislation (95% CI: 24.6-49.3 and 95% CI: 5.1-22.8 respectively) compared with 4 years before (95% CI: 47.7-74.3 and 95% CI: 0.7-13.2 respectively). ***Supporting strategies*** *included the closure of smoking rooms and staff training*.

Other Impacts on Staff: Staff Quitting Activity (Acute & Maternity)

Evidence statement 2.4: There is **inconsistent** evidence from two before and after studies from the USA **(Daughton 1992 [-], Hudzinski 1990 [+])**, and two interrupted time series, one from Spain (**Martinez 2008 [+])** and one from the USA (**Ripley-Moffitt 2010 [+])**, about the impact of local-level policy and national legislation for smokefree implementation with supporting strategies on staff quit attempts in an **acute and maternity setting**.

UK Applicability: This evidence was conducted outside the UK and the policy covered in three studies (indoor smokefree) is already national legislation in the UK, however the other study's policy is for smokefree grounds and buildings (a policy implemented in parts of the UK). There is no reason to believe the effect on staff is not applicable to the UK setting.

(a) Quit attempts: There is **inconsistent** evidence from two before and after studies from the USA (**Daughton 1992 [-], Hudzinski 1990 [+]**) and two interrupted time series, one in Spain (**Martinez 2008 [+]** and one in the USA (**Ripley-Moffitt 2010 [+]**), to suggest that smokefree implementation with supporting strategies decreases or has no effect on the number of quit attempts by staff.

Three studies found no change or a decrease post-implementation. **Hudzinski 1990 [+]** in the USA reported that the proportion of hospital staff smokers who reported that they intended to stop smoking if the institution implemented a policy was slightly higher than the proportion that staff who reported that they tried to stop smoking at six and 12 months post-implementation a local (medical foundation's) smokefree (campus) buildings and grounds policy. ***Supporting strategies*** *included a Smoke-Free Task Force (with clinicians, psychologists, and administrative personnel from public affairs and employee relations departments)*. Following implementation of a local (hospital's) smokefree buildings policy, **Daughton 1992 [-]** in the USA reported **no change** in the rate of staff smokers self-reporting trying to quit (around two-fifths) between 5 months and 17 months post-implementation. ***Supporting strategies*** *included an implementation committee, employee bulletins and newsletters, cessation support and an in-house media campaign*. Following implementation of national indoor smokefree legislation in Spain in 2005, **Martinez 2008 [+]** in Spain reported a non-significant decrease the proportion of hospital employee smokers reporting having attempted to quit smoking at least once from 4 years before the smokefree legislation (95% 95% CI: 52.0-76.0) to 1 year after the legislation (95% CI: 29.8-55.0). ***Supporting strategies*** *included the closure of smoking rooms and staff training*.

One study found an increase post-implementation. **Ripley-Moffitt 2010 [+]** in the USA reported an increase in current smokers self-reporting to have made a quit attempt in the preceding 6 months from the month pre-implementation of a local (hospital's) smokefree (campus) buildings and grounds policy to 6 months post-implementation, the proportion falling at 12 months post-

implementation but still a higher than before smokefree was in place. There was no change in the proportion of employees who currently smoked who reported plans to quit smoking in the next 30 days or 6 months across all three surveys; it was always higher than the proportion who made quit attempts. ***Supporting strategies*** *included posters, staff meetings, an employee newsletter and cessation support.*

(b) Successful quitting: There is **weak** evidence from one before and after study in the USA (**Daughton 1992 [-]**) and one interrupted time series in the USA (**Ripley-Moffit 2010 [+]**) to suggest that implementation of a local smokefree policy for buildings or buildings and grounds with supporting strategies does not change the proportion of staff who quit smoking. **Daughton 1992 [-]** in the USA found a similar quit rate for staff who remain smoke-free for ≥3 months in the year pre-policy, at 5 months post-policy and at 7 months post-policy. ***Supporting strategies*** *included an implementation committee, employee bulletins and newsletters, cessation support and an in-house media campaign.* **Ripley-Moffitt 2010 [+]** in the USA reported no change in the proportion of staff reporting that they had quit smoking in the previous 6 months at the month pre-implementation of a local (hospital's) smokefree (campus) buildings and grounds policy to those reporting at 6 months post-implementation. ***Supporting strategies*** *included posters, staff meetings, an employee newsletter and cessation support.*

Other Impacts on Staff: Staff Readiness to Quit (Acute & Maternity)

Evidence statement 2.5: There is **inconsistent** evidence from one before and after study in Israel (**Donchin 2004 [+]**) and one interrupted time series in Spain (**Martinez 2008 [+]**) that that smokefree implementation with supporting strategies may increase the number of staff smokers' readiness to quit in an acute or maternity care setting.

UK Applicability: This evidence was conducted outside the UK and the policy covered (indoor smokefree) is already national legislation in the UK. However there is no reason to believe the strategy's effect is not applicable to the UK setting.

Martinez 2008 [+] in Spain found a significant increase in hospital employee smokers expressing readiness to quit after the implementation of national indoor smokefree legislation in Spain in 2005 compared with before ($p<0.05$). ***Supporting strategies*** *included the closure of smoking rooms and staff training*. Whereas **Donchin 2004 [+]** in Israel reported an increase in staff smokers classified in the pre-contemplation stage, and a smaller decrease in those classified in the preparatory stage, following the implementation of a local (hospital board's) smokefree buildings policy, measured 3 months before and 6-9 months after implementation, indicating less readiness to quit. ***Supporting strategies*** *included an implementation committee, cessation support, smoking shelters erected outside the hospital building, bans on the sale of tobacco products on site, an information campaign 2 months before the policy was introduced, a press conference launch and fines for violations*. The evidence from **Donchin 2004 [+] in Israel** could be due to those who were most motivated to quit doing so as a result of smokefree, leaving the least motivated group; alternatively smokefree had an effect that made staff smokers less likely to want to quit.

Other Impacts on Staff: Employee Resignations and Hires (Acute & Maternity)

Evidence statement 2.6: There is **weak** evidence from one uncontrolled before and after study in the USA (**Wheeler 2007 [-]**) that implementation of a local (university hospital board's) policy for smokefree indoors and outdoors with **extensive** supporting strategies does not change the mean number of the number of employee resignations/terminations, the likelihood of employees leaving as a result of the policy, or the rate of new employee hired in an acute or maternity care setting.

UK Applicability: This evidence was conducted outside the UK, however the policy covers smokefree grounds and buildings (a policy implemented in parts of the UK) and there is no reason to believe the effect is not applicable to the UK setting.

Wheeler 2007 [-] in the USA found no discernible changes in mean employee resignations/terminations or new employee hires after implementation of a local (university hospital board's) policy for smokefree indoors and outdoors. More employees stated that they were likely to stay as a result of the policy or were unaffected by the policy than those who said they were likely to leave because of the policy. ***Supporting strategies*** *included written policies, an implementation committee, posters, staff meetings, letters in staff payslips, patient appointments letters, cessation support, pharmacotherapies and announcements in local media*.

Other Impacts on Patients: Inpatient Violent Incidents/Aggression (Mental Healthcare)

Evidence statement 3.1: There is **moderate** evidence from four before and after studies, three in the USA (**Hempel 2002 [+], Quinn 2000 [-], Haller 1996 [+])** and one in the UK **(Shetty 2010 [+]**) that smokefree implementation with supporting strategies may decrease or have no effect on inpatient verbal aggression in a mental healthcare setting. One cohort study in the USA (**Velasco 1996 [-]**) showed an immediate significant increase in verbal aggression, but this was not maintained in the long term.

UK Applicability: Evidence comes from one recent UK study but mostly from outside the UK. However nearly half the studies test smokefree grounds and buildings (a policy implemented in parts of the UK), the others test indoor smokefree already national legislation in the UK. There is no reason to believe the effect is not applicable to the UK setting.

In the USA, **Hempel 2002 [+]** reported a significant decline in verbal aggression in heavy smokers (≥19 cigs/day) ($Z = -2.12$, $p=0.034$) 4 weeks after implementation a local (hospital board's) smokefree (campus) buildings and smokefree grounds policy compared with 4 weeks prior to implementation. There were no significant changes for non-smokers, light smokers (1-9 cigs/day) and moderate smokers (10-18 cigs/day). ***Supporting strategies*** *included education for staff about potential withdrawal symptoms, and any tobacco products found on patients were seized.*

In the USA, **Quinn 2000 [-]** reported a significant decrease in verbal acts of aggression 1 month post-implementation of a local (hospital's) smokefree (campus) buildings and smokefree grounds policy compared to the month prior to implementation ($p<0.01$). ***Supporting strategies*** *included written policies, pharmacotherapy and patient education about smoking and tobacco addiction recovery.*

In the USA, **Haller 1996 [+]** reported a significant decrease in verbal aggression 1 month following a local (hospital's) smokefree buildings and smokefree grounds policy, an increase during the second month, and a return to pre-policy levels at 3 and 4 months following the policy's implementation

(p<0.01). **Supporting strategies** were pharmacotherapies, staff education to recognise and treat nicotine withdrawal and written information for patients.

In the UK, **Shetty 2010 [+]** reported a non-significant reduction in the number of recorded verbal aggression incidents by male patients from 3 months before implementing the national indoor smokefree legislation and a local (NHS Trust's) smokefree grounds policy, to 3 months after (P=0.9). Two male patients were involved in verbal outbursts attributed to nicotine withdrawal during the first month after implementation, however 12 months after implementation, there was no recorded verbal aggression directly related to nicotine withdrawal. ***Supporting strategies*** *were posters, group and individual cessation support, pharmacotherapies, closure of smoking rooms and staff training.*

In the USA, **Velasco 1996 [-]** reported that the mean number of verbal assaults during the 6-week period immediately after implementation of local (hospital's) smokefree buildings policy in 1991 was significantly higher than in the 6-week period before implementation (p<0.001). ***The supporting strategy*** *was that patients were notified of the indoor smoking ban prior to admission.*

Evidence statement 3.2: There is **inconsistent** evidence from six before and after studies in the USA (**Hempel 2002 [+], Quinn 2000 [-], Haller 1996 [+], Matthews 2005 [-])** and the UK (**Shetty 2010 [+], Cormac 2010 [+],**) two cohort studies in the USA (**Rauter 1997 [+], Velasco 1996 [-]**) and one interrupted time series in the USA (**Erwin 1991 [-]**) that smokefree implementation with supporting strategies may affect inpatient physical aggression in a **mental healthcare setting**.

UK Applicability: Evidence comes from two recent UK studies but mostly from outside the UK. However over half the studies test smokefree grounds and buildings (a policy implemented in parts of the UK), the others test indoor smokefree already national legislation in the UK. There is no reason to believe the effect is not applicable to the UK setting.

One before and after study in the UK (**Cormac 2010 [+]**) showed a significant increase in inpatient violent incidents for pre-implementation smokers 4 months after implementation of the national indoor smokefree legislation in England and a local (NHS Trust's) smokefree grounds policy compared with 4 months before implementation (p=0.01). There was no significant difference between pre-ban smokers assessed 1 month pre- and 1 month post-implementation. ***Supporting strategies*** *were pharmacotherapy, cessation support, staff training and patient surrender of smoking materials.*

Five studies that reported significance values found that smokefree implementation with supporting strategies either significantly decreases inpatient physical aggression (**Quinn 2000 [-]**), or has no significant effect on inpatient physical aggression (**Hempel 2002 [+]**, **Haller 1996 [+]**, **Matthews 2005 [-]**, **Velasco 1996 [-]**). Three further studies reported a non-significant decline in inpatient physical aggression (**Shetty 2010 [+]**, **Rauter 1997 [-]**) or a decline in inpatient physical aggression (without providing the p values) (**Erwin 1991 [-]**) in a **mental healthcare setting**.

One interrupted time series in the USA (**Erwin 1991 [-]**) reported a decline in the proportion of nursing staff reporting that they intervened verbally or physically to prevent a patient who demanded to smoke from harming self or others, between 1 week post-implementation and 4 weeks post-implementation of a local (US Department of Veterans Affairs) smokefree buildings policy (no p values calculated). ***Supporting strategies*** *were based around nursing interventions, including encouraging patients to participate in smoking cessation groups and addressing patients with the urge to smoke*.

In the USA, **Hempel 2002 [+]** reported no significant changes in physical aggression in non-smokers or smokers 4 weeks after implementation a local (hospital board's) smokefree (campus) buildings and smokefree grounds policy compared with 4 weeks prior to implementation. ***Supporting strategies*** *included education for staff about potential withdrawal symptoms, and any tobacco products found on patients were seized.*

In the USA, **Quinn 2000 [-]** reported a significant decrease in physical acts of aggression 1 month post-implementation of a local (hospital's) smokefree (campus) buildings and smokefree grounds policy compared to the month prior to implementation ($p<0.01$). ***Supporting strategies*** *included written policies, pharmacotherapy and patient education about smoking and tobacco addiction recovery.*

In the UK, **Shetty 2010 [+]** reported a non-significant reduction in the number of recorded physical aggression incidents by male patients from 3 months before implementing the national indoor smokefree legislation and a local (NHS Trust's) smokefree grounds policy, to 3 months after ($P=0.6$). ***Supporting strategies*** *were posters, group and individual cessation support, pharmacotherapies, closure of smoking rooms and staff training.*

In the USA, **Haller 1996 [+]** reported no significant change in physical aggression against other people or physical aggression against objects occurred over the 1 month preceding the local (hospital's) smokefree buildings and smokefree grounds policy or the 4 months following its implementation. There was a significant increase in physical aggression against self during the second month post-policy and a decrease to pre-policy levels at 3 and 4 months following the policy's implementation ($p<0.01$). ***Supporting strategies*** *were pharmacotherapies, staff education to recognise and treat nicotine withdrawal and written information for patients.*

In the USA, **Matthews 2005 [-]** reported no significant differences between the number of episodes or total number of patients who committed at least 1 episode of assault or self-harm in the 3 months before and 3 months after the local (hospital's) smokefree buildings policy was implemented. ***Supporting strategies*** *included patient education about nicotine addiction and withdrawal and pharmacotherapies.*

In the USA, **Rauter 1997 [-]** reported a decrease in the average monthly assault rate for the first three months of the implementation of a local (hospital's) smokefree buildings policy when compared to the same time 1 year previously. ***Supporting strategies*** *included smoking reduction workshops and patients wishing to participate were urged to do so.*

In the USA, **Velasco 1996 [-]** reported no significant change in the mean number of physical assaults between any of the three time periods: 6 weeks immediately before implementation of the local (hospital's) smokefree buildings policy, 6 weeks immediately after the 1991 ban, and the 1993 follow up. ***The supporting strategy*** *was that patients were notified of the indoor smoking ban prior to admission.*

Other Impacts on Patients: Inpatient Seclusion and Restraint (Mental Healthcare)

Evidence statement 3.3: There is **moderate** evidence from five before and after studies, one in the UK (**Cormac 2010 [UK +])** and four in the USA **(Haller 1996 [+], Hempel 2002 [+], Matthews 2005 [-], Patten 1995 [+]**), and one interrupted time series in the USA (**Erwin 1991 [-]**) that the introduction of smokefree in mental healthcare settings decreases or has no significant effect on incidents of

inpatient seclusion and restraint. One poor quality cohort study in the USA (**Velasco 1996 [-]**) showed a significant increase for soft restraints but no difference for leather restraints.

UK Applicability: Evidence comes from one recent UK study but mostly from outside the UK. However over half the studies test smokefree grounds and buildings (a policy implemented in parts of the UK), the others test indoor smokefree already national legislation in the UK. The use of mechanical or physical restraints is not a first-line response in the UK and so this is of limited applicability in the UK.

Cormac 2010 [+] in the UK found no significant results for comparisons of the numbers of seclusions between pre-ban smokers or non-smokers or all patients for between 1 month before and 1 month after implementation of the national indoor smokefree legislation in England and a local (NHS Trust's) smokefree grounds policy, nor between 4 months before and 4 months after implementation. ***Supporting strategies*** *were pharmacotherapy, cessation support, staff training and patient surrender of smoking materials.*

Haller 1996 [+] in the USA reported no significant changes in the proportion of patients who were secluded or the proportion of patients who were restrained over the 1 month preceding the local (hospital's) smokefree buildings and smokefree grounds policy or the 4 months following its implementation. ***Supporting strategies*** *were pharmacotherapies, staff education to recognise and treat nicotine withdrawal and written information for patients.*

Hempel 2002 [+] in the USA reported no significant changes in mean instances per week of seclusion or restraint in non-smokers or smokers 4 weeks after implementation a local (hospital board's) smokefree (campus) buildings and smokefree grounds policy compared with 4 weeks prior to implementation. ***Supporting strategies*** *included education for staff about potential withdrawal symptoms, and any tobacco products found on patients were seized.*

Matthews 2005 [-] in the USA reported no significant differences between the total number of patients who required seclusion or restraint in the 3 months before and 3 months after the local (hospital's) smokefree buildings policy was implemented. ***Supporting strategies*** *included patient education about nicotine addiction and withdrawal and pharmacotherapies.*

One before and after study in the USA (**Patten 1995 [+]**) found no significant change in the use of restraints between 3 months pre- and 3 months post-implementation of a local (hospital board's) smokefree buildings and smokefree grounds policy ($p=0.175$). Seclusion rates, however, were significantly lower post-implementation ($p<0.05$). ***Supporting strategies*** *included an implementation committee, weekly patient cessation support groups, pharmacotherapies, written information for patients and staff education sessions on the treatment of nicotine dependence*.

One interrupted time series in the USA (**Erwin 1991 [-]**) reported little change in nursing staff reporting that they had encouraged room "time outs" to decrease stimulation, between 1 week post-implementation and 4 weeks post-implementation of a local (US Department of Veterans Affairs) smokefree buildings policy (no p values calculated). ***Supporting strategies*** *were based around nursing interventions, including encouraging patients to participate in smoking cessation groups and addressing patients with the urge to smoke*.

In the USA, **Velasco 1996 [-]** reported that the number of applications of soft restraints was significantly higher during the 1993 follow up period than during the period before implementation of the local (hospital's) smokefree buildings policy ($p<0.001$). The mean number of leather wrist or ankle bindings did not change significantly between any of the three time periods; 6 weeks

immediately before and after implementation of the policy and the 1993 follow up. ***The supporting strategy*** *was that patients were notified of the indoor smoking ban prior to admission.*

Other Impacts on Patients: Security Calls (Mental Healthcare)

Evidence statement 3.4: There is **weak** evidence from one cohort study in the USA (**Velasco 1996 [-]**) that recorded security calls (for help from security officers) may not increase with the introduction of smokefree in mental healthcare settings.

UK Applicability: This evidence was conducted outside the UK and the policy covered (indoor smokefree) is already national legislation in the UK. However there is no reason to believe the strategy's effect is not applicable to the UK setting.

In the USA, **Velasco 1996 [-]** reported no significant change in the mean number if security calls for help from security officers between any of the three time periods: 6 weeks immediately before implementation of the local (hospital's) smokefree buildings policy, 6 weeks immediately after the 1991 ban, and the 1993 follow up. ***The supporting strategy*** *was that patients were notified of the indoor smoking ban prior to admission.*

Other Impacts on Patients: Inpatient Medication Changes (Mental Healthcare)

Evidence statement 3.5: There is **inconsistent** evidence from five before and after studies, two in the UK (**Cormac 2010 [+], Shetty 2010 [+])** and three in the USA **(Haller 1996 [+], Hempel 2002 [+], Patten 1995 [+]**), one interrupted time series in the USA (**Erwin 1991 [-]**) and one cohort study in the USA (**Velasco 1996 [-]**) that the introduction of smokefree legislation may change the required doses of inpatient PRN medication. Five before and after studies, two in the UK (**Cormac 2010 [+], Shetty 2010 [+])** and three in the USA **(Haller 1996 [+], Hempel 2002 [+], Patten 1995 [+]**), and one interrupted time series in the USA (**Erwin 1991 [-]**) suggest that required doses of inpatient PRN medications do not change or may decrease, whereas one cohort study in the USA (**Velasco 1996 [-]**) suggests that required doses of inpatient PRN medications for agitation and aggression may increase with the introduction of smokefree in mental healthcare settings.

UK Applicability: Evidence comes from two recent UK studies but mostly from outside the UK. However over half the studies test smokefree grounds and buildings (a policy implemented in parts of the UK), the others test indoor smokefree already national legislation in the UK. There is no reason to believe the effect is not applicable to the UK setting.

In the UK, **Cormac 2010 [+]** found a significant decline in mean dose of regular antipsychotic medication for smokers from 1 month before to 1 month after (95% CI 0.37-5.42; p=0.025) implementation of the national indoor smokefree legislation in England and a local (NHS Trust's) smokefree grounds policy. Other results were not significant for comparisons of mean dose of regular or PRN antipsychotics or benzodiazepines between pre-ban smokers or non-smokers for the 1 month pre-post or the 4 month pre-post comparisons. ***Supporting strategies*** *were pharmacotherapy, cessation support, staff training and patient surrender of smoking materials.*

One interrupted time series in the USA (**Erwin 1991 [-]**) reported a reduction in the number of patients offered PRN medications, between 1 week post-implementation and 4 weeks post-implementation of a local (US Department of Veterans Affairs) smokefree buildings policy (no p values calculated). ***Supporting strategies*** *were based around nursing interventions, including encouraging patients to participate in smoking cessation groups and addressing patients with the urge to smoke*.

In the USA, **Haller 1996 [+]** reported no significant changes in the proportion of patients who

received PRN medications over the 1 month preceding the local (hospital's) smokefree buildings and smokefree grounds policy or the 4 months following its implementation. ***Supporting strategies*** *were pharmacotherapies, staff education to recognise and treat nicotine withdrawal and written information for patients.*

In the USA, **Hempel 2002 [+]** reported no significant changes in mean instances per week of PRN for agitation and aggression in non-smokers or smokers 4 weeks after implementation a local (hospital board's) smokefree (campus) buildings and smokefree grounds policy compared with 4 weeks prior to implementation. ***Supporting strategies*** *included education for staff about potential withdrawal symptoms, and any tobacco products found on patients were seized.*

In the UK, **Shetty 2010 [+]** reported a non-statistically significant change in rates of PRN tranquilisers for male patients from 3 months before implementing the national indoor smokefree legislation and a local (NHS Trust's) smokefree grounds policy, to 3 months after (p=0.6 for lorazepam and p=0.4 for haloperidol). ***Supporting strategies*** *were posters, group and individual cessation support, pharmacotherapies, closure of smoking rooms and staff training.*

One before and after study in the USA (**Patten 1995 [+]**) reported no significant differences in total PRN medication use (p=0.249) or in the percentage of patient days with PRN medication (p=0.166) between 3 months pre- and 3 months post-implementation of a local (hospital board's) smokefree buildings and smokefree grounds policy. ***Supporting strategies*** *included an implementation committee, weekly patient cessation support groups, pharmacotherapies, written information for patients and staff education sessions on the treatment of nicotine dependence*.

In the USA, **Velasco 1996 [-]** reported that the use of PRN medication for anxiety was significantly higher during the 6-week period immediately after implementation of local (hospital's) smokefree buildings policy in 1991 was significantly higher than in the 6-week period before implementation (p<0.06). ***The supporting strategy*** *was that patients were notified of the indoor smoking ban prior to admission.*

Evidence statement 3.6: There is evidence from two before and after studies in the UK (**Cormac 2010 [+]**), **Shetty 2010 [+]**) about the impact of smokefree legislation on inpatient antipsychotic medication in a **mental healthcare setting**.

UK Applicability: The evidence comes from two recent UK studies thus is highly applicable.

There is **weak** evidence from one before and after study in the UK **(Cormac 2010 [+]**) that required doses of antipsychotic medication significantly decreases with the introduction of a national indoor smokefree legislation and local (NHS Trust's) smokefree grounds policy *(95% CI 0.37-5.42; p=0.025)*.

In the UK, **Cormac 2010 [+]** found a significant decline in mean dose of regular antipsychotic medication for smokers from 1 month before to 1 month after (95% CI 0.37-5.42; p=0.025) implementation of the national indoor smokefree legislation in England and a local (NHS Trust's) smokefree grounds policy. Other results were not significant for comparisons of mean dose of regular or PRN antipsychotics between pre-ban smokers or non-smokers for the 1 month pre-post or the 4 month pre-post comparisons. ***Supporting strategies*** *were pharmacotherapy, cessation support, staff training and patient surrender of smoking materials.*

There is **weak** evidence from one before and after study in the UK (**Shetty 2010 [+]**) that serum levels of clozapine in male patients significantly increases with the introduction of smokefree *the* national indoor smokefree legislation and a local (NHS Trust's) smokefree grounds policy *(p=0.006)*.

In the UK, **Shetty 2010 [+]** reported a statistically significant increase in serum clozapine levels (p=0.006) for male patients from 3 months before implementing the national indoor smokefree legislation and a local (NHS Trust's) smokefree grounds policy, to 3 months after. ***Supporting strategies*** *were posters, group and individual cessation support, pharmacotherapies, closure of smoking rooms and staff training.*

Other Impacts on Patients: Inpatient Disruptive Behaviours (Mental Healthcare)

Evidence statement 3.7: There is **weak** evidence from one before and after study in the USA (**Hempel 2002 [+]**) that combined measures of inpatient disruptive behaviours decreases with the introduction of smokefree in mental healthcare settings, particularly amongst moderate and heavy smokers.
Instances of PRN for agitation, PRN for aggression, verbal aggression, physical aggression, loss of privileges, and restraint and seclusion were combined to give a total for instances of inpatient 'disruptive behaviours'. Overall, there was a significant post-ban local (hospital board's) smokefree (campus) buildings and smokefree grounds policy decline in inpatient disruptive behaviours among the moderate smokers, Z = -2.24 p=0.025 and heavy smokers, Z = -2.71, p=0.007. There were no significant post-ban changes in inpatient disruptive behaviours among the non-smokers or light smokers. ***Supporting strategies*** *include provision of education to staff about potential withdrawal symptoms, and any tobacco products found on patients were seized.*

UK Applicability: This evidence was conducted outside the UK however the study tests smokefree grounds and buildings (a policy implemented in parts of the UK). There is no reason to believe the strategy's effect is not applicable to the UK setting.

Other Impacts on Patients: Patient Admittance and Length of Stay or Attendance (Mental Healthcare)

Evidence statement 3.8: Impact of smokefree legislation on patient admission and inpatient length of stay/outpatient length of attendance in a mental healthcare setting
There is evidence from three before and after studies in the USA (**Haller 1996 [+], Patten 1995 [+], Rees 2008 [+]**), one randomised controlled trial in the USA (**Kempf 1996 [+]**) and two cohort studies in the USA (**Sterling 1994 [-], Velasco 1996 [-]**) about the impact of smokefree legislation on patient admission and inpatient length of stay/outpatient length of attendance in a **mental healthcare setting**.

UK Applicability: This evidence was conducted outside the UK. Some of the studies test smokefree grounds and buildings (a policy implemented in parts of the UK), the others test indoor smokefree already national legislation in the UK. The age of the studies and the specific settings may not very applicable to the UK setting.

There is **moderate** evidence from one before and after study with inpatients in the USA (**Rees 2008 [+]**), one randomised controlled trial with inpatients in the USA (**Kempf 1996 [+]**) and one cohort study with outpatients in the USA (**Sterling 1994 [-]**) that the introduction of smokefree does not significantly impact on admission or retention to substance misuse treatment programmes.

In the USA, **Rees 2008 [+]** reported no significant changes in the number of admissions and patient demographics between the 12 months before and 12 months after implementation of a local (university hospital's) smokefree buildings policy in its inpatient medical detoxification unit. ***The***

supporting strategy *was that patients were informed of the indoor smoking ban as part of their admission screening process.*

In the USA, **Kempf 1996 [+]** reported that 2% of 105 adolescents randomly assigned to the tobacco-free residential programme based at the intervention campus, with a local (facility's) smokefree buildings and grounds (campus) policy, declined admission compared to 5% of 105 adolescents randomly assigned to the residential programme based at the control campus, with a smokefree buildings and designated outdoor areas policy. Pre-allocation, there was no significant difference between adolescents randomly assigned to either programme who declined admission (p=0.38). There was no significant difference between the two programmes for retention at 2 days (p=0.43) or retention at 2 weeks (p=0.37) Heavy smokers were significantly more likely to drop out in the first 2 days of treatment (p=0.005), although were equally likely to drop out of either programme (p=1.0). ***No supporting strategies*** *were reported.*

In the USA, **Sterling 1995 [-]** reported no significant change in neither the average number of daily new admissions per week, nor average number of outpatients attending groups per week between 1 and 3 months before and 1 and 3 months after the implementation of a local (facility's) smokefree buildings policy (p>0.05). ***Supporting strategies*** *were that outpatients were informed of the ban by a therapist and posters were displayed.*

There is **weak** evidence from one before and after study in the USA (**Rees 2008 [+]**) that reported a significant decrease in the length of patient stay between the 12 months before and 12 months after implementation of a local (university hospital's) smokefree buildings policy in its inpatient medical detoxification unit (p<0.05). The decrease was similar for patients who used tobacco and those who did not (p>0.10). ***The supporting strategy*** *was that patients were informed of the indoor smoking ban as part of their admission screening process.*

There is **strong** evidence from three before and after studies with inpatients in the USA (**Haller 1996 [+], Patten 1995 [+], Rees 2008 [+]**) and two cohort studies in the USA, one with outpatients (**Sterling 1994 [-]**) and one with inpatients (**Velasco [-]**), that the introduction of smokefree in mental health care settings does not significantly impact on the number of discharges against medical advice or patient attendance.

In the USA, **Haller 1996 [+]** reported no significant changes in the proportion of patients who were discharged against medical advice or in the proportion of patients who eloped over the 1 month preceding the local (hospital's) smokefree buildings and smokefree grounds policy or the 4 months following its implementation. ***Supporting strategies*** *were pharmacotherapies, staff education to recognise and treat nicotine withdrawal and written information for patients.*

One before and after study in the USA (**Patten 1995 [+]**) reported a non-significant increase in the number of patients who left against medical advice (p=0.500) between 3 months pre- and 3 months post-implementation of a local (hospital board's) smokefree buildings and smokefree grounds policy. ***Supporting strategies*** *included an implementation committee, weekly patient cessation support groups, pharmacotherapies, written information for patients and staff education sessions on the treatment of nicotine dependence*.

In the USA, **Rees 2008 [+]** reported no significant changes in the rates of patients leaving the unit against medical advice, or transfers to other inpatient facilities among tobacco users (p>0.10) between the 12 months before and 12 months after implementation of a local (university hospital's) smokefree buildings policy in its inpatient medical detoxification unit. ***The supporting strategy*** *was that patients were informed of the indoor smoking ban as part of their admission screening process.*

In the USA, **Sterling 1995 [-]** reported no significant change in the proportion of outpatient premature terminators ('drop-outs') between 1 and 3 months before and 1 and 3 months after the implementation of a local (facility's) smokefree buildings policy (p>0.05). ***Supporting strategies*** *were that outpatients were informed of the ban by a therapist and posters were displayed.*

In the USA, **Velasco 1996 [-]** reported no significant change in the mean number of discharges against medical advice between any of the three time periods: 6 weeks immediately before implementation of the local (hospital's) smokefree buildings policy, 6 weeks immediately after the 1991 ban, and the 1993 follow up. ***The supporting strategy*** *was that patients were notified of the indoor smoking ban prior to admission.*

Other Impacts on Patients: Inpatient Complaint Investigations (Mental Healthcare)

Evidence statement 3.9: There is **moderate** evidence from one before and after study in the USA (**Patten 1995 [+]**) and one cohort study in the USA (**Rauter 1997 [+]**) that the introduction of smokefree in mental health care settings, results in a small number of formal complaints from inpatients about perceived violations of their right to smoke; complaints may be higher in number in the months immediately after implementation than 1 year later (**Rauter 1997 [+]**).

UK Applicability: This evidence was conducted outside the UK. One of the studies tests smokefree grounds and buildings (a policy implemented in parts of the UK), the other tests indoor smokefree already national legislation in the UK. Applicability to the UK could depend on the complaints structure for mental health inpatients in UK.

In the USA, **Rauter 1997 [-]** reported a decrease in formal inpatient complaints about smoking (from patients perceiving the smokefree building as a violation of their human rights) from the first 6 months of the implementation of a local (hospital's) smokefree buildings policy compared to the 1 year later. The majority from recently admitted patients ***Supporting strategies*** *included smoking reduction workshops and patients wishing to participate were urged to do so.*

In the USA, **Patten 1995 [+]** reported that only one female inpatient made a complaint related to a smoking issue 3 months post-implementation of a local (hospital board's) smokefree buildings and smokefree grounds policy. No complaints were reported during the 3 months pre-implementation. ***Supporting strategies*** *included an implementation committee, weekly patient cessation support groups, pharmacotherapies, written information for patients and staff education sessions on the treatment of nicotine dependence*.

Other Impacts on Patients: Inpatient Smoking and Quitting Behaviours (Mental Healthcare)

Evidence statement 3.10: There is **inconsistent** evidence from two before and after studies (one with a control group in the USA (**Joseph 1993 [+]**) and one uncontrolled in Switzerland (**Etter 2008 [+]**) that the introduction of smokefree in mental health care settings impacts on inpatient smoking and cessation behaviour outcomes in mental healthcare settings. There was no significant change in psychiatric inpatients' mean cigarette consumption or smoking prevalence in Switzerland (**Etter 2008 [+])** but in the USA **Joseph 1992 [+]** found significantly more male inpatients in substance abuse treatment quit for ≥1 week after discharge in the local (facility's) smokefree buildings policy (with supporting strategies) intervention group than the control group without smokefree premises.

UK Applicability: This evidence was conducted outside the UK and the policy covered (indoor smokefree) is already national legislation in the UK. However there is no reason to believe the effect is not applicable to the UK setting.

In the USA, **Joseph 1992 [+]** reports there were no significant differences between the proportion of smokers in the control group, admitted pre-implementation of the local (facility's) smokefree buildings policy), and the intervention group, admitted post-implementation, who reported currently smoking 'more', 'the same' or 'less' compared with smoking at admission 8-21 months earlier. A significantly higher proportion of the intervention group reported to have quit smoking for at least 1 week after discharge compared the control group (p=0.02). ***Supporting strategies*** *were that patients were informed of the policy and cessation programme prior to admission, and were required to agree in writing to nicotine abstinence during the treatment*.

From 2 years pre- to 1 year post-implementation of a local (hospital administration's) smokefree buildings policy in Switzerland, **Etter 2008 [+]** reported no significant change in the cigarette consumption or smoking prevalence in the clinic of inpatients who smoked (p=0.81) and no significant change in smoking prevalence since admission to the clinic of inpatients who smoked. One year post-implementation, 2% fewer inpatients who smoked reported smoking more in the clinic than before admission compared with 2 years pre-implementation. ***Supporting strategies*** *included signage, cessation support, pharmacotherapies, closure of smoking rooms and staff training*.

Other Impacts on Patients: Long Term Smoking Cessation (Mental Healthcare)

Evidence statement 3.11: There is **moderate** evidence from one before and after study in the USA (**Patten 1995 [+]**) and one cohort study in the USA (**Joseph 1992 [+]**) that the introduction of smokefree with appropriate supporting strategies in mental health care settings minimal impact on long term smoking cessation.

UK Applicability: This evidence was conducted outside the UK and the policy covered in one study (indoor smokefree) is already national legislation in the UK, however the other study's policy is for smokefree grounds and buildings (a policy implemented in parts of the UK). There is no reason to believe the effect is not applicable to the UK setting.

In the USA, **Patten 1995 [+]** reported that amongst a sub-sample of patients who were current smokers at admission during the first 3 months of a local (hospital board's) smokefree buildings and smokefree grounds policy, then followed up 16-18 months post-discharge, all reported resuming smoking immediately after hospital discharge although 2 patients reported not smoking at 6 months and 12 months after discharge. ***Supporting strategies*** *included an implementation committee, weekly patient cessation support groups, pharmacotherapies, written information for patients and staff education sessions on the treatment of nicotine dependence*.

Joseph's 1993 [+] study in the USA reported that among the n=152 patients who smoked at admission (from retrospective viewing of chart data), ten self-reported they were not current smokers at the follow-up interview (8-21 months after discharge); n=3 from the control (pre-implementation of the local (facility's) smokefree buildings policy) group and n=7 from the intervention (post-policy implementation) group. ***Supporting strategies*** *were that patients were informed of the policy and cessation programme prior to admission, and were required to agree in writing to nicotine abstinence during the treatment*.

Other Impacts on Patients: Inpatient Prescriptions For or Use of NRT (Mental Healthcare)

Evidence statement 3.12: Impact of smokefree legislation on patient use of smoking cessation support in a mental healthcare setting
There is evidence from three before and after studies, one in the UK (**Cormac 2010** [+]), one in Switzerland **(Etter 2008 [+])** and one in the USA **(Patten 1995 [+]**), one interrupted time series in the USA (**Erwin 1991 [-]**) and one cohort study in the USA (**Velasco 1996 [-]**) about the impact of smokefree legislation on inpatient use of smoking cessation support in a **mental healthcare setting.**

UK Applicability: Evidence comes from one recent UK study but mostly from outside the UK. However the policy covered in most of the other studies (indoor smokefree) is already national legislation in the UK, however the one study's policy is for smokefree grounds and buildings (a policy implemented in parts of the UK). There is no reason to believe the effect is not applicable to the UK setting.

There is **moderate** evidence from two before and after studies, one in the UK (**Cormac 2010 [+]** and one in Switzerland **(Etter 2008 [+]**), and one cohort study in the USA (**Velasco 1996 [-]**) that the introduction of smokefree, particularly when including cessation support and pharmacotherapy as supporting strategies, increases the amount of NRT dispensed or received by inpatients. There is **inconsistent** evidence from two before and after studies, one in Switzerland (**Etter 2008 [+]** and one in the USA **(Patten 1995 [+]**), and one interrupted time series in the USA (**Erwin 1991 [-]**) on the impact of smokefree on inpatient use of cessation support during hospitalisation.

One before and after study in the UK (**Cormac 2010 [+]**) reported an increase in inpatients who commenced NRT after implementation of the national indoor smokefree legislation in England and a local (NHS Trust's) smokefree grounds policy (no further details are reported). ***Supporting strategies*** *were pharmacotherapy, cessation support, staff training and patient surrender of smoking materials.*

From 2 years pre- to 1 year post-implementation of a local (hospital administration's) smokefree buildings policy, **Etter 2008 [+]** in Switzerland reported a significant increase in the inpatients who smoked reporting that during their current stay a physician or nurse provided medication (like a patch, gum or Zyban) to quit smoking ($p<0.001$), no significant change in those reporting that staff advised them to quit smoking ($p=0.006$) or helped them to quit smoking ($p=0.015$). Staff reported that the proportion of inpatients to whom NRT was provided significantly increased 2 years pre- to 1 year post implementation ($p<0.001$, OR 4.0, 95% CI 1.6-9.9) and the proportion of inpatients to whom help was provided to quit smoking significantly increased from 1 year pre- to 1 year post-implementation ($p=0.007$, OR 3.8, 95% CI 1.6-9.3). ***Supporting strategies*** *included signage, cessation support, pharmacotherapies, closure of smoking rooms and staff training*.

One interrupted time series in the USA (**Erwin 1991 [-]**) reported a decline in nursing staff reporting that they had encouraged inpatients to participate in smoking cessation groups, between 1 week post-implementation and 4 weeks post-implementation of a local (US Department of Veterans Affairs) smokefree buildings policy (no p values calculated). ***Supporting strategies*** *were based around nursing interventions, including encouraging patients to participate in smoking cessation groups and addressing patients with the urge to smoke*.

In the USA, **Patten 1995 [+]** reported no change in the number of inpatient consultations to the Nicotine Dependence Centre between 3 months pre- and 3 months post-implementation of a local (hospital board's) smokefree buildings and smokefree grounds policy. ***Supporting strategies*** *included an implementation committee, weekly patient cessation support groups,*

pharmacotherapies, written information for patients and staff education sessions on the treatment of nicotine dependence.

In the USA, **Velasco 1996 [-]** reported that the number of inpatients who received NRT during the 6-week period immediately after implementation of local (hospital's) smokefree buildings policy in 1991 and during the 1993 follow up was significantly higher than in the 6-week period before implementation (p<0.001). ***The supporting strategy*** *was that patients were notified of the indoor smoking ban prior to admission.*

Other Health Impacts on Patients (Mental Healthcare)

Inpatient Sick Calls (Mental Healthcare)
Inpatient Acuity Level (Mental Healthcare)
Inpatient Seizure Rates (Mental Healthcare)

Evidence statement 3.13: There is **weak** evidence from one before and after study in the USA (**Hempel 2002 [+]**) that implementation of a local smokefree buildings and smokefree grounds policy with supporting strategies results in a decline in the number of inpatient sick calls (for a physical complaint) for moderate and heavy smokers immediately following implementation in a mental healthcare setting.

UK Applicability: This evidence was conducted outside the UK, however the policy covers smokefree grounds (a policy implemented in parts of the UK) and there is no reason to believe the effect is not applicable to the UK setting.

In the USA, **Hempel 2002 [+]** reported a significant post-implementation decline in inpatient sick calls for moderate smokers (10-18 cigs/day) (p=0.038) and for heavy smokers ((≥19 cigs/day) (p=0.008) 4 weeks after policy implementation compared with 4 weeks prior to implementation. There were no significant changes for non-smokers and light smokers (1-9 cigs/day). ***Supporting strategies*** *included education for staff about potential withdrawal symptoms, and any tobacco products found on patients were seized.*

Evidence statement 3.14: There is **weak** evidence from one cohort study in the USA (**Rauter 1997 [+]**) that implementation of a local (hospital's) smokefree buildings policy with supporting strategies significantly decreases mean inpatient acuity levels, as recorded daily by nurses, between the pre-implementation period and 9 months post-implementation in a mental healthcare setting (p=0.03). ***Supporting strategies*** *included smoking reduction workshops and patients wishing to participate were urged to do so.*

UK Applicability: This evidence was conducted outside the UK and the policy covered (indoor smokefree) is already national legislation in the UK. However there is no reason to believe the effect is not applicable to the UK setting.

Evidence statement 3.15: There is **weak** evidence from one before and after study in the USA (**Rees 2008 [+]**) that a local (university hospital's) smokefree buildings policy in its inpatient medical detoxification unit with supporting strategies does not significantly change inpatient seizure rates in a mental healthcare setting, when seizure rates were measured during the 12 months before and 12 months after implementation. ***The supporting strategy*** *was that patients were informed of the indoor smoking ban as part of their admission screening process.*

UK Applicability: This evidence was conducted outside the UK and the policy covered (indoor smokefree) is already national legislation in the UK. However there is no reason to believe the effect is not applicable to the UK setting.

Other Impacts on Staff: Staff Absenteeism

Evidence statement 3.16: There is **weak** evidence from one before and after study in the USA (**Matthews 2005 [-]**) that implementation of a local (hospital's) smokefree buildings policy with supporting strategies has no significant effect on staff absenteeism in a mental healthcare setting.

In the USA, **Matthews 2005 [-]** reported no significant differences in staff absenteeism between the 3 months before and 3 months after the local (hospital's) smokefree buildings policy was implemented. ***Supporting strategies*** *included patient education about nicotine addiction and withdrawal and pharmacotherapies.*

UK Applicability: This evidence was conducted outside the UK and the policy covered (indoor smokefree) is already national legislation in the UK. It is unlikely to be applicable.

Contents

1. Introduction

The National Institute for Health and Clinical Excellence (NICE) has been requested by the Department of Health to develop two separate pieces of complementary guidance on:

- 'Smoking cessation in secondary care: acute and maternity services' (NICE, 2011a)
- 'Smoking cessation in secondary care: mental health services' (NICE, 2011b).

The guidance will address smokefree policies and smoking cessation and make recommendations on approaches to help secondary care commissioners, professionals and managers (including patients and service users and their family or carers, visitors and staff) in hospitals and other acute, maternity or mental healthcare settings (including emergency care, planned specialist medical care or surgery, and maternity care provided in hospitals, outpatient clinics, community outreach and rural units, as well as intensive services in psychiatric units and secure hospitals).

There are **five components** of work associated with the guidance development that the CPHE has commissioned:

1. Smoking cessation in acute and maternity services: one review of effectiveness and one review of barriers and facilitators (Reviews 2 & 3)
2. Smoking cessation in mental health services: one review of effectiveness and one review of barriers and facilitators (Reviews 4 & 5)
3. **Smokefree strategies and interventions in secondary care settings: one review of effectiveness and one review of barriers and facilitators (Reviews 6 & 7)**
4. An economic analysis (Cost Effectiveness Review and Economic Model)
5. Review of effects of nicotine in secondary care (Review 1).

This systematic review is Review 6 for Component 3.

1.1 Background and rationale

Awareness of the dangers of second hand smoke (SHS) exposure has been accumulating since the 1970s and it is now well established that SHS causes death and disease (IARC, 2004). Indeed in 2002, the World Health Organization declared that SHS was a human carcinogen (WHO, 2005).

For these reasons smokefree policies and legislation have now been introduced in a number of countries including the UK. The White Paper 'Choosing health: making healthier choices easier' (Department of Health 2004) set a requirement for the NHS to become smoke-free by the end of 2006.

In the UK, the implementation of national legislation varied slightly by country. The Health Act 2006[1] was passed on 16th July 2006 and required that all indoor and substantially enclosed outdoor workplaces and public places in England and Wales became smoke-free by 1st July 2007, specifically banning smoking tobacco. In March 2007, residential mental health settings were given a temporary one year exemption from the implementation date, thus were required to become smoke-free by 1st

[1] *The Health Act 2006 (c.28)*. Online http://www.legislation.gov.uk/ukpga/2006/28/pdfs/ukpga_20060028_en.pdf

July 2008[2]. In Northern Ireland, the Smoking (Northern Ireland) Order 2006[3] was made on the 14th November 2006, and enacted as being against the law to smoke in enclosed and substantially enclosed workplaces and public places, and in certain vehicles from 30th April 2007. A temporary one year exemption for designated rooms in residential accommodation in mental health units (for patients 16 years and over) ceased to be in effect from 30th April 2008[4]. And in Scotland, the Smoking, Health and Social Care (Scotland) Act 2005[5] was passed on 30th June 2005, and established that, from 26th March 2006, it was an offence to smoke in any wholly or substantially enclosed public space in Scotland. Under the Act, no-smoking premises in Scotland include hospitals, hospices, psychiatric hospitals, psychiatric units and health care premises, however exemptions were put in place on 26th February 2006 for designated rooms in adult care homes, adult hospices and designated rooms in psychiatric hospitals and psychiatric units[6]. (Information regarding the legislative context for other countries is provided in Appendix 1).

The application of smokefree legislation to mental health units in England was legally challenged by three patients in 2008 on the basis that the legislation was incompatible with the human rights of patients detained under Mental Health Act 1983[7]. It was argued that preventing detained mental health patients from smoking, particularly those patients detained on a long-term basis and in mental health units where it is not feasible to permit patients to smoke outdoors, was a breach of Article 8 of the European Convention on Human Rights, the right to respect for private and family life, as the mental health facility could be considered to be their home. A High Court ruling established that smoking is not a basic human right, and did not uphold the patients' challenge[8].

Smokefree hospitals are a particularly important component of smokefree legislation because in addition to the links between SHS exposure and leading causes of death such as lung cancer and heart disease, evidence also exists of greater risk of preoperative and postoperative complications for smokers. These complications contribute to longer hospital stays and higher treatment costs (SCoTH, 2004). There is a significantly higher prevalence of smoking among people with mental health problems than among the general population (McNeill, 2001).

There is no legislative requirement for smokefree grounds in England and Wales, however many NHS secondary care settings have smokefree policies that apply to their grounds (as well as enclosed areas), although there have been problems with compliance and enforcement (Ratschen et al., 2009; Shipley and Allcock, 2008). Achieving smokefree environments in hospital buildings is challenging, as a number of studies have shown (Lawn and Pols, 2005; Kunyk et al., 2007). This is particularly the case for mental health facilities and for this reason not all psychiatric hospitals in the UK (most notably in Scotland) are smokefree. Variability also exists regarding the extent to which hospital grounds are covered by smokefree policies and the extent to which the introduction of smokefree is linked to services to stop smoking for patients and staff (Ratschen et al., 2009).

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[2] *The Smoke-free (Exemptions and Vehicles) Regulations 2007*. Statutory Instruments 2007 No. 765. Online: http://www.legislation.gov.uk/uksi/2007/765/pdfs/uksi_20070765_en.pdf

[3] *Smoking (Northern Ireland) Order 2006*. Statutory Instruments 2006 No.2957 (NI 20). Online: http://www.dhsspsni.gov.uk/ifh-smoking-ni-order-2007.pdf

[4] *The Smoke-free (Exemptions, Vehicles, Penalties and Discounted Amounts) Regulations (Northern Ireland) 2007*. Statutory Rules of Northern Ireland 2007 No. 138. Online: http://www.dhsspsni.gov.uk/ifh-smoke-free-_exemptions_-vehicles_-penalties-and-discounted-amounts_-regulations-2008.doc

[5] *The Smoking, Health and Social Care (Scotland) Act 2005 (asp 13)*. Online: http://www.legislation.gov.uk/asp/2005/13/pdfs/asp_20050013_en.pdf

[6] *The Prohibition of Smoking in Certain Premises (Scotland) Regulations 2006*. Scottish Statutory Instruments 2006 No.90. Online: http://www.legislation.gov.uk/ssi/2006/90/pdfs/ssi_20060090_en.pdf

[7] *Mental Health Act 1983 (c.20).* Online: http://www.legislation.gov.uk/ukpga/1983/20/pdfs/ukpga_19830020_en.pdf

[8] R (G) v Nottinghamshire Healthcare NHS Trust [2008] EWHC 1096 (Admin). Online: http://www.bailii.org/ew/cases/EWHC/Admin/2008/1096.html; R (N) v Secretary of State for Health; R (E) v Nottinghamshire Healthcare NHS Trust [2009] EWCA Civ 795. Online: http://www.bailii.org/ew/cases/EWCA/Civ/2009/795.html

Smokefree strategies and interventions in secondary care for ensuring compliance with smokefree legislation and local smokefree policies in secondary care settings include signage and enforcement in the grounds, staff residencies and inside hospitals; restrictions on staff smoking breaks; interventions that help people temporarily abstain from smoking whilst onsite; campaign and information materials to alert staff and service users of proposed and impending policy changes.

The aim of the study is to systematically review the effectiveness of smokefree strategies and interventions in secondary care settings (acute, maternity and mental health settings). Alongside a related systematic review of the barriers to and facilitators for implementing smokefree strategies and interventions in secondary care settings (acute, maternity and mental health settings) from the users' and the providers' perspectives, its purpose is to support the development by NICE of two separate pieces of complementary public health guidance: a) smoking cessation in secondary care: acute and maternity services, and b) smoking cessation in secondary care: mental health services. The reviews will provide the best available evidence on smokefree strategies and interventions in these settings.

1.2 Review questions

Question 1: How effective are strategies and interventions for ensuring compliance with smokefree legislation and local smokefree policies in secondary care settings?

- **Subsidiary question:** How does the effectiveness vary for different population groups, health status or speciality care services?

Question 2: Are there any unintended consequences from adopting smokefree approaches in acute and maternity care settings?

Question 3: Are there any unintended consequences from adopting smokefree approaches in mental healthcare settings?

The following sections of the review report on the methodology (Section 2); the review findings, structured around the review questions (Section 3); and the Discussion (Section 4). Lists of the included and excluded papers follow this. Finally, the seven appendices are in a separate document.

2. Methodology

The following methodological stages were conducted at the same time for Reviews 6 (Effectiveness) and 7 (Barriers and Facilitators): the search strategy, title and abstract screening, full text retrieval and full text screening stages. The process was then split for the subsequent stages of the two reviews, Review 6 being reported here.

2.1 Search strategy

Sensitive search strategies were developed using a combination of controlled vocabulary and free-text terms, by an information specialist in conjunction with the research team and peer-reviewed by information specialists at NICE. The search strategy was initially developed in MEDLINE and was then adapted to meet the syntax and character restrictions of each database. Searches were run in February 2012. All the literature searches were conducted from 1990 onwards. Sample search strategies can be found in Appendix 2.

The following databases were searched:

AMED (Allied and Complementary Medicine)
ASSIA (Applied Social Science Index and Abstracts)
British Nursing Index
CDC Smoking & Health Resource Library database
CINAHL (Cumulative Index of Nursing and Allied Health Literature)
Cochrane Central Register of Controlled Trials (includes the Cochrane Tobacco Addiction Group Specialist Register)
Cochrane Database of Systematic Reviews (CDSR)
Conference Papers Index (years: 2008-2012)
Database of Abstracts of Reviews of Effectiveness (DARE; 'other reviews' in CDSR database)
Database of Promoting Health Effectiveness Reviews (EPPI Centre DoPHER)
EMBASE
Health Evidence Canada
Health Technology Assessment (HTA) database in the CDSR database
HMIC
International Bibliography of Social Sciences
Medline, including Medline in Process
PsycINFO
Social Policy and Practice
Social Science Citation Index and Conference Proceedings Citation Index
Sociological Abstracts
Trials Register of Promoting Health Interventions (EPPI Centre TRoPHI)
UK Clinical Research Network Portfolio Database

The following websites were also searched for research papers relevant to the review questions (see also, Appendix 4):

Action on Smoking and Health (ASH) http://www.ash.org.uk
Association for the Treatment of Tobacco Use and Dependence (ATTUD) www.attud.org

Canadian Council for Tobacco Control*http://www.cctc.ca/cctc/EN/tcrc/articles/tcarticle.2010-12-24.4349020582
CDC tobacco control and prevention* http://www.cdc.gov/tobacco/
Current controlled trials www.controlled-trials.com
Globalink* http://www.globalink.org/
International Tobacco Control Policy Evaluation Project http://www.itcproject.org
International Union against Cancer http://www.uicc.org
Joseph Rowntree Foundation http://www.jrf.org.uk/publications
National Institute on drug abuse- the science of drug abuse and addiction http://www.nida.nih.gov/nidahome.html
NHS Centre for Smoking Cessation and Training http://www.ncsct.co.uk/
NHS Evidence https://www.evidence.nhs.uk/
NICE http://www.nice.org.uk/
Public health observatories http://www.apho.org.uk/resource/advanced.aspx
Scottish Government http://www.scotland.gov.uk/topics/research
Smoke free http://smokefree.nhs.uk
Society for Research on Nicotine and Tobacco http://www.srnt.org
Tobacco Harm Reduction http://www.tobaccoharmreduction.org/index.htm
Tobacco Information Scotland* http://www.tobaccoinscotland.com/page.cfm?pageid=71
Treat tobacco.net http://www.treatobacco.net/en/index.php
UK Centre for Tobacco Control Studies http://www.ukctcs.org/ukctcs/index.aspx
Welsh Government http://wales.gov.uk/
WHO Tobacco Free Initiative (TIF) http://www.who.int/tobacco/en
World Conference on Tobacco or Health abstracts from 2006, 2009, 2012 conferences* http://2006.confex.com/uicc/wctoh/techprogram; http://www.indianjcancer.com/article.asp?issn=0019-509X;year=2010;volume=47;issue=5;spage=109;epage=210;aulast=#Smokefree%20implementation%20and%20enforcement; http://wctoh2012.org
(*Searched in addition to those listed in Reviews 6 and 7's protocols.)

Electronic files of papers identified from Reviews 1, 2, 3, 4 and 5 that have potential relevance— supplied by those project teams— were also screened for eligibility. The bibliographies of other reviews identified by the search strategy were searched for further studies. As noted above, the World Conference on Tobacco or Health abstracts from the 2006, 2009 and 2012 conferences were searched online.

Studies were managed during the review using the EPPI-Centre's online review software EPPI-Reviewer version 4.0 (ER4) (Thomas et al., 2010). An initial de-duplication procedure was run using EndNote software before uploading the records to ER4.

2.2 Title and Abstract Screening

All records from the searches were uploaded into a database and duplicate records were removed. Where no abstract was available, a web search was first undertaken to locate one; if no abstract could be found, records were screened on title alone and full-text documents were retrieved where there was any doubt.

To trial the inclusion criteria, a pilot round of screening was conducted on a random selection of 30 document titles and abstracts. Piloting was conducted by three reviewers. A reconciliation meeting was then held to discuss disagreements and suggest changes to the inclusion criteria. An additional

three rounds of piloting, with random samples of 25, 25, and 113 records, respectively were conducted to further refine the criteria and achieve consensus. By the fourth round of piloting, a high level of agreement was achieved.

Following the pilot screening, 2,200 records (20%) were double screened. The agreement rate for double-screening was 98.3%, which was considered by the project team and NICE to be sufficiently high. As such, the remaining documents were split between the three reviewers who independently screened their allocated records. Of the double-screened items, any disagreements were resolved by a third reviewer. Throughout the entire process, the reviewers discussed difficult and ambiguous records to ensure consistency.

The final inclusion criteria for Reviews 6 and 7 are presented below (also see Appendix 3 for detailed guidance and definitions used for each criterion). The criteria were applied in a hierarchical manner.

1. The document must be published during or after 1990
2. The document must be published in English
3. The document must report on a piece of empirical research
4. The title and/or abstract must refer to smokefree strategies or interventions (including smoking bans, smoking reduction policies, or programs to reduce environmental tobacco smoke)
5. The study (or a component of it) must be conducted in a secondary care setting or with secondary care staff.
6. If the study is conducted in a community or private residence setting, it must explicitly refer to smokefree policies and be clearly relevant to secondary care workers or services in the title and/or abstract
7. The study design must involve a comparison (e.g. controlled trials, before-and-after) and/or views or process evaluation (e.g. interviews, surveys).

If the study met the above criteria and evaluated the effectiveness of an intervention, it was marked as relevant to Review 6. If the study met the above criteria and included evidence on barriers or facilitators (including knowledge, attitudes and beliefs) to using or implementing smokefree policy it was marked as relevant to Review 7.

After the title and abstract screening stage, full text documents were retrieved for the remaining records.

2.3 Full Text Screening

The retrieved full-text documents were all re-screened for relevance and applicability for inclusion in Review 6 and/or 7 on the basis of the detail available in the full-text article.

The full-text screening process was piloted using ten studies and refined using a further ten studies by four reviewers. Following this, the rest of the studies were divided between different pairings of the same four reviewers and all double-coded in batches. Early inter-rater consistency levels were below the agreed cut-off point, thus double-coding between different pairs maintained a more rigorous process. The reviewers met regularly to discuss uncertain inclusions for both Reviews 6 and 7, and disagreements were resolved by group discussion.

The final inclusion criteria for Review 6 (Effectiveness) are presented below (also see Appendix 5 for detailed guidance and definitions used for each criterion). The criteria were applied in a hierarchical manner and were the same as points 1 to 6, above, then:

7. The study must evaluate the effectiveness of one or more strategies or interventions to support compliance with or implementation of smokefree legislation or policies
8. The study design must involve a comparison (e.g. controlled trials, before-and-after studies or an interrupted time series)
9. Retrospective comparison studies which included self-report behaviour and/or perceptions of compliance post-implementation were excluded initially, as a less robust measure of effectiveness, but marked so they could be retrieved for Review 6 later if necessary.

The extent of evidence on the effectiveness of smokefree strategies was extremely limited, thus after consultation with the NICE Team, a re-screening of the studies marked as excluded on research design (including those marked as retrospective comparison studies) was conducted by the reviewers (also double-screened). The definition of smokefree was clarified and the following inclusion criteria were refined:

- The study must have a minimum of indoor smokefree in place, i.e. exclude studies with partial indoor bans (e.g. where smoking is permitted in a smoking room, area or cafeteria)
- As the UK has indoor smokefree legislation in place in secondary care settings at this time-point, studies with indoor smokefree must mention at least one supporting strategy to be included. If the smokefree policy in the study extends to smokefree grounds and other areas, supporting strategies are not necessarily required for inclusion
- Point 7, above, was broadened to include studies on the effects of smokefree legislation or policies.

The documents that passed the inclusion criteria on the basis of full-text screening were included in Review 6. See Figure 2.1 for the flow of literature through the review stages.

2.4 Data Extraction

Data were extracted into an evidence table using the template provided in the methods manual (NICE 2009). Included studies were shared among three reviewers, with the data extracted from the original paper by one reviewer and checked for accuracy by a second. Evidence tables for the included studies are presented in Appendix 7.

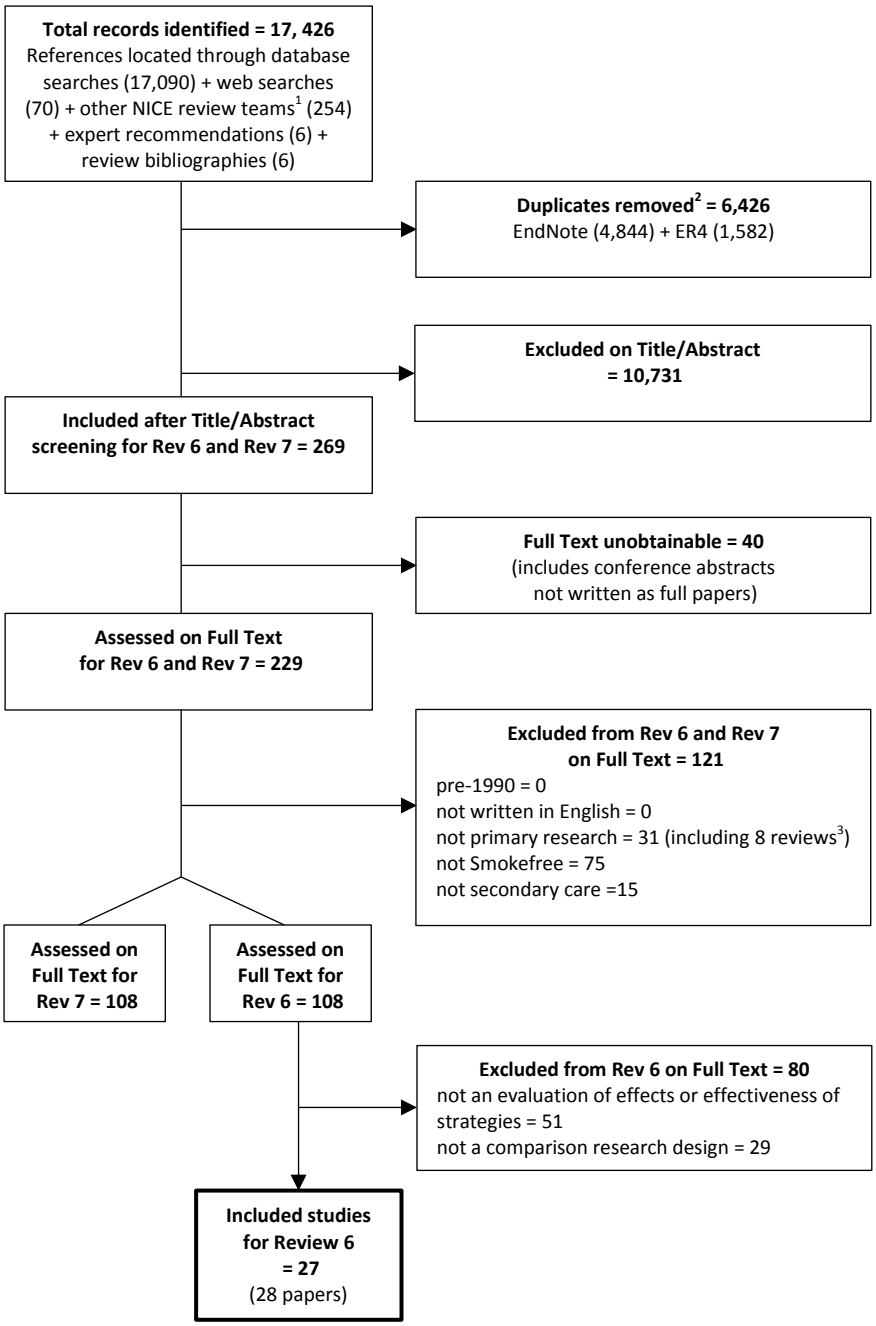

FIGURE 2.1: FLOW OF LITERATURE CHART

1. Teams conducting other reviews to inform guidance on smoking cessation in secondary care.
2. Including an initial de-duplication in EndNote before entering records into Eppi-Reviewer 4 (ER4).
3. Bibliographies' of the reviews were checked for additional relevant studies. Six new studies were identified for full text assessment (two of which were subsequently included in Review 7).

2.5 Quality Assessment

All the included full-text studies were rated for internal validity (whether the study's results were unbiased) and external validity (whether the study's findings were generalizable to the source population) using critical appraisal checklists provided in the methods manual (NICE 2009).

The quality assessment process was piloted with a pair of studies by four reviewers followed by discussions about completion. Each study was rated by one reviewer. Through the process of

synthesising the review findings the review team familiarised themselves with the details of all the included studies. Two members for the team then collaboratively considered, calibrated and finalised the scores, with disagreements resolved by a third reviewer.

Each item on the checklist was coded using the following ratings:

- **++** for that aspect, the study has been designed/conducted in such a way as to minimise the risk of bias
- **+** the answer is not clear from the way the study is reported, or that the study may not have addressed all potential sources of bias for that aspect
- **–** for those aspects of the study design in which significant sources of bias may persist
- **NR** not reported
- **NA** not applicable

For checklist items assessing applicability to the UK, studies were rated as applicable to the current UK setting in the quality appraisal checklist in the following way:

From the UK and published 2000 onwards (++)
From the UK and published pre-2000, non-UK but a high income economy country (+)
From outside the UK and a high income economy country but with a contrasting or country-specific setting (-)

The full critical appraisal checklists and the score for each checklist item for each study are given in Appendix 6. An overall quality grading score was assigned using the following ratings for internal validity and external validity:

- **++** All or most of the checklist criteria have been fulfilled, where they have not been fulfilled the conclusions are very unlikely to alter.
- **+** Some of the checklist criteria have been fulfilled, where they have not been fulfilled, or not adequately described, the conclusions are unlikely to alter.
- **–** Few or no checklist criteria have been fulfilled and the conclusions are likely or very likely to alter.

Both the internal and external validity scores are reported in the evidence tables and the internal validity score as part of each study's citation.

2.6 Synthesis Methods

Twenty-seven studies, published in English since 1990, were included in Review 6 to answer the review questions on the effectiveness of smokefree strategies and interventions in secondary care settings and any other consequences from their adoption in mental healthcare or acute and maternity healthcare settings.

Sample Characteristics

Thirteen studies were published between 1990 and 2000, 12 from the USA and one in 1996 from Australia (two from 1990, one from 1991, one from 1992, one from 1993, one from 1994, one from 1995, four from 1996, one from 1997 and one from 2000). Fourteen included studies were published in the last 12 years, the four most recent in 2010 (one from 2002, one from 2004, one from 2005, one from 2006, one from 2007, four from 2008, one from 2009 and four from 2010).

Twenty-six of the studies were published in academic or practitioner journals and one is an unpublished report (Kvern 2006 -).

Countries: Two of the included studies were from the UK, both in England (Cormac 2010 +, Shetty 2010 +), and a further four were from Europe, two from Spain (Fernandez 2008 +, Martinez 2008 +), and one from France (Vorspan 2009 +) and Switzerland (Etter 2008 +). The majority of included studies were conducted in the USA (Daughton 1992 -, Erwin 1991 +, Gadomski 2010 +, Haller 1996 +, Hempel 2010+, Hudzinski 1990+, Joseph 1993 +, Kempf 1996 +, Matthews 2005 -, Patten 1995 +, Quinn 2000 -, Rauter 1997 +, Rees 2008 +, Ripley-Moffitt 2010 +, Sterling 1994 -, Stillman 1990 +, Velasco 1996 -, Wheeler 2007 -); and there was one study from Canada (Kvern 2006 -), one from Australia (Nagle 1996 +) and one from Israel (Donchin 2004 +).

Study design: One of the included studies was a randomised controlled trial (Kempf 1996 +). The rest of the included studies were quantitative observational studies, only one had a concurrent control group in the study (Nagle 1996 +). Fernandez 2008 [+] was a before and after measurement of air vapour-phase nicotine; eleven were before and after studies with different samples at follow-up (Cormac 2010 +, Donchin 2004 +, Etter 2008 +, Haller 1996 +, Joseph 1993 +, Kvern 2006 -, Matthews 2005 -, Nagle 1996 +, Patten 1995 +, Rees 2008 +, Wheeler 2007 -); and seven studies were before and after studies with the same samples at follow-up (Daughton 1992 -, Erwin 1991 +, Hempel 2002+, Hudzinski 1990 +, Quinn 2000 -, Shetty 2010 +, Vorspan 2009 +). One before and after study (Gadomski 2010 +) used the same staff sample and a different patient sample before and after). Four were cohort studies ((Rauter 1997 +, Sterling 1994 -, Stillman 1990 +, Velasco 1996 -) and two were interrupted time series (Martinez 2008 +, Ripley-Moffitt 2010 +).

Secondary healthcare setting: Sixteen of the studies were conducted in a mental healthcare setting (Cormac 2010 +, Erwin 1991 +, Etter 2008 +, Haller 1996 +, Hempel 2010 +, Joseph 1993 +, Kempf 1996 +, Matthews 2005 -, Patten 1995 +, Quinn 2000 -, Rauter 1997 +, Rees 2008 +, Shetty 2010 +, Sterling 1994 -, Velasco 1996 -, Vorspan 2009 +). These studies were from four countries (France, Switzerland, UK and USA) and were published from 1991 to 2010, the early evidence all being from the USA and those from 2008 onwards from the other countries also.

Eleven studies were conduced in an acute and/or maternity healthcare setting (Daughton 1992 -, Donchin 2004 +, Fernandez 2008 +, Gadomski 2010 +, Hudzinski 1990 +, Kvern 2006 -, Martinez 2008 +, Nagle 1996 +, Ripley-Moffitt 2010 +, Stillman 1990 +, Wheeler 2007 -). These studies were from five different countries (Australia, Canada, Israel, Spain and USA) and were published from 1990 to 2010.

Patient population: Of the n=16 studies conducted in a mental healthcare setting, n=15 studies were at conducted at a facility for inpatients. Only one study (Sterling 1994 -) was for an outpatient program, and reports patient outcomes. Of the n=11 studies conducted in an acute or maternity secondary care setting, five studies report on patient outcomes. Nagle 1996 [+] and Donchin 2004 [+] report findings for all hospital users – staff, patients and visitors – without distinguishing between inpatients and outpatients. Studies by Gadmomski 2010 [+] and Kvern 2006 [-] report on findings for inpatients and Wheeler 2007 [-] reports bed occupancy rates, thus relevant to inpatients. The review's evidence statements refer to the evidence for inpatients and outpatients from these studies.

Type of ban: Thirteen of the studies were in secondary care settings that were implementing smokefree grounds, seven of these in a mental healthcare setting (Cormac 2010 +, Haller 1996 +, Hempel 2010, Kempf 1996 +, Patten 1995 +, Quinn 2000 -, Shetty 2010 +) and six of these in an acute and/or maternity healthcare setting (Gadomski 2010 +, Hudzinski 1990 +, Kvern 2006 -, Nagle 1996 +, Ripley-Moffitt 2010 +, Wheeler 2007 -). The other 14 studies were in settings that were implementing smokefree buildings policies or indoor smokefree legislation; the same level as the current smokefree legislative requirements of the UK.

Quality Scores

Twenty studies were rated as '+' for overall internal validity and seven studies were rated as '-' for overall internal validity. Nineteen studies were rated as '+' for external validity, four studies were rated as '-' and four studies were rated as '++' for external validity. See Appendix 6 for the quality scores for each study.

Narrative Synthesis

A narrative synthesis approach was adopted:

- Studies were first grouped according to their outcome measure for assessing compliance (to answer Research Question 1) and their outcome measures for assessing other consequences according to their secondary healthcare setting (to answer Research Questions 2 and 3).
- The key features of each study were described individually.
- Notable similarities and differences in methods or results across studies were described and interpreted.
- Evidence statements were devised.

Strength of Evidence

The strength of evidence rating for studies grouped together for an evidence statement was applied in the following way:

> **Weak evidence** – a single study (- or +); two studies (-- or - +); three studies (- - - or - - +) with the same direction of effect, or no change in effect.
> **Moderate evidence** – two studies (+ +); three studies (+ + -, + + +); four studies (- - + + or better) with the same direction of effect, or no change in effect.
> **Inconsistent evidence** – where two or more studies do not agree

2.7 Definitions & Outcomes Measured

Smokefree: the review uses the World Health Organization's FTCT definition of smokefree as "air that is 100% smoke free. This definition includes, but is not limited to, air in which tobacco smoke cannot be seen, smelled, sensed or measured" (FTCT 2008).

Indoor and/or Outdoor Smokefree terms used:

- *Indoor policies* – includes smokefree buildings, and vehicles where mentioned; "hospital smoking ban" was coded as an indoor policy.
- *Outdoor policies* – includes "smokefree grounds" and "smokefree campus". If is unclear from the use of 'campus' whether it covers indoor and outdoor, an assumption has been that 'campus' refers to both.
- *Local policy* – an indication is given for who instigated the policy e.g. hospital board, local health authority. Where this is unclear, 'hospital' is used.
- *National or state legislation* – for smokefree (indoor in all cases).

Table 2.1 Characteristics of smoke-free in studies in mental health settings and Table 2.2 Characteristics of smoke-free in studies in acute and maternity settings provided a summary for each study of the type of ban, its implementation stage (the most recent stage addressed in the study),

when it was assessed, the legislation, policy or other impetus for introducing smokefree in secondary care setting, and detail of the supporting strategies mentioned in the paper.

Settings: Throughout the report acute and maternity (non-mental health) secondary care settings are referred to as **Acute and Maternity Settings**; those in mental health secondary care settings are referred to as **Mental Health Settings**. It should be noted that some Acute and Maternity Settings may also include mental health services or wards, although this was not reported in the studies. For the purposes of the review they are referred to as Acute and Maternity Settings. Finally, no studies were identified that were set in a maternity setting.

In addition to the list of included outcomes below, tables are included at the beginning of each of the 3 findings sub-sections to summarise the outcome measures used in each study (Tables 3.1, 3.2 and 3.3).

Compliance Outcome Measures: Outcome measures for compliance with the smokefree policy or legislation in place in the secondary healthcare setting were not restricted at the screening stage and have all been included in the synthesis. Objective measures of compliance included: measures of atmospheric nicotine vapour as a proxy for environmental tobacco smoke; hospital records relating to incidences of patients' possession of smoking-related contraband, patients' violations of smokefree or fire incidents due to negligent smoking. Observation checklists to count smokers violating the smokefree policy, recorded security incidents and counts of cigarette butts were included as less objective compliance measures. Subjective measures of compliance included: self-reported compliance, observations of other people's compliance, self-reported challenges to smokefree violators, and perceived or actual exposure to environmental tobacco smoke.

Unintended Consequences Outcome Measures: 'Unintended consequences' have been interpreted in the review as 'other consequences'. Relevant outcomes, adverse or beneficial, were not restricted at the screening stage and have all been included in the synthesis. Measures of other outcomes in acute and maternity settings included: other consequences for patients such as smoking and cessation behaviours, use of cessation pharmacotherapies, signing out of hospital against medical advice, use of and attendance at acute hospitals; and other consequences for staff such as smoking and cessation behaviours, use of cessation pharmacotherapies; decrease work productivity, employee resignations, terminations and hires. Measures of other outcomes in mental healthcare settings included: other consequences for patients such as smoking and cessation behaviours, use of cessation pharmacotherapies, violent incidents/aggression, seclusion and restraint, medication changes, acuity levels, seizure rates, complaint investigations; and other consequences for staff such as absenteeism from work.

Table 2.1: Characteristics of smoke-free in studies in mental health settings

○ **Title** ○ **Study design** ○ **Acute and/or Maternity Setting** ○ **Type of ban** ○ **Implementation stage (the most recent stage addressed in the study)** ○ **When assessed**	**Legislation, policy or other impetus** *(As reported in the paper. If national legislation or a national or local policy is not cited in the article, other statements from the study are provided. All papers typically report the health risks to smokers and those around them in their introduction or literature review.)*	**Supporting strategies/ interventions**	**Sample size & characteristics**
Studies with Smokefree Grounds			
Kempf 1996 [USA +] **Randomised controlled trial** *The New Jersey Substance Abuse Treatment Campus, a 350 bed residential substance abuse treatment facility which incorporates a central intake unit and around the clock medical services.* **Intervention campus (18 month therapeutic community model):** Smokefree building(s) Smokefree doorways/entrances Smokefree grounds **Control campus (6 month chemical dependency model):** Smokefree building(s) *Designated outdoor areas for smoking* Smokefree in place: *(implementation date not reported)* After implementation – multiple time points: *Feb 94 – Feb 95*	"A primary **goal and responsibility of the treatment community** is to give patients the opportunity to recover from all their addictions, including nicotine addiction." [p.2]	Cessation support *Medical support for nicotine addiction available to all residents if nicotine abstinence is part of the addiction treatment plan*	Total sample *n=155 adolescents (figure cannot be broken down by random allocation to intervention or control)* Sample characteristics: *Age range 13-17 years, average 15.7 years; 82% male; 40% African-American, 32% Hispanic; 28% Caucasian; average highest school grade completed 8th; 41% have health insurance; 80% have an arrest record (other than traffic offences); 85% (n=132) smoke cigarettes, of these 25% smoke 1-5 cigs/day, 36% smoke a half pack (6-15 cigs)/day; 39% smoke a pack or more (16-35 cigs)/day; Drug of preference: 63% marijuana/hashish, 17% heroin/cocaine, 13% alcohol, 7% other.*

Hempel 2002 [USA +] **Uncontrolled before-and-after study (with same sample after intervention)** *A maximum security forensic campus (Vernon Campus) of the North Texas State Hospital* Smokefree building(s) Smokefree "other description": *States "on hospital property"* Smokefree in place: *Implemented 1st Dec 98* Before implementation – single time point: *4 weeks prior to implementation* After implementation – single time point: *4 weeks post implementation*	"As **a mandate from the superintendent of the North Texas State Hospital**, all nicotine products were banned from both of its campuses, effective December 1, 1998." [p.509]	Pharmacotherapies/NRT Other strategies: *Patient education about potential symptoms of withdrawal.* *Any tobacco product found on patients would be considered contraband, seized and appropriate actions taken against the individual.*	Total sample *140 patients* Sample characteristics: *86% male, 14% female* *50% Black, 31% White, 16% Hispanic, 2% Asian.* *Aged 19- 75 years (mean 39 years).* *Almost all suffered from a disorder that resulted in psychosis at some time prior to or during their hospitalization: most common diagnosis was schizophrenia, paranoid type; remaining diagnosed with another form of schizophrenia, schizoaffective disorder, bipolar disorder, delusion disorders or major depression.* *Four groups: (i) non-smoker (n=30), (ii) light (n=30), 1-9 cigs/day, (iii) moderate (n=34), 10-18 cigs/day, (iv) heavy (n=46), ≥19 cigs/day. Smokers consumed mean 14 cigs/day, usually filtered.*
Quinn 2000 [USA -] **Uncontrolled before-and-after study (with same sample after intervention)** *Wichita Falls State Hospital* Smokefree "other description": *"Tobacco could not be used on any part of the hospital campus" (applied to patients, staff and visitors)*	"To provide patients at Wichita Falls State Hospital the opportunity to be free of tobacco use, **the facility implemented** a tobacco-free policy" [p.451]	Written policy(ies) Cessation support *Patient education about smoking and tobacco addiction recovery.* Pharmacotherapies/NRT	Total sample *Nov 98: average daily census n=190; admissions n=68* *Jan 99: average daily census n=188; admissions n=73* Sample characteristics: *Smoking status not reported; aged 18-65 years; both acute and newly admitted psychiatrically ill*

Smokefree in place: *Implemented 1st Dec 98* Before implementation – single time point: *Nov 98* After implementation – single time point: *Jan 99*			*patients; 98% patients admitted on an involuntary basis.*
Shetty 2010 [UK +] **Uncontrolled before-and-after study (with same sample after intervention)** *NHS 60-bed medium secure unit that admits adult men with primary diagnoses of mental illness. In-patients are distributed between 3 wards (assessment, continuing care and rehabilitation) according to levels of risk.* Smokefree building(s) Smokefree grounds Smokefree "other description": *All in-patients in medium secure units were required to abstain from tobacco (unenforceable for small number with unescorted community leave)* Ban exclusions: *If the clinical team agreed there was a clinical reason not to enforce abstinence (in practice, none) or for the small number of patients who had unescorted community leave*. Smokefree in place: *Implemented Mar 07* Before implementation – single time point: *3 months pre-ban* After implementation – multiple time points: *3 months post-ban, 12 months post-ban*	"**The Health Act 2006** introduced legislation that prohibited smoking in all enclosed public areas and workplaces. In-patient mental health units in England and Wales were obliged to ensure that wards and communal areas became smoke-free, and **from 1 July 2008 the legislation covered any enclosed or substantially enclosed part of a mental health unit**. … Nottinghamshire Healthcare National Health Service (NHS) Trust introduced a smoke-free policy in March 2007 prohibiting the use of tobacco products within **the buildings and grounds of all Trust premises**" [p.287]	Posters/signage Cessation support *In-patients groups and individual sessions* Pharmacotherapies/NRT Closure of smoking rooms Staff training Other strategies: *Engagement with patients: individual & group discussions, patient advocates. A physical and procedural security infrastructure already adapted to the prevention of illicit substance use.*	Total sample *n=56* Sample characteristics: *All adult males with primary diagnoses of mental illness.* *89% patients smoked; mean 21 (range 5-50) cigarettes/patient; average daily cigarette consumption in Ward 1 (assessment) n=19 cigs/day, in Ward 2 (continuing care) n=23 cigs/day, in Ward 3 (rehabilitation) n=22 cigs/day*
Cormac 2010 [UK +]	"**The Health Act 2006** required that all	Cessation support	Total sample

Uncontrolled before-and-after study (with different sample after intervention) *Pre- and post-ban responses not linked but most sample the same (n=298 patients for study duration)* *A high secure, long-stay psychiatric hospital for patients with complex mental health disorders who are a grave and immediate danger to the public or themselves (the majority have committed serious offences)* Smokefree building(s) Smokefree grounds Smokefree in place: *Implemented 31 Mar 07* Before implementation – multiple time points: *Dec 06, Mar 07* After implementation – multiple time points: *Apr 07, Jul 07*	indoor and substantially enclosed outdoor workplaces and public places in England and Wales became smoke-free by 1 July 2007. Residential mental health settings were given a temporary exemption for 1 year only." [p.413]	Pharmacotherapies/NRT Staff training Other strategies: *Information provision (no further details)* *Surrender of smoking materials (in-patients)* *On the weekend of policy introduction, all wards were fully staffed and additional activities were provided as a distraction.*	*Patients n=175 (pre-ban) n=115 (post-ban); Staff n=1038 (pre-ban) n=670 (post-ban)* Sample characteristics: *Patients pre-ban (89% male, 70% smokers pre-ban) Patients post-ban (85% male, 87% smokers pre-ban); Staff pre-ban (46% male, 23% smokers pre-ban, 61% nursing staff) Staff post-ban (38% male, 22% smokers pre-ban, 54% nursing staff)*
Haller 1996 [USA +] **Uncontrolled before-and-after study (with different sample after intervention)** *A 16-bed locked inpatient unit in San Francisco, CA, with a 2-week mean length of stay.* Smokefree building(s) Smokefree grounds Smokefree in place: *(Implementation date not reported, early 1990s)* Before implementation – single time point:	"In 1992, the **Joint Commission on Accreditation of Healthcare Organizations** mandated that hospitals must be smoke-free." [p.329]	Pharmacotherapies/NRT *Prescriptions for patients* Other strategies: *Staff education to recognize and treat nicotine withdrawal symptoms/cigarette cravings; written information for patients (use of nicotine gum and how to manage cravings)*	Total sample *Patients: n=27 (pre-ban), n=26 (1 month post-ban), n=30 (2 months post-ban), n=36 (3 months post-ban), n=43 (4 months post-ban) (n=135 total post-ban)* Sample characteristics: *Schizophrenia 19% (pre-ban) 32% (post-ban), Mood disorder 48% (pre-) 28% (post-), Other (pre-) 33% (post-) 40%; 83% of the patients discharged over the 5 months of the study were civilly*

Chart data 1 month pre-ban After implementation – multiple time points: *Chart data 1, 2, 3 and 4 months post-ban*			*committed; Current smoker: Yes 41% (pre-) 53% (post-), No 59% (pre-) 47% (post-); Mean age 44 years (pre-) 42 years (post-); Male 41% (pre-) 57% (post-); White 63% (pre-) 71% (post-), Non-white 37% (pre-) 29% (post-). No statistically significant differences in demographic and clinical features between pre- and post-ban sample.*
Patten 1995 [USA +] **Uncontrolled before-and-after study (with different sample after intervention)** *A 28-bed locked adult inpatient psychiatric unit in Saint Marys Hospital, Rochester, Minnesota* Smokefree building(s) Smokefree grounds Ban exclusions: *Patients with off-unit privileges, at an appropriate level, were granted brief passes to leave the building unaccompanied to smoke ("very few patients")* Smokefree in place: *Implemented 1st Jan 91* Before implementation – single time point: *Records data 3 months pre-implementation* After implementation – single time point: *Rev 6: Records data 3 months post-implementation*	"The **Joint Commission on Accreditation of Healthcare Organizations** accreditation standards … In 1987 Mayo Medical Center initiated a smoke-free policy… the psychiatric units were initially excluded from complete adherence." [p.372]	Implementation committee Cessation support *Patients' weekly support group led by Nicotine Dependence Center* Pharmacotherapies/NRT *Nicotine gum (patients)* Other strategies: *Staff education sessions on the treatment of nicotine dependence; written information for patients*	Total sample *Patients: n=184 (pre-ban), n=178 (post-ban)* Sample characteristics: *Smoker 43.3% (pre-ban) 33.3% (post-ban); Mean years of smoking (smokers only) 16.2 (SD=11.0) (pre-ban) 16.9 (SD=12.6) (post-ban) Range 1-55 years (pre-ban) 1-64 years (post-ban); Cigarettes per day (smokers only) mean 27.1 (SD=17.8) (pre-ban) 28.7 (SD=28.7) (post-ban) Range 5-100 (pre-ban) 5-170 (post-ban); Mean age 39.3 (SD=16.2) years (pre-ban) 39.3 (SD=18.6) years (post-ban) Range 11-82 years (pre-ban) 14-83 years (post-ban); Male 40.8% (pre-ban) 48.3% (post-ban); Diagnosis: Mood disorders 32% (pre-ban) 35% (post-ban); Adjustment disorders 19% (pre-ban) 19% (post-ban); Psychotic disorders not*

			elsewhere classified 11% (pre-ban) 16% (post-ban); Schizophrenia 11% (pre-ban) 6% (post-ban); Psychoactive substance use disorders 7% (pre-ban) 8% (post-ban); (see Evidence Table for list of disorders occurring ≤4%). No statistically significant differences between the pre-ban and post-ban samples.
Studies with Smokefree Indoors Only			
Erwin 1991 [USA -] **Uncontrolled before-and-after study (with same sample after intervention)** *A VA (US Dept. of Veterans Affairs) hospital in an urban centre in Illinois. Two 21-bed acute care psychiatric wards for veterans with diagnose including schizophrenia, depression and post-traumatic stress disorder* Smokefree "other description": *Smokefree acute psychiatric wards (presume from the paper's introduction, the rest of hospital is smokefree)* Smokefree in place: *Implemented 1st Mar 90 (announced 2 months earlier)* Before implementation – single time point: *No date reported* After implementation – multiple time points: *1 week following implementation and 4 weeks following implementation*	"In December 1988, officials of the VA announced the goal of establishing smoke-free acute care sections by mid-1989. Patients excluded from this original proclamation included those hospitalized on psychiatric wards … The **Department of Psychiatry responded to the intentions of VA officials** by following through with the proposal of establishing smoke-free environments for veteran patients" [p.12-3]	Cessation support *Nursing interventions included "Encouraged patients to participate in smoking cessation groups"* Other strategies: *Interventions by nursing staff that address patients with the urge to smoke on the psychiatric ward (e.g. encouraging activities that foster energy replenishment/use; promoting physical benefits of not smoking and preventing harm; individualising care (p.r.n. medications, time outs); involving significant others in care).*	Total sample *n=29 nursing staff* Sample characteristics: *66% (n=19) registered nurses, 17% (n=5) licensed practical nurses, 17% (n=5) nurses aides*
Vorspan 2009 [France +]	"Psychiatric facilities were **included in the**	Pharmacotherapies/NRT	Total sample

Uncontrolled before-and-after study (with same sample after intervention) *Psychiatry department of Fernand Widal hospital, in Paris* Smokefree building(s) Smokefree in place: *Implemented 1st Feb 07* Before implementation – single time point: *1 month pre-ban (Jan 07)* After implementation – single time point: *1 month post-ban (Mar 07)*	**general smoking ban in public places** that occurred in France, in 2007." [p.529]	*For inpatients experiencing withdrawal symptoms (patches 10-40mg/day, inhalators and ad libitum gum); therapies available for staff willing to quit* Closure of smoking rooms *Indoor smoking areas were closed* Other strategies: *Patients evaluated for outdoor smoking breaks, ranging from none, limited and accompanied by a nurse, to unlimited.*	*n=42 staff* Sample characteristics: *76% women; mean age 37 (SD=10) years; location in hospital 62% ground floor, 38% 1st floor; 100% non-smokers, 100% smokerlyser CO measures <5ppm, n=2 lived with smoker.*
Etter 2008 [Switzerland +] **Uncontrolled before-and-after study (with different sample after intervention)** *(The staff sample consisted of largely the same people who answered successive surveys, although results not linked)* *Two in-patient, adult units of the Psychiatry Department of the Geneva University Hospitals: an admission and short-stay unit (16 beds, mean duration of stays=17 days, median=7 days) and a medium-stay unit (16 beds, mean duration of stays=37 days, median=15 days).* Smokefree building(s): *Patients (except those in locked rooms) and staff were allowed to leave the unit to smoke outside* Smokefree in place: *Implemented in Jan 06* Before implementation – multiple time points:	"The **hospital administration** decided that smoking would be banned everywhere inside hospital buildings beginning January 2006. The smoking rooms were then removed. Smoking continued to be allowed outdoors, and patients (except those in locked rooms) and staff were allowed to leave the unit to smoke outdoors." [p.573]	Posters/signage Cessation support Pharmacotherapies/NRT *NRT free for patients, not for staff.* Closure of smoking rooms Staff training	Total sample *2003 (no ban) n=106 (n=49 patients, n=57 staff), 2006 (total ban) n=134 (n=77 patients, n=57 staff)* Sample characteristics: *Patients 2003 (no ban) 91.8% Ever smoked 100+ cigarettes, Daily smokers 73.5%, Occasional (non-daily) smokers 6.1%, Former smokers 12.2%, Never smokers 8.2%; mean age 39.9 years; 59.2% men. Patients 2006 (total ban) 81.6% Ever smoked 100+ cigarettes, Daily smokers 65.8%, Occasional (non-daily) smokers 2.6%, Former smokers 15.8%, Never smokers 15.8%; mean age 41.0 years; 60.0% men.*

Oct 03 (pre ban), Apr 04 (2 months post-partial ban), Dec 05 (20 months post-partial ban/pre-total ban) After implementation – single time point: *Mar-May 06 (3-5 months post-total ban)*			*Staff 2003 (no ban) 64.9% Ever smoked 100+ cigarettes, Daily smokers 26.3%, Occasional (non-daily) smokers 7.0%, Former smokers 22.8%, Never smokers 43.9%; mean age 38.8 years; 35.1% men. Staff 2006 (total ban) 57.9% Ever smoked 100+ cigarettes, Daily smokers 26.3%, Occasional (non-daily) smokers 7.0%, Former smokers 22.8%, Never smokers 43.9%; mean age 40.7 years; 37.5% men.*
Joseph 1993 [USA +] **Cohort study** *The Minnesota Veterans Affairs Medical Centre Drug Dependency Treatment Programme* Smokefree building(s) Smokefree in place: *Implemented in Jun 88* Before implementation – single time point: *1st Jan 88 – 19th May 88* After implementation – single time point: *19th Jul 88 – 31st Dec 88*	"In June 1988, the **Minneapolis Veterans Affairs Medical Center (MVAMC) Drug Dependency Treatment Program (DDTP)** implemented a smoke-free policy on the inpatient unit. Simultaneously, the program began to include treatment for nicotine addiction along with other substances." [p.636]	Other strategies: *Patients informed of policy and cessation programme prior to admission. They were required to agree in writing to nicotine abstinence during treatment and asked to abstain from smoking even when off-site.*	Total sample *All patients n=314, Respondents n=197* Sample characteristics (respondents): *100% male patients; 18-65 years, mean 39.9 years; mean length of stay 22.4 days; 79% smoker on admission; 81% high school graduate; 45% divorced/separated; 61% unemployed on admission; 49% no medical conditions, 12% cardiovascular disease, 7% lung disease, 11% liver disease, 20% psychiatric disease.*
Matthews 2005 [USA -] **Uncontrolled before-and-after study (with different sample after intervention)** *An 18-bed acute crisis stabilization unit where all male patients are first admitted, for up to 3*	"The Joint Commission of Healthcare Organizations (JCAHO) (2005) has mandated that hospitals develop and implement policies to prohibit smoking but allows hospitals to permit patients' smoking only in areas designated separate	Cessation support *Patients - education about nicotine addiction and withdrawal* Pharmacotherapies/NRT *Patients - given nicotine gum (up to 12 mg per day was typically*	Total sample *Patients n=420 admissions (pre-ban) n=428 admissions (post-ban); Nursing staff n=14 (pre-ban) n=13 (post-ban)*

days, by which time patients are either discharged or referred to the male acute treatment unit. The unit is within Dorothea Dix State Psychiatric Hospital, which provides care to people in the south central region of North Carolina. Approx. 3,000 patients (1,800 men, 1,200 women) are admitted to adult psychiatry service per year (approx. 95% involuntarily). Smokefree "other description": *Described as "smoking ban"* Smokefree in place: *Implemented 21st Oct 02* Before implementation – single time point: *Clinical data 3 months pre-ban; other data not reported* After implementation – single time point: *Clinical data 3 months post-ban; other data not reported*	from care, treatment, and service. … **We implemented the ban** because of our frustration with having to schedule assessments and therapeutic activities around patients' smoking breaks. In addition, there were seemingly endless discussions (usually initiated by patients) about how many smoking breaks should be offered, how long they should last, and how many cigarettes they could have." [p.34]	*prescribed) or patches (offered in 7 mg, 14 mg, or 21 mg strengths (depending on the number of cigarettes the patients had reported smoking prior to admission)) to ease withdrawal symptoms.*	Sample characteristics: *Patients: 100% males; a statistically significant difference in diagnostic composition of the patient groups before and after implementation.*
Rees 2008 [USA +] **Uncontrolled before-and-after study (with different sample after intervention)** *The 13-bed First-Step Unit at Louisiana State University Medical centre is a publically funded inpatient substance abuse detoxification unit.* Smokefree "other description": *Ban on tobacco and discontinuation of patient smoke breaks.* Smokefree in place: *Apr 01* Before implementation – single time point: *12 months pre-ban*	"In August of 2000, **Louisiana State University Medical Center, Lafayette (UMC)** prohibited smoking, but made an exception for its inpatient acute medical detoxification facility … observations such as these [tobacco-related mortality rates] were influential in the decision of the First Step Unit to discontinue all patient smoke breaks and ban tobacco". [p.343]	Other strategies: *Patients informed of smoking ban policy as part of their admission screening process*	Total sample *n=516 patients (pre-ban), n=561 patients (post-ban)* Sample characteristics: *Mean age 36.7 years (SEM=0.41) (pre-ban) 35.7 years (SEM=0.41) (post-ban); 69.6% males (pre-) 73.6% males (post-); 72.7% European Americans (pre-) 76.5% European Americans (post-).*

After implementation – single time point: *12 months post-ban*			
Rauter 1997 [USA +] **Cohort study** *New Hampshire Hospital. Public inpatient psychiatric hospital, state of New Hampshire consisting of an acute psychiatric service (APS) with a 145 bed capacity, an adolescent program, and a psychiatric nursing home. APS has approx. 850 admissions annually.* Smokefree building(s) Other: *Designated open-air smoking areas established outside the buildings* Smokefree in place: *All units smokefree 1st Jan 91* Before implementation – multiple time points: *Two pre- implementation baseline measures: Oct 89-Mar 90 (for 6m, starting 15m pre-) and Oct 90-Dec 90 (for 3m pre-)* After implementation – multiple time points: *Two post-implementation measures: Jan 91-Mar 91 (3m post-) and Jan 92-Jun 92 (for 6m, starting 12m post-). (Acuity measures: Jan 91-Jun 91 (6m post-) only).*	"In **response to enlightened state legislative deliberations and concerns for a healthy patient environment** … the hospital administration implemented a strict smoking policy." [p.36]	Cessation support*Sessions from the New Hampshire Lung Association and workshops using hypnosis to quit smoking were offered to employees; 10 % signed up.* *Patients wishing to participate in smoking reduction workshops were urged to do so.*	Total sample *Pre-ban period 1: average daily census n=126; average admissions n=67; pre-ban period 2: average daily census n=129; average admissions n=56; post-ban period 1: average daily census n=129; average admissions n=55.* Sample characteristics: *Patients typically admitted on an involuntary basis with an age range from 18-65 years. A small percentage remains hospitalised for ≥6 months.*
Sterling 1994 [USA -] **Cohort study** *Outpatient cocaine treatment program.* Smokefree building(s)	"Nearly all health care facilities have by now adopted smoke-free environment policies … **reports [of surveys of substance abuse as well as other psychiatric inpatient and outpatient programs instituting smokefree policies] are encouraging** for administrators who have	Posters/signage Closure of smoking rooms *Prior to the ban, smoking was restricted to one large room* Other strategies: *Outpatients informed by therapist*	Total sample *Outpatients: n=204* Sample characteristics: *93.1% African American; 60.3% female; average age at admission 31.6 years (SD=6.4).*

Smokefree in place: *Implemented Sep YYYY (year not stated, early 1990s?)* Before implementation – multiple time points: *3 months pre-ban (Jun-Aug) breakdown; sub-sample 1 month pre-ban (Aug)* After implementation – multiple time points: *3 months post-ban (Sep-Nov) breakdown; sub-sample 1 month post-ban (Sep)*	considered smoke-free policies, these results are based primarily on attitudes and perceptions, and not on actual patient behaviour … we decided to conduct an empirical evaluation." [p.162]		
Velasco 1996 [USA -] **Cohort study** *25 bed, locked inpatient psychiatric service in the university of Louisville Hospital which serves primarily an inner city population.* Smokefree "other description": *Prohibited cigarette smoking of inpatients.* Smokefree in place: *Implemented 1st Oct 91* Before implementation – single time point: *6 weeks immediately prior (14th Aug-30th Sep 91)* After implementation – multiple time points: *6 weeks immediately after (1st Oct-12th Nov 91) and 6 weeks two years later (1st Oct-3rd Nov 93)*	"The **Joint Commission on Accreditation of Healthcare Organizations** (JCAHO) declared that all accredited hospitals be smoke-free as of January 1992." [p.200]	Posters/signage Pharmacotherapies/NRT Other strategies: *Patient notification prior to admission.*	Total sample *1991 (immediately prior and immediately post-ban combined): n=193 patients; 1993: n=96 patients* Sample characteristics: 1*991 (immediately prior and immediately post-ban combined): 52% female; 70% Caucasian, 28% African American, 2% other; About 40% of the patients have psychoses, 40% have an affective disorder, and 20% have a chemical dependence or personality or organic mental disorders". 1993: 53% women; 63% Caucasian, 36% African American, 1% other. Average length of stay approximately 9 days in 1991 and in 1993; and daily patient census and patient diagnosis similar in both years.*

Table 2.2: Characteristics of smoke-free in studies in acute and/or maternity (or non-mental health) settings

○ **Title** ○ **Study design** ○ **Acute and/or Maternity Setting** ○ **Type of ban** ○ **Implementation stage (the most recent stage addressed in the study)** ○ **When assessed**	**Legislation, policy or other impetus** *(As reported in the paper. If national legislation or a national or local policy is not cited in the article, other statements from the study are provided. All papers typically report the health risks to smokers and those around them in their introduction or literature review.)*	**Supporting strategies/ interventions**	**Sample size & characteristics**
Studies with Smokefree Grounds			
Nagle 1996 [Australia +] **Controlled before-and-after study (with different sample after intervention)** **Hospital 1 (H1 intervention):** A large urban teaching hospital of 530 beds. **Hospital 2 (H2 control):** A smaller rural hospital of 156 beds with similar case mix to H1. Smokefree building(s) Smokefree grounds *Partial - both H1 and H2 retained "smoking areas" within the grounds* Smokefree in place: *Indoor since 1988; partial outdoor in 1991 in H1, already in place in H2.* Before implementation – single time point: *2 weeks pre-implementation at H1 (both H1 and H2) in 1991* After implementation – single time point: *1 month post-implementation at H1 (both H1 and H2) in 1991*	"In Australia, **legislation was introduced in 1988, in New South Wales (NSW)**, which required a total prohibition of smoking by all staff, patients, and visors, in all hospital buildings and vehicles. … Recently a few hospitals … have undertaken initiatives aimed at the gradual implementation of totally smoke-free hospital sites (that is restrictions that include parts or all of the grounds outside the buildings." [p.199-200]	Implementation committee *H1: Formed by occupational health and safety team with reps from NSW Cancer Council, National Heart Foundation, hospital management, unions, and study's lead author* Posters/signage *H1: all signs displayed either the words "No Smoking" or the symbol and all were attached to the outer walls of the building in 22 sites (16%); H2: signs displayed the words "You are now entering a smoke-free environment, please extinguish your cigarette" and were positioned at the entrance of the site accompanied by an ashtray in 11 sites (16%).* Staff letters/payslip notes *H1: Newsletters notified staff* Other strategies: *H1: Policy launch incorporated into World No Tobacco Day Activities. Staff notified by bulletin boards and their supervisors.*	Control/Comparison sample *Hospital 2: T1 n=2414 observations; T2 n=1943 observations. 67 sites mapped and observed at different time points over 7 days: 3 courtyards, 5 main entrances, 22 secondary entrances, 2 covered exit passageways, 16 verandas, 1 internal and 3 external firestairs, 7 pathways >10m and <50m from any entrance, and 8 lawns/car parks >10m and <50m from entrances.* Intervention sample *Hospital 1: T1 n=4252 observations; T2 n=2787 observations. 135 sites mapped and observed at different time points over 7 days: 8 courtyards, 5 main entrances, 8 secondary entrances, 9 covered exit passageways, 88 verandas, 5 internal and 3 external firestairs, 9 pathways >10m and <50m from any entrance, and 4 lawns/car parks >10m and <50m from entrances*
Wheeler 2007 [USA -] **Uncontrolled before-and-after study (with different**	"Despite these concerns [such policies would lead employees and patients to migrate to	Written policy(ies) Implementation committee	Total sample *Questionnaire site 1 (staff): n=842*

sample after intervention) Two sites: Site 1: Arkansas's university hospital and academic medical center; and Site 2: a smaller, private children's hospital that uses the university's faculty and residents for its medical staff. Smokefree building(s) Smokefree vehicles Smokefree grounds Smokefree "other description": *All property owned or leased.* Smokefree in place: *Site 1: announced 29th Oct 03, implemented 4th Jul 04; Site 2: announced Spring 04, implemented 6 months later (employees) and Spring 05 (12 months later) (employees, visitors, patients)* Before implementation – single time point: *Site 1: Apr 04 (questionnaire), Jul 03-Jun 04 monthly mean (hospital utilisation), Jan 04 (employee resignations, terminations, hires); Site 2: 2 months after employee only ban (= 4 months pre-full smokefree) (questionnaire), May 04-Oct 04 monthly mean (hospital utilisation)* After implementation – single time point: *Site 1: May 05 (questionnaire), Aug 04-Jul 05 monthly mean (hospital utilisation), Jan 05 (employee resignations, terminations, hires); Site 2: May 05-Oct 05 monthly mean (hospital utilisation)*	other institutions, create difficult enforcement roles for hospitals, and cause hospitals to be viewed as uncaring and judgmental toward patients and families], **the leadership of Arkansas's only university hospital and academic medical center decided to adopt a smoke-free campus policy at the urging of the university's chancellor**. Soon thereafter, a similar policy was adopted by a smaller, private children's hospital that uses the university's faculty and residents for its medical staff." [p.745]	Posters/signage Staff meetings Staff letters/payslip notes Patient appointment letters Cessation support Pharmacotherapies/NRT *Site 1: free to employees for 6m (Apr-Sep 04), on sale on campus to non-employees. Site 2: free to employees (open-ended), n sale on campus to non-employees.* Other strategies: *Staff appointed (site 1: wellness director, site 2: tobacco control specialist with cessation expertise); Site 1: portable pagers in emergency dept. for patrons/visitors who needed to leave campus to smoke; Scripts for staff to deal with patrons smoking; Staff violations dealt with by HR dept.; Written policy in new employees packs; Neighbouring businesses notified; Announcements in local media.*	*(pre-implementation), n=912 (post-implementation)* Sample characteristics: *occupation distribution changed significantly due to a change in nurse respondents from 19% (pre-) to 11% (post-) (p<0.0001) and education distribution changed significantly due to decreases in 'high school or less' and 'college graduate' and an increases in 'professional or post-college education' (p=0.015). Gender (p=0.8964), age and race distributions did not change significantly between measures*
Kvern 2006 [Canada -] **Uncontrolled before-and-after study (with different sample after intervention)** A number of Winnipeg Regional Health Authority operations including Deer Lodge Centre (a long-term care facility), Health Sciences Centre (a tertiary care facility), community sites, Saint Boniface General Hospital and other long-term care facilities.	"In April 2003, the WRHA [Winnipeg Regional Health Authority] Smoke-free Policy Working Group (SFPWG) provided a smoke-free policy background paper to the WRHA Board for their information and consideration, and to request permission to develop a smoke-free policy. **Once the SFPWG received this permission, they developed WRHA's Smoke-free Policy (10.000.010), which was approved by the**	Written policy(ies) *Smokefree Policy; a Comprehensive Communications plan* Implementation committee *Smokefree Policy Working Group* Posters/signage *Signage; no-smoking symbols painted on pavements + driveways* Staff meetings	Total sample *Data reported from a range of hospitals and care facilities.*

Smokefree building(s) Smokefree doorways/entrances Smokefree grounds *Smokefree grounds policy excludes mental health services and home-based services* Smokefree in place: *Smokefree grounds implemented 5th Jul 04* Before implementation – single time point: *Policy compliance observation (31 May – 09 Jun '04)* After implementation – single time point: *Policy compliance observation (26 Jul – 9 Aug '04); Support for inpatients (NRT use) (Jul-Sep '04)* After implementation – multiple time points: *Policy compliance security contacts (Jul '04, Aug '04, Sep '04)*	**Board in June 2003**. The Board then tasked the SFPWG with developing a policy implementation plan for the smoke-free grounds aspect of this policy and to make recommendations on its operational implications; this was done over the ensuing year. After much planning, the smoke-free grounds aspect of the Smoke-free Policy began a phased-in implementation on July 5, 2004." [p.1]	Staff letters/payslip notes *Posted notices, pay stub inserts, facility newsletters* Cessation support *Staff: Information resources, on-site cessation groups* Pharmacotherapies/NRT *Staff: reimbursement for smoking cessation medication* *In-patients: prescribing aids to assist appropriate NRT* Temporary abstinence support *In-patients* Moved ashtrays/shelters *To the site periphery* Staff training *Admissions training for new staff (inform policy, identify NRT needs); Security staff trained to address non-compliance with a 'graded approach' – used info sheet as an aid, ask to extinguish cigarette or move off-site.* Other strategies: *Media (paid and earned) to inform public and patient groups; health organisations' websites; bilingual information sheet for inpatients and general public*	
Hudzinski 1990 [USA +] **Uncontrolled before-and-after study (with same sample after intervention)** A health care institution (clinic and medical foundation) with inpatient units employing staff physicians and psychologists Smokefree building(s) Smokefree "other description": *A "comprehensive campus-wide smokefree environment"*	"The Ochsner Medical Institutions (New Orleans, LA) have been a prime health care provider **advocating this health risk ever since one of our founders, Alton Ochsner, first reported the association of smoking and lung cancer in 1939**. More recently, we have established one of the first health care institution policies that enforced a comprehensive campus-wide smokefree environment." [p.1198]	Implementation committee *Smoke-Free Task Force (included clinicians, psychologists, and administrative personnel from public affairs and employee relations departments)*	Total sample *Staff: n=1946 (pre-ban), n=1608 (6m post-ban), n=684 (12m post-ban)* Sample characteristics: *At 12 months follow-up: 18% physicians, 82% other employees; 4% <35years, 29% 35-44 years, 27% ≥45 years; 29% male*

Ban exclusions: *Patient smoking permitted on the acute psychiatry inpatient unit by physician approval*. Smokefree in place: *Implemented 1986* Before implementation – single time point: *6 months pre-ban* After implementation – multiple time points: *6 months post-ban and 12 months post-ban*			
Gadomski 2010 [USA +] **Uncontrolled before-and-after study (with different patient sample), (with same staff sample)** A 180-bed, acute care inpatient teaching facility in a small town in upstate New York Smokefree building(s) Smokefree doorways/entrances Smokefree grounds *No description of how comprehensive grounds ban is.* Smokefree in place: *Implemented 1st Jul 06* Before implementation – single time point: *Staff: Mar-Jun 05* Before implementation – multiple time points: *Patients: each month Jan 05-Jun 06* After implementation – single time point: *Staff: Mar-Jun 06* After implementation – multiple time points: *Patients: each month Jul 06-Sep 08*	"Prior to the implementation of the smoke-free medical campus policy, it was common to see employees, visitors, and patients lined up outdoors around the main hospital entrances and smoking just beyond the ''no smoking'' signage. Inpatients could look out their windows at the main entrance or into the courtyard and see hospital staff, other patients, and visitors smoking." [p.51]	Cessation support Pharmacotherapies/NRT Other strategies: *Campus map detailing new smoke-free borders.* *Staff, community and patient education*	Total sample *Average of n=959 patients per month pre-ban, n=988 per month post-ban.* *Cohort of n=489 staff reporting in both 05 and 07. n=624 staff with anniversary date Mar-Jun 05; n=661 staff with anniversary date Mar-Jun 06; n=1112 staff with anniversary date Mar-Jun 07 (07 sample includes new hires and management staff).* Sample characteristics*: not reported*
Ripley-Moffitt 2010 [USA +] **Interrupted time series** University-affiliated hospital system in North Carolina	"With all U.S. hospitals having eliminated indoor smoking, an **increasing number have shown interest in adopting 100% tobacco-free hospital campus (TFHC) policies**" [p.e25]	Posters/signage Staff meetings Staff letters/payslip notes *Employee newsletters* Cessation support *Employees offered free smoking*	Total sample *n=2024 employees (37%) pre-smokefree; n=210 (68% smokers from baseline) enrolled in follow-up* Sample characteristics (of smoking

Smokefree buildings Smokefree grounds *"100% tobacco-free hospital campus"* Smokefree in place*: Implemented 4th Jul 07* Before implementation – single time point: *1 month prior to smokefree* After implementation – multiple time points: *6 months and 1 year after smokefree*		*cessation services through occupational health*	cohort): *average age 42 years (SD=10); 82% female 73% White (higher percentages than in the full-time employee population as a whole). 90% post-high school education; 97% private insurance (most with the state employee health plan)*
Studies with Smokefree Indoors Only			
Fernández 2008 [Spain +] **Uncontrolled before-and-after study (air vapour-phase nicotine samples)** 44 of 61 public hospitals (directly managed by or serving the national health service), all who have joined the Catalan Network for Smoke-Free hospitals and implemented the Smokefree Hospital Project. Smokefree building(s) Smokefree in place: *1st Jan 06* Before implementation – single time point: *Sep-Dec 05* After implementation – single time point: *Sep-Dec 06*	"On January 1st 2006, **Spain … enacted a comprehensive regulation to prevent and control smoking**. Smoking is banned in all indoor public workplaces, public transport, hospitality venues (with some exceptions), schools and universities, retail stores and shopping centers, as well as hospitals and other health care facilities. … smoking is now totally banned in any location within hospitals and health care buildings, eliminating smoking rooms, smokers' cafeterias and smokers' areas within cafeterias" [p.624]	Cessation support *to professionals, patients and visitors* Staff training *tobacco control training* Other strategies: *Guaranteeing common follow up and evaluation*	Total sample *n=44 public hospitals* Sample characteristics: *22 county hospitals of basic health care level, 10 reference hospitals and 12 university hospitals. Median number of beds=250, with 18 hospitals >300 beds. Median number of employees=612, with one third hospitals >800 workers.*
Donchin 2004 [Israel +] **Uncontrolled before-and-after study (with different sample after intervention)** A 959-bed university hospital in Jerusalem, employing over 3,700 salaried workers and accommodating 42,580 inpatients and 201,185 outpatient visits (2001). Smokefree building(s) Smokefree in place: *Implemented 1 Nov '00*	"Based on the U.S. experience, and in accordance with these laws, **the general director of Hadassah Hospital implemented a complete ''smoke-free'' policy in the hospital** as of November 2000. … In August 2001 (15 months later), antismoking law was revised in Israel. The revised law called for, among other things, a complete ban of smoking in all hospitals." [p.589-90]	Implementation committee Cessation support *Employees* Other strategies: *Smoking shelters ("booths") erected outside the hospital building; sale of tobacco products banned on site; Information campaign (2 months pre-policy) and press conference launch; Fines for violations authorised*	Total sample *n=368 staff (pre-policy), n=364 (post-policy)* Sample characteristics (pre- and post-policy): *Doctors and dentists 17.1% (pre-) 13.5% (post-), nurses 27.4% 31.9%, administrators and clerks 14.9% 17.0%,technicians 28.0% 26.6%, unskilled workers 12.5% 11.0%; <35 years 23.1% (pre-) 22.5% (post-), 35–*

Before implementation – single time point: *3 months pre-policy* After implementation – single time point: *6-9 months post-policy*			*44 years 26.9% 28.3%, 45– 54 years 29.3% 27.7%, 55+ years 20.7% 21.4%; Males 36.1% (pre-) 30.2% (post-); 0-12 years of education 23.2% (pre-) 25.4% (post-), 13-15 years of education 23.5% 18.5%, 16+ years of education 53.3% 56.1%. Smoking status: current smokers 19% (pre-) 19.5% (post-), past smokers 12.5% 19.5%.*
Stillman 1990 [USA +] **Cohort study *Prospective descriptive study*** The Johns Hopkins Hospital. Maryland, USA. A large urban medical centre encompassing 24 buildings in a 12-square-block area. (Same location as Stillman 1995 study) Smokefree building(s) Smokefree in place: *Announced 1st Jan 88, implemented 1st Jul 88.* Before implementation – single time point: *Survey Nov 87 (2 months pre-announcement); Ashtray butt counts monthly for 6 months pre-ban; Smoking observations monthly for 8 months pre-ban* Before implementation – multiple time points: *Nicotine vapour monitoring 8 months and 1 month pre-ban* After implementation – single time point: *Survey Nov-Dec 88 (1 year follow-up, 6 months post-ban); Nicotine vapour monitoring 8 months post-ban; Ashtray butt counts monthly for 6 months post-ban; Smoking observations monthly for 8 months post-ban*	"In 1987, **the Board of Trustees of The Johns Hopkins Hospital voted to eliminate smoking as of July 1, 1988, in all areas of the hospital complex** … the previous policy allowed smoking in the designated areas … except in The Children's Center. Smoking also persisted among visitors, patients, and staff in non-designated areas through the institution." [p.1565]	Written policy(ies) Implementation committee *Steering committee of representatives of all major departments was formed to implement the smokefree environment* Cessation support *Free to all employees: multi component 8-week smoking cessation groups, 1-hour quitting clinics, individualised counselling, and self-help manuals* Staff training *Targeted at all hospital managers, supervisors and security personnel to ensure proper policy enforcement* Other strategies: *Internal media and educational campaign; Free employee screening for cholesterol, blood pressure, CO, cardiovascular risk assessment counselling 6 months before implementation and continued to the present.*	Total sample *n=5190 staff pre-implementation (59%); of those still employed post-implementation, n=2877 (64%).* *n=1260 minutes of observations of employee and visitor smoking in the cafeterias and n=1440 minutes in the lounges*
Martínez 2008 [Spain +] **Interrupted time series *4 surveys between 2001-2006***	"After the ratification of the Framework Convention on Tobacco Control on January 27, 2005, **a new law for Prevention and Control of**	Closure of smoking rooms Staff training *For nurses: tobacco control educational*	Total sample *Staff: n=188 in 2001, n=186 in 2002, n=206 in 2004, n=237 in 2006*

The Catalan Institute of Oncology, a Comprehensive Cancer Centre in Barcelona Smokefree "other description": *The Hospital became "entirely smoke-free" in 2005* Smokefree in place *A smoke free policy was introduced progressively from '97: in '03, smoking was only allowed in 1 smoking area, exclusively for employees. In Jul '05, the Hospital became entirely smoke-free.* After implementation – multiple time points *2001, 2002 and 2004 (all pre-full ban implementation) 2006 (post-full ban implementation)*	**Smoking has been implanted in Spain**. Restrictions in selling, advertising, and using tobacco in public places, workplaces and hospitals have been established …The Catalan Institute of Oncology (ICO), a Comprehensive Cancer Center in Barcelona, Spain, began the implementation of the ‘‘smoke-free’’ policy in 1997. Before the official launching, ICO gradually developed a smoke-free policy plan whose main element was to facilitate an organizational change.” [p.89]	*and training courses*	Sample characteristics: *Occupation 2001 20% doctors 34% nurses 56% administrative employees 35.3% other; 2002 24.3% doctors 32.3% nurses 46.7% administrative employees 30.7% other; 2004 17.2% doctors 30% nurses 31.3% administrative employees 47.8% other; 2006 15.2% doctors 32.6% nurses 37% administrative employees 35.7% other.* *Smoking status: 2001 34.5% smokers 38.3% never smokers 27.1% former smokers; 2002 32.8% smokers 44.6% never smokers 22.6% former smokers; 2004 34% smokers 37.9% never smokers 28.2% former smokers; 2006 30.6% smokers 39.4% never smokers 30.1% former smokers.*
Daughton 1992 [USA -] **Uncontrolled before-and-after study (with same sample after intervention)** *(Post-sample is a sub-sample of the pre-sample*) "In a hospital setting" Smokefree building(s) *A “total indoor smoking ban”* Smokefree in place *No implementation date reported* After implementation – multiple time points *Post-ban Survey 1 (1 year after policy announced, 5 months after implementation); Post-ban Survey 2 (2 years after policy announced, 17 months after implementation)*	Not reported	Implementation committee *32-member Smoke-Free Campus Task Force* Staff letters/payslip notes *Employee bulletins and newsletters* Cessation support *Hospital-promoted cessation programs, and offer to subsidise costs of locally available cessation programs.* Other strategies: *In-house media campaign*	Total sample *Staff Survey 1: n=1070* Sample characteristics: *n=589 non-smokers, n=284 ex-smokers (self-report abstinent for >5 months prior to ban announcement), n=16 ban-year quitters (self-report abstinent for ≥3 months), n=181 smokers (n=55 light smokers <10 cigs/day, n=110 moderate smokers 10-29 cigs/day, n=22 heavy smokers ≥30 cigs/day). Occupations (of those who identified themselves) included: physicians, nurses, cafeteria workers, painters, mailroom clerks, laboratory technicians, administrators, secretaries, researchers and environmental service workers.*

			Staff survey 2: n=88

3. Review Findings

Twenty-seven studies, published in English since 1990, were included in Review 6 to answer the review questions on the effectiveness of smokefree strategies and interventions in secondary care settings and any other consequences from their adoption in mental healthcare or acute and maternity healthcare settings. This section is structured by the three research questions:

- Q1: How effective are strategies and interventions for ensuring compliance with smokefree legislation and local smokefree policies in secondary care settings? (And how does the effectiveness vary for different population groups, by health status or by specialty care services?)
- Q2: Are there any unintended consequences from adopting smokefree approaches in acute and maternity care settings?
- Q3: Are there any unintended consequences from adopting smokefree approaches in mental healthcare settings?

Each of the three sections begins with a summary table outlining the outcomes measured by each study used to answer the question, followed by a figure containing descriptive summaries of the main features of the studies. Findings from the studies are then organised by outcome measure for acute and maternity services then mental health services in secondary care settings, and the evidence statements and their applicability to the UK setting are presented throughout. The full evidence tables for each study are appended (Appendix 7) and the tables summarising the type and extent of each study's smokefree policy and supporting strategies can also be referred to in the previous section (Table 2.1 for mental health setting studies and Table 2.2 for acute and maternity setting studies).

3.1 Q1: How Effective are Strategies and Interventions for Ensuring Compliance with Smokefree Legislation and Local Smokefree Policies in Secondary Care Settings?

Subsidiary question: how does the effectiveness vary for different population groups, health status or specialty care services?

Thirteen studies were identified and included in the review which addressed this question, seven conducted in acute and maternity settings and six in mental healthcare settings. The outcomes measures of effectiveness for each study are presented in Table 3.1 and the studies are summarised in full detail in the evidence tables in Appendix 7. The findings from the studies are presented (studies are annotated with the country and internal validity score in parentheses following the citation).

Table 3.1: Outcome measures of compliance with smokefree by setting, type of ban & study

Title Study design	Type of ban	Outcomes measured: compliance with smokefree
Acute And Maternity Settings		
Smokefree Grounds		
Nagle 1996 [Australia +] **Before-and-after study (with different sample after intervention)**	Smokefree building(s) Smokefree grounds *Partial - both H1 and H2 retained "smoking areas" within the grounds*	**Outcomes: compliance with smokefree** Number of smokers (anyone who was either lighting, stubbing out, or smoking a cigarette, pipe or cigar) and non-smokers observed in pre-defined outdoor sites (researcher observation). **Outcomes: effectiveness of strategy to ensure compliance** Number of smokers (anyone who was either lighting, stubbing out, or smoking a cigarette, pipe or cigar) and non-smokers observed in pre-defined outdoor sites (researcher observation).
Wheeler 2007 [USA -] **Uncontrolled before-and-after study (with different sample after intervention)**	Smokefree building(s) Smokefree vehicles Smokefree grounds Smokefree "other description": *All property owned or leased.*	Proportion of employees exposed to ETS (self-report to walking through cigarette smoke on campus).
Kvern 2006 [Canada -] **Uncontrolled before-and-after study (with different sample after intervention)**	Smokefree building(s) Smokefree doorways/entrances Smokefree grounds	Number of individuals smoking on the property (1 individual, made all observations at both time points). Number of contacts security personnel had with staff smokers smoking on facility grounds (data records). Number of contacts security personnel had with contractor smokers smoking on facility grounds (data records). Number of contacts security personnel had with visitor smokers smoking on facility grounds (data records). Number of contacts security personnel had with in-patient smokers smoking on facility grounds (data records). Measured but no pre- comparator; outcome excluded from review: *number of complaints received about policy (data records).*
Smokefree Indoors Only		
Fernández 2008 [Spain +] **Before-and-after study (air vapour-phase nicotine samples)**	Smokefree building(s)	Overall change in median airborne nicotine concentrations across the hospitals (sampled using a plastic cassette, with a windscreen on one side, containing a 37mm diameter filter treated with sodium bisulphate.) Change in median airborne nicotine concentrations by locations (7 public and staff locations: cafeterias, surgical area staff dressing rooms, general surgery unit corridors, general medicine hospitalization unit

		corridors, top floor fire escapes, emergency department waiting rooms, and main entrance halls) across the hospitals (sampled using a plastic cassette, with a windscreen on one side, containing a 37mm diameter filter treated with sodium bisulphate.)
Donchin 2004 [Israel +] **Uncontrolled before-and-after study (with different sample after intervention)**	Smokefree building(s)	Rate of observed smoking in unauthorized areas by staff (How often do you see people [employees, patients or visitors] smoking at work in places where smoking is banned?' Frequently, occasionally, never.) Proportion of staff reporting they usually leave their workstation to smoke (Do you usually leave your work station to smoke? Always, sometimes, never).
Stillman 1990 [USA +] **Cohort study** ***Prospective descriptive study***	Smokefree building(s)	Proportion of staff observed actively smoking (in hospital cafeterias, in lounges) Proportion of visitors observed actively smoking (in hospital cafeterias, in lounges) Median levels of vapour-phase nicotine concentration (a proxy for ETS) levels in 7 indoor locations around the hospital (using passive diffusion nicotine monitors) Number of cigarette remnants (in ashtrays, morning and afternoon, at Elevator lobbies, Waiting lounges, Hospital entrances at the parking garages) Number of negligent smoking fires (hospital incident reports)
Martínez 2008 [Spain +] **Interrupted time series** ***4 surveys between 2001-2006***	Smokefree "other description": *The Hospital became "entirely smoke-free" in 2005*	Proportion of employees reporting to have smoked in selected hospital areas (self-reported measure). Proportion of employees reporting to work in a smokefree environment (Asked to estimate the number of hours they are exposed to ETS during their shift: zero hours (smokefree), <1 hour, 1-4 hours, >4 hours).
Title **Study design**	**Type of ban**	**Outcomes: compliance with smokefree**
Mental Health Settings		
Smokefree Grounds and/or Buildings		
Patten 1995 [USA +] **Uncontrolled before-and-after study (with different sample after intervention)**	Smokefree building(s) Smokefree grounds Ban exclusions: *Patients with off-unit privileges, at an appropriate level, were granted brief passes to leave the building unaccompanied to smoke ("very few patients")*	Frequency of incidents of patients smoking in the hospital room (data from patient charts)

Shetty 2010 **[UK +]** **Uncontrolled before-and-after study (with same sample after intervention)**	Smokefree building(s) Smokefree grounds Smokefree "other description": *All in-patients in medium secure units were required to abstain from tobacco (unenforceable for small number with unescorted community leave)* Ban exclusions: *If the clinical team agreed there was a clinical reason not to enforce abstinence (in practice, none) or for the small number of patients who had unescorted community leave*.	Measured but no pre- comparator; outcome excluded from review: *frequency of illicit use or possession of tobacco (from chart data and hospital records)*
Smokefree Buildings		
Erwin 1991 **[USA -]** **Interrupted time series**	Smokefree "other description": *Smokefree acute psychiatric wards (presume from the paper's introduction, the rest of hospital is smokefree)*	**Outcomes: effectiveness of strategy to ensure compliance** Staff's rating of their own overall individual effectiveness (use of strategies, regardless of the number and type) to help patients comply with smokefree on the wards by addressing their urge to smoke (self-report measure). Data for 'mildly effective', 'moderately effective' ratings reported. Data for 'not effective' or 'very effective' not reported, no p values calculated **Outcomes: compliance with smokefree** Frequency of nursing staff reporting they requested patients to terminate smoking a lit cigarette (self-report measure). Frequency of nursing staff reporting they requested family to desist 'smuggling' cigarettes to patients (self-report measure).
Vorspan 2009 **[France +]** **Uncontrolled before-and-after study (with same sample after intervention)**	Smokefree building(s)	Non-smoking staff exposure to ETS measured by salivary cotinine levels (quantified by high performance liquid chromatography). Employees were defined as ''exposed'' before the ban if cotinine level >25ng/ml. Subjective measures of exposure to ETS before and after smokefree both taken after implementation; excluded from review.
Etter 2008 **[Switzerland +]**	Smokefree building(s) *Patients (except those in*	Perceived exposure to ETS among non-smokers patients in unit (bedrooms, dining rooms, corridors) –

Uncontrolled before-and-after study (with different sample after intervention) *(The staff sample consisted of largely the same people who answered successive surveys, although results not linked)*	*locked rooms) and staff were allowed to leave the unit to smoke outside*	never, sometimes, often (self-report measure). Perceived exposure to ETS among non-smokers staff in unit (bedrooms, dining rooms, corridors) – never, sometimes, often (self-report measure). Annoyance from ETS among non-smokers patients in unit (bedrooms, dining rooms, corridors) – absolutely not, somewhat, a lot (self-report measure). Annoyance from ETS among non-smokers staff in unit (bedrooms, dining rooms, corridors) (self-report measure).
Matthews 2005 [USA -] **Uncontrolled before-and-after study (with different sample after intervention)**	Smokefree "other description": *Described as "smoking ban"*	Staff anticipating/reporting an increase in patients' smoking-related contraband (self report measure) Instances of smuggling smoking-related contraband (Patient records data)
Rauter 1997 [USA +] **Cohort study**	Smokefree building(s) Other: *Designated open-air smoking areas established outside the buildings*	Frequency of possession of unauthorised cigarettes or matches incidents (hospital incident reports)

3.1.1 Effectiveness of Supporting Strategies and Interventions for Ensuring Compliance: Acute and Maternity Settings

One study was identified which specifically looked at the effectiveness of supporting strategies for ensuring compliance with a smokefree policy or national legislation in an acute and maternity setting. It showed a decrease in indicators of compliance with a local-level smokefree policy.

3.1.1.1 Effectiveness of the Introduction of 'No Smoking Outdoors' Signs

One before and after study reported outcomes relating to the effectiveness of the introduction of 'no smoking outdoors' signs for ensuring compliance with a local (hospital board's) outdoor partial smokefree policy (see Table 2.2 above). It showed a decrease in indicators of compliance with a local (hospital board's) outdoor partial smokefree policy, at a hospital that had already implemented New South Wales state legislation for indoor (hospital buildings and vehicles) smokefree.

[9]**Nagle's 1996 [Australia +] controlled before and after study (with different sample after)** described the type and location of smokers on the grounds of hospitals with local smokefree policies, and the impact of introducing smokefree signs in outdoor areas of the grounds. Assessments were conducted at the intervention hospital (H1) at a single time point before and after

[9] A discrepancy is noted in Table 3 of Nagle et al., 1996 (p.202) between the raw data and percentages given: the "n/total n" figures do not correspond to the (%) figures for Hospital 1 at Time 1 (32% and 68%, also quoted in the text on p.202 and the abstract). From our calculations, the Chi-square test results do correspond to the "n/total n" figures as printed and we believe the percentages may be incorrect (by our calculations, 18% and 82% for Hospital 1 at Time 1). As the two percentages are the only discrepant figures in the data in Table 3, we have made the assumption that the frequencies data is correct and used it in our review.

the policy was implemented, and at a control hospital (H2) at the same two time periods. Supporting strategies included an implementation committee, posters, a policy launch incorporated into the World No Tobacco Day activities, staff newsletters, bulletin boards and information by supervisors. In the intervention hospital 2 weeks before the implementation of smokefree areas in the grounds, **Nagle 1996 [Australia +]** reports that 18% of all outdoor smokers (105/593) used the outdoors sites selected to become smokefree. There was a significant increase to 28% of all outdoor smokers (83/301) observed in those sites 1 month following the implementation of smokefree outdoor areas signage ($p<0.001$). In the control hospital, there was no significant change in the proportion of all outdoor smokers who smoked in outdoor sites with smokefree signage at 2 weeks before implementation (48%, 62/130) and at 1 month following implementation (46%, 68/148) ($p=0.771$).

The study provides limited details about which outdoor sites at the control hospital (H2) were smokefree and which were smoking areas, but the authors note that in the main entrance site "*clear geographical boundaries existed and the smokefree signs were positioned at all entries to the area with the wording 'You are now entering a smoke-free environment, please extinguish your cigarette'*". Only 7% of all outdoor smokers were observed in the main entrance location in violation of the signs at 1 week pre- and 1 month post-intervention. Sites within 10m of entrances and exits of the control and intervention hospitals were more popular with outdoor smokers at both time points (82% (1 week pre-), 82% (1 month post-) and 90% (1 week pre-), 93% (1 month post-) respectively) than sites more than 10m and less than 50m from entrances in exits of the control and intervention hospitals. These two zones are not further sub-divided in the report, however, into those with smokefree sites and those with smoking areas.

Effectiveness of Supporting Strategies and Interventions for Ensuring Compliance: Acute and Maternity Settings

Evidence statement 1.1: There is **weak** evidence from one before and after study in Australia (**Nagle 1996 [+]**) in an **acute and maternity setting** that 'no smoking outdoors' signage decreases compliance with state indoor (hospital buildings and vehicles) smokefree legislation in New South Wales and a local (hospital board's) outdoor partial smokefree policy. Comparing use of the outdoor sites selected to become smokefree 2 weeks before implementation of the smokefree outdoor signage, with usage 1 month after its implementation, there was a significant increase in the proportion of outdoor smokers who smoked in those areas at the intervention hospital ($p<0.001$, Chi-square=11.71, df=1). ***Other supporting strategies*** *were: an implementation committee (formed by occupational health and safety team with reps from NSW Cancer Council, National Heart Foundation, hospital management, unions, and study's lead author), the policy launch incorporated into the World No Tobacco Day activities, staff newsletters, bulletin boards and information by supervisors*.

UK Applicability: This evidence was conducted outside the UK, however the policy covers outdoor smokefree (a local policy similar to the UK context) and there is no reason to believe the strategy's effect is not applicable to the UK setting.

3.1.1.2 How does the effectiveness vary for different population groups, by health status or by specialty care services?

There were no sub-group analyses for different population groups, by health status or by specialty care services in the only study (**Nagle 1996 [Australia +]**) which specifically looked at the

effectiveness of supporting strategies for ensuring compliance with a local outdoor partial smokefree policy in an acute and maternity setting.

3.1.2 Effectiveness of Supporting Strategies and Interventions for Ensuring Compliance: Mental Healthcare Settings

One study was identified which specifically looked at the effectiveness of supporting strategies for ensuring compliance with a smokefree policy or national legislation in a mental healthcare setting. It showed an increase in indicators of compliance with a local-level smokefree policy.

3.1.2.1 Effectiveness of Staff Aiding Patients' Compliance

One before and after study in a mental healthcare setting reported outcomes relating to the effectiveness of staff aiding inpatients' compliance with a local smokefree buildings policy by the US Department of Veteran's affairs.

Erwin 1991 [USA -] interrupted time series
This study presents the reactions of 29 nursing staff members on two inpatient psychiatric wards at a Veterans Affairs hospital who experienced the transition to smokefree status after the introduction of a local smokefree buildings policy by the US Department of Veterans Affairs. Assessments were conducted before implementation, and at 1 week and 4 weeks following implementation. Outcomes relevant to this review were only reported for two post-implementation time points. Nursing interventions included encouraging patients to participate in smoking cessation groups and addressing patients with the urge to smoke to support the strategy.

Erwin 1991 [USA -] reports that 1 week post-implementation, nursing staff ratings of their own overall individual effectiveness (use of strategies, regardless of the number and type) to help inpatients comply with smokefree on the wards by addressing their urge to smoke were 80% and 70% (Wards A and B) 'mildly' or 'moderately effective'; and 75% and 90% (Wards A and B) 'mildly' or 'moderately effective' 4 weeks post-implementation. (Data for 'not effective' or 'very effective' were not reported, no p values calculated). Nursing Interventions used by nursing staff to address a patient's urge to smoke on the psychiatric ward included: encouraging patients to participate in smoking cessation groups; encouraging activities that foster energy replenishment or energy use; promoting the physical benefits of not smoking and preventing harm; individualising care (e.g. p.r.n. medications, "time outs"); and involving significant others in care.

Effectiveness of Supporting Strategies and Interventions for Ensuring Compliance: Mental Healthcare Settings

Evidence statement 1.2: There is **weak** evidence from one interrupted time series in the USA (**Erwin 1991 [-]**) in a **mental healthcare setting** that staff aiding inpatients' compliance through strategies such as encouraging patients to participate in smoking cessation groups and addressing patients' urge to smoke increases patient compliance a local (US Department of Veterans Affairs') smokefree buildings policy. One week post-implementation, nursing staff ratings of their own overall individual effectiveness using policies listed above to help inpatients comply with smokefree on the wards by addressing their urge to smoke increased four weeks post-implementation (no p values calculated). ***Supporting strategies*** *were based around nursing interventions, including encouraging patients to participate in smoking cessation groups and addressing patients with the urge to smoke.*

UK Applicability: This evidence was conducted outside the UK and the policy covered (indoor

smokefree) is already national legislation in the UK. However there is no reason to believe the strategy's effect is not applicable to the UK setting.

3.1.2.2 How does the effectiveness vary for different population groups, by health status or by specialty care services?

There were no sub-group analyses for different population groups, by health status or by specialty care services in the only study (**Erwin 1991 [USA -]**) which specifically looked at the effectiveness of supporting strategies for ensuring compliance with a local (US Department of Veterans Affairs) smokefree buildings policy in a mental healthcare setting.

3.1.3 Supporting Strategies and Indicators of Compliance with Smokefree Policy: Acute and Maternity Settings

As the extent of evidence on the effectiveness of smokefree strategies was limited to two studies, the data presented in the following two sections reviews studies using a comparative design to measure indicators of compliance in settings which had a smokefree policy covering the whole estate or an indoors-only smokefree policy with at least one supporting strategy. This section covers studies conducted in secondary care acute and maternity settings, and is organised into the following six measured outcome sub-headings: staff compliance with smokefree: smoking behaviour; visitor compliance with smokefree: smoking behaviour; patient compliance with smokefree: smoking behaviour; all hospital users compliance with smokefree: smoking behaviour; air quality; and other indicators of smokefree compliance. The subsequent section (Section 3.1.4) covers studies conducted in mental healthcare settings.

Figure 3.1: Study descriptions for studies with supporting strategies and indicators of compliance with smokefree policy: acute and maternity settings

Donchin 2004 [Israel +] before and after study (with different sample)
This study was a process and outcome evaluation of a local (hospital board's) smokefree buildings policy implementation using two successive random-sample surveys among hospital employees, assessing attitudes towards the policy, changes in employee smoking behaviour and short term impact on smoking in unauthorised areas. Assessments were conducted 3 months before and between 6 and 9 months after the policy was introduced. Supporting strategies included an implementation committee, cessation support, smoking shelters erected outside the hospital building, bans on the sale of tobacco products on site, an information campaign 2 months before the policy was introduced, a press conference launch and fines for violations.

Martinez 2008 [Spain +] interrupted time series
This study examined the extent of smoking compliance with tobacco restrictions among hospital employees where a smokefree policy was progressively introduced to comply with national indoor smokefree legislation which came into force in 2005. Assessments were conducted annually for 6 years after policy implementation. Supporting strategies included the closure of smoking rooms and staff training.

Stillman 1990 [USA +] cohort study
This study evaluated a local (hospital board's) smokefree buildings policy in a large urban medical centre among employees at the hospital and school of medicine. Assessments were conducted before and after implementation of the policy. Supporting strategies included written policies, an

implementation committee, cessation support, an internal media and educational campaign and free health checks for employees.

Kvern 2006 [Canada -] before and after study (with different sample)
This study evaluated the processes used to implement a local (regional health authority's) smokefree grounds policy. Assessments were conducted at a single time point before and after the implementation of the policy. Supporting strategies included written policies, an implementation committee, signage, staff meetings, notices in staff payslips, cessation support, pharmacotherapies, temporary abstinence support for inpatients, moving of ashtrays and shelters to the site periphery, staff training, media campaigns, bilingual information sheets for patients and the public and information on health organisations' websites.

Wheeler 2007 [USA –] before and after study
This study measured the impact of a local (university hospital board's) smokefree indoors and outdoors policy on employees and patients at two sites on a hospital campus. Pre ban assessments were conducted between 2003 and 2004; prior to full implementation at site one, and between the implementation of an employee only ban and full ban to also include patients and visitors. Post ban assessments were conducted between August 2004 and October 2005. Supporting strategies included written policies, an implementation committee, posters, staff meetings, letters in staff payslips, patient appointments letters, cessation support, pharmacotherapies and announcements in local media.

Fernandez 2008 [Spain +] before and after study
This study measured airborne nicotine concentrations in public hospitals in Catalonia, Spain to assess changes in second hand smoke exposure after introduction of national indoor smokefree legislation. Assessments were made at a single time point before and after the implementation of smokefree policy. Supporting strategies included cessation support to professionals, patients and visitors, staff training in tobacco control and guaranteeing common follow up and evaluation.

3.1.3.1 Staff Compliance with Smokefree: Smoking Behaviour (Acute & Maternity)

Two cohort studies, one before and after study and one interrupted time series, in an acute and maternity setting reported outcomes relating to staff smoking at work (see study descriptions in Figure 3.1 and Table 2.2 above). All showed an increase in indicators of compliance with local-level smokefree policy or national smokefree legislation.

Donchin 2004's [Israel +] before and after study (with different sample) reported a significant increase in staff smokers reporting they always usually leave their workstation to smoke after implementation of a local (hospital board's) smokefree buildings policy (62.1%) compared with pre-policy (16.9%) ($p<0.0001$). Post-policy self-reported compliance (leaving workstation to smoke) of smokers with the new regulations was associated with occupation: clerical staff (85.7%), nurses (76.5%) and doctors (66.7%) were most likely to comply while technicians (40.0%) and unskilled workers (e.g. cleaners, 47.1%)) were least likely to do so ($p=0.04$). There was no significant association found for gender or years of education. In **Martinez 2008's [Spain +] interrupted time series,** a smokefree policy was introduced progressively from 1997: in 2003, smoking was only permitted in one smoking area exclusively for employees, and in July 2005 the Hospital became entirely smokefree to comply with national indoor smokefree legislation. In a series of annual cross-sectional surveys from 2001-2006, hospital staff were asked whether they smoked in selected smokefree areas. In 2001 "few smokers" (no data given) reported to have smoked inside the nursing rooms and in 2006 no employee respondents reported smoking inside the nursing rooms. In 2004

and 2006, no employees reported smoking in the smokefree cafeteria and the employees' rest areas. A **cohort study** by **Stillman 1990 [USA +]** reported that in the 8 months before the local (hospital board's) smokefree buildings policy was introduced, 2% staff (of 422 staff observed) were recorded actively smoking in two of the hospital cafeterias with a significant decrease to 0% staff (of 330 observed) recorded at 1 and 6 months after the policy was introduced ($p<0.0001$). A similar observation in four lounge areas of the hospital found a significant decrease in observed staff smoking from 39% (of 23 staff observed) to 0% (of 17 staff observed) before and after the smokefree policy was introduced ($p<0.0001$). In **Kvern 2006's [Canada -] before and after study (with different sample)**, the number of contacts security personnel had with staff smokers decreased from 22 in the first month post implementation of a local (regional health authority's) smokefree grounds policy to eight in the second month post-implementation to two in the third month post-implementation.

Staff Compliance with Smokefree: Smoking Behaviour (Acute & Maternity)

Evidence statement 1.3: There is **moderate** evidence from two cohort studies in the USA **(Stillman 1990 [+]**) and Canada (**Kvern 2006 [-])**, one before and after study (**Donchin 2004 [Israel +]**) and one interrupted time series from Spain that (**Martinez 2008 [Spain +])** the implementation of local-level policy and national legislation for smokefree implementation in an **acute and maternity setting** decreases the number of staff smoking.

UK Applicability: This evidence was conducted outside the UK and the policy or national legislation covered in most (indoor smokefree) is already national legislation in the UK however one recent study's policy covers smokefree grounds (a local policy similar to the UK context); there is no reason to believe the effect is not applicable to the UK setting.

(a) Observed Smoking Behaviour: There is evidence from two cohort studies in the USA (**Stillman 1990 [+]** and Canada (**Kvern 2006 [-]**) that the implementation of local smokefree policies in an **acute and maternity setting** decreases the number of staff observed smoking. In the USA, **Stillman 1990 [+]** reported a significant decrease in observed staff smoking in hospital cafeterias and lounge areas at 1 and 6 months after the local (hospital board's) smokefree buildings policy was introduced ($p<0.0001$). ***Supporting strategies*** *included written policies, an implementation committee, cessation support, an internal media and educational campaign and free health checks for employees*. **Kvern 2006 [-]** in Canada reported that the number of contacts security personnel had with staff smokers on hospital grounds decreased over 1, 2 and 3 months post-implementation of a local (regional health authority's) smokefree grounds policy. ***Supporting strategies*** *included written policies, an implementation committee, signage, staff meetings, notices in staff payslips, cessation support, pharmacotherapies, temporary abstinence support for inpatients, moving of ashtrays and shelters to the site periphery, staff training, media campaigns, bilingual information sheets for patients and the public and information on health organisations' websites.*

(b) Self-reported Smoking Behaviour: There is evidence from one before and after study in Israel (**Donchin 2004 [+]**) and one interrupted time series in Spain (**Martinez 2008 [+]**) that local-level policy and national legislation for smokefree implementation with supporting strategies decreases staff self-reported smoking during working hours in an **acute and maternity setting**. **Donchin 2004 [+]** in Israel reported a significant increase in staff smokers reporting they always usually leave their workstation to smoke following the implementation of a local (hospital board's) smokefree buildings policy, measured 3 months before and 6-9 month after implementation ($p<0.0001$). ***Supporting strategies*** *included an implementation committee, cessation support, smoking shelters erected outside the hospital building, bans on the sale of tobacco products on site, an information campaign 2 months before the policy was introduced, a press conference launch and fines for violations*. **Martinez 2008 [+]** reported that in 2001 "few smokers" (no data given) reported to have smoked

inside the nursing rooms and, following the implementation of national indoor smokefree legislation in Spain in 2005, no employee respondents reported smoking inside the nursing rooms in 2006. In 2004 and 2006, no employees reported smoking in the smokefree cafeteria and the employees' rest areas. ***Supporting strategies*** *included the closure of smoking rooms and tobacco control training for nurses*.

3.1.3.2 Visitor Compliance with Smokefree: Smoking Behaviour (Acute & Maternity)

One cohort study and one before and after study in an acute and maternity setting reported outcomes relating to visitors' smoking (see study descriptions in Figure 3.1 and Table 2.2 above). All showed an increase in indicators of compliance with local-level smokefree policy.

In the **cohort study** by **Stillman 1990 [USA +],** during the 8 months before the local (hospital board's) smokefree buildings policy was introduced, 13% visitors (of 424 visitors observed) were recorded actively smoking in two of the hospital cafeterias with a significant decrease to 0.3% visitors (equivalent to 1 visitor of 329 observed) recorded at 1 and 6 months after the policy was introduced ($p<0.0001$). A similar observation in four lounge areas of the hospital found a significant decrease in observed visitors smoking from 41% (of 64 visitors observed) to 0% (of 68 visitors observed) before and after the smokefree policy was introduced ($p<0.0001$). In **Kvern 2006's [Canada -] before and after study (with different sample)**, the number of contacts security personnel had with visitor smokers decreased from 173 in the first month post implementation of a local (regional health authority's) smokefree grounds policy to 86 in the second month post-implementation to 26 in the third month post-implementation.

Visitor Compliance with Smokefree: Smoking Behaviour (Acute & Maternity)

Evidence statement 1.4: There is **weak** evidence from two cohort studies, one in the USA **(Stillman 1990 [+])** and one in Canada **(Kvern 2006 [-])**, in an **acute and maternity setting** that implementation of local smokefree policies with supporting strategies decreases hospital visitor smoking.

UK Applicability: This evidence was conducted outside the UK, however one of the two studies' policy covers smokefree grounds (a policy implemented in parts of the UK) and there is no reason to believe the effect is not applicable to the UK setting.

In the USA, **Stillman 1990 [+]** reported a significant decrease in observed visitor smoking in hospital cafeterias and lounge areas at 1 and 6 months after the local (hospital board's) smokefree buildings policy was introduced ($p<0.0001$). ***Supporting strategies*** *included written policies, an implementation committee, cessation support, an internal media and educational campaign and free health checks for employees*. **Kvern 2006 [-]** in Canada reported that the number of contacts security personnel had with visitor smokers on hospital grounds decreased over 1, 2 and 3 months post-implementation of a local (regional health authority's) smokefree grounds policy. ***Supporting strategies*** *included: written policies, an implementation committee, signage, staff meetings, notices in staff payslips, cessation support, pharmacotherapies, temporary abstinence support for inpatients, moving of ashtrays and shelters to the site periphery, staff training, media campaigns, bilingual information sheets for patients and the public and information on health organisations' websites*.

3.1.3.3 Patient Compliance with Smokefree: Smoking Behaviour (Acute & Maternity)

One before and after study in acute and maternity setting reports outcomes relating to patients observed smoking in hospital grounds (see study descriptions in Figure 3.1 and Table 2.2 above). It showed an increase in indicators of compliance with local-level smokefree policy.

Kvern 2006's [Canada -] before and after study (with different sample) reported that the number of contacts security personnel had with inpatient smokers decreased from 65 in the first month post implementation of a local (regional health authority's) smokefree grounds policy to 14 in the second month post-implementation to 16 in the third month post-implementation.

Patient Compliance with Smokefree: Smoking Behaviour (Acute & Maternity)

Evidence statement 1.5: There is **weak** evidence from one before and after study in Canada (**Kvern 2006 [-]**) about the impact of local smokefree policies with supporting strategies on inpatient smoking behaviour in an **acute and maternity setting**.

UK Applicability: This evidence was conducted outside the UK, however the policy covers smokefree grounds (a policy implemented in parts of the UK) and there is no reason to believe the effect is not applicable to the UK setting.

There is **weak** evidence from one cohort study in Canada (**Kvern 2006 [-]**) that the number of inpatients challenged about smoking on hospital grounds by security personnel decreased over 1, 2 and 3 months post-implementation of a local (regional health authority's) smokefree grounds policy with supporting strategies. ***Supporting strategies*** *included written policies, an implementation committee, signage, staff meetings, notices in staff payslips, cessation support, pharmacotherapies, temporary abstinence support for inpatients, moving of ashtrays and shelters to the site periphery, staff training, media campaigns, bilingual information sheets for patients and the public and information on health organisations' websites*.

3.1.3.4 All Hospital Users' Compliance with Smokefree: Smoking Behaviour (Acute & Maternity)

Two before and after studies in an acute and maternity setting, report outcomes relating to observed smoking in contrary to smokefree policy (see study descriptions in Figure 3.1 and Table 2.2 above). All showed an increase in indicators of compliance with local-level smokefree policy.

In a **before and after study (with different sample)**, **Donchin 2004 [Israel +]** found a significant reduction in observed smoking (by employees, patients, or visitors) in unauthorized areas was reported by staff in the hospital building after implementation of a local (hospital board's) smokefree buildings policy: frequently observe smoking in unauthorized places (63.2% pre- vs. 41.4% post-, p value not given), occasionally observe smoking in unauthorized places (22.6% pre- vs. 16.3% post-, p value not given), never observe smoking in unauthorized places (14.2% pre- vs. 42.3% post-, $p<0.001$). Smokers and non-smokers responded similarly in the pre-policy survey. However, smokers were less likely to report observation of smoking in unauthorized places than non-smokers post-policy ($p=0.03$). No significant association was found for gender, age or occupation. **Kvern 2006's [Canada -] before and after study (with different sample)** reported that, over 6 days of observation covering five locations and four standard break-times, 1 month before implementation of a local (regional health authority's) smokefree grounds policy n=314 (tertiary care centre) and n=115 (long-term care facility) people were observed smoking on facility grounds. Post-policy, at the same times and locations 1 month later, the number of people observed smoking on facility grounds

had reduced to n=32 (tertiary care centre) and n=6 (long-term care facility). No further statistical analysis was provided.

All Hospital Users' Compliance with Smokefree: Smoking Behaviour (Acute & Maternity)

Evidence statement 1.6: There is **weak** evidence from two before and after studies in Canada (**Kvern 2006 [-])** and Israel (**Donchin 2004 [+]**) in an **acute and maternity setting** that local smokefree policy implementation with supporting strategies decreases observed smoking amongst all hospital users as a whole (patients, staff and visitors).

UK Applicability: This evidence was conducted outside the UK, however one of the two studies' policy covers smokefree grounds (a policy implemented in parts of the UK) and there is no reason to believe the effect is not applicable to the UK setting.

In Israel, **Donchin 2004 [+]** reported a significant reduction in observed smoking (p<0.001), frequently observed smoking (p value not reported) and occasionally observed smoking (p value not reported) by employees of other employees, patients, or visitors in unauthorized areas in the hospital following the implementation of a local (hospital board's) smokefree buildings policy, measured 3 months before and 6-9 month after implementation. ***Supporting strategies*** *included an implementation committee, posters/signage, staff letters/payslip notes, incorporating the policy launch with World No Tobacco Day, notices on staff bulletin boards and notification by supervisors*. In Canada, **Kvern 2006 [-]** reported that the number of people observed smoking on facility grounds had reduced between 1 month pre-implementation of a local (regional health authority's) smokefree grounds policy and 1 month post-implementation. ***Supporting strategies*** *included written policies, an implementation committee, signage, staff meetings, notices in staff payslips, cessation support, pharmacotherapies, temporary abstinence support for inpatients, moving of ashtrays and shelters to the site periphery, staff training, media campaigns, bilingual information sheets for patients and the public and information on health organisations' websites*.

3.1.3.5 Air Quality in Acute & Maternity Settings

Two before and after studies and two cohort studies report outcomes relating to air quality in an acute and maternity setting (see study descriptions in Figure 3.1 and Table 2.2 above). All showed an increase in indicators of compliance with local-level smokefree policy or national smokefree legislation.

Two studies used objective measures of air quality. A **before and after study** by **Fernandez 2008 [Spain +]**, reported that 198 standard locations across 44 hospitals were sampled for vapour-phase nicotine before and after the implementation of a smokefree policy to comply with national indoor smokefree legislation (in Sep-Dec '05 and in Sep-Dec '06 respectively). Airborne nicotine was detected in 96.5% of the locations in 2005 (191/198) and decreased to 66.2% of the locations in 2006 (131/198 sample). No p-value reported. The overall median nicotine concentration level significantly declined by 56.5%, from 0.23 mcg/m3 (IQR, 0.13–0.63) in 2005 (pre-implementation) to 0.10 mcg/m3 (Inter quartile range (IQR) 0.02–0.19) in 2006 (post-implementation) (p<0.01). There were no sub-group differences in median nicotine concentrations before and after smokefree implementation by the type of hospital (county, reference or university) or the size of hospital (number of beds and number of employees). Median nicotine concentration levels declined significantly in all seven locations measured across the 44 hospitals between 2005 and 2006.

Before smokefree implementation to comply with the legislation, median nicotine concentrations were highest in cafeterias (0.62 mcg/m^3, IQR 0.23–3.43), followed by top-floor fire escapes (0.31 mcg/m^3, IQR 0.14–0.87) dropping by 83.9% (to 0.10 mcg/m^3, IQR 0.02–0.18) and by 51.6% (to 0.15 mcg/m3, IQR, 0.02–0.22), respectively (p<0.01). Before smokefree legislation, median nicotine concentrations were lowest in staff dressing rooms (in the surgical area) (0.18 mcg/m^3, IQR 0.18–1.17) dropping by 83.3% (to 0.03 mcg/m^3, IQR 0.02–0.22, p<0.05). The greatest declines in median nicotine concentration levels after smokefree implementation occurred in general surgery hospitalization unit corridors, dropping by 97.8% (from 0.23 mcg/m^3, IQR 0.09–0.42) to concentrations under the limit of quantification (0.01 mcg/m^3, IQR 0.01–0.14, p<0.01); and in general medicine hospitalization unit corridors, dropping by 97.2% (from 0.18 mcg/m^3, IQR 0.10–0.33) to concentrations also under the limit of quantification (0.01 mcg/m^3, IQR 0.01–0.10, p<0.01).

Following the implementation of smokefree to comply with national legislation, airborne nicotine concentrations declined to a lesser extent in the emergency department waiting rooms, by 30.4% (from 0.23 mcg/m^3 (IQR 0.15–0.52) to 0.16 mcg/m^3 (IQR 0.7–0.24), p<0.01), and at the main hall entrance, by 31.6% (from 0.19 mcg/m^3 (IQR 0.13–0.63) to 0.13 mcg/m^3 (IQR 0.06–0.22), p<0.01). For the 33 hospitals where airborne nicotine concentrations levels were measured in the cafeterias, before the smokefree legislation was implemented, smoking was still totally permitted in the cafeteria in 3 hospitals, partially permitted in the cafeteria in six hospitals and already totally prohibited in the cafeteria in 24 hospitals. The median nicotine concentrations were highest in cafeterias where smoking was partially permitted (3.67 mcg/m^3 (IQR, 3.04–6.25)) and totally permitted before the ban (3.61 mcg/m^3 (IQR, 0.82–11.48)) dropping by 93.2% (to 0.25 mcg/m^3 (IQR, 0.03–0.42), p<0.01) and by 97.0% (to 0.11 mcg/m^3 (IQR, 0.05–0.19), p=0.109) after the ban, respectively. The median nicotine concentration level was already low in hospital cafeterias where smoking was already prohibited in 2005 (0.48 mcg/m^3 (IQR 0.18–0.68)) and declined by 81.3% after implementation (to 0.09 mcg/m^3 (IQR, 0.02–0.17), p<0.01).

In a **cohort study, Stillman 1990 [USA +]** used passive diffusion nicotine monitors to measure atmospheric nicotine vapour as a proxy for environmental tobacco smoke (ETS) levels in seven indoor locations around the hospital at 1 and 8 months pre-implementation of a local (hospital board's) smokefree buildings policy and 8 months post-implementation. In six locations there was a significant decrease in median levels of nicotine concentrations after smokefree was implemented: in visitor/patient waiting areas (from 3.88 to 0.28 mcg/m^3) and in cafeterias (from 7.06 to 0.22 mcg/m^3) (both p<0.001); in staff lounges (from 2.43 to 0.12 mcg/m^3) and in offices (from 2.05 to 0.12 mcg/m^3) (both p<0.01); in corridors and elevators (from 2.28 to 0.20 mcg/m^3) and in patient areas (from 0.84 to 0.12 mcg/m^3) (both p<0.05). The decrease in median concentration of vapour-phase nicotine in restrooms of to 17.71 to 10.00 mcg/m^3 was not significant, and the levels of ETS were high before and after implementation of smokefree.

Wheeler 2007 [USA -] in a **before and after study** reported that significantly fewer employees at site one reported that they had to walk through cigarette smoke on campus after implementation of a local (university hospital board's) smokefree indoors and outdoors policy than before implementation (18.0% vs. 43.1%, p<0.0001). In the **interrupted time series** by **Martinez 2008 [Spain +]**, it is reported that smokefree policy was introduced progressively from 1997: in 2003, smoking was only permitted in one smoking area exclusively for employees, and in July 2005 the Hospital became entirely smokefree to comply with national indoor smokefree legislation in Spain. In a series of annual cross-sectional surveys from 2001-2006, hospital staff were asked to estimate the number of hours they are exposed to environmental tobacco smoke during their shift. The proportion of employees who reported working in a smokefree environment (i.e. reported exposure to ETS for 0 hours during their shifts) increased significantly from 33.0% (95% CI: 26.2-39.7) in 2001

(pre-implementation) to 91.4% (95% CI: 87.3-94.6) in 2006 (1 year post-implementation). One year after smokefree implementation, some hospital employees still reported being exposed to ETS during their shifts: 5.3% (95% CI: 2.4-8.1) were exposed for <1 hour in 2006 (a significant decrease from 46.3% in 2001 (95% CI: 39.1-53.4)); and 1% (95% CI: 0-2.2) were exposed for 1 to 4 hours in 2006 (a significant decrease from 18.1% in 2001 (95% CI: 12.6-23.6)).

Air Quality in Acute & Maternity Settings

Evidence statement 1.7: There is evidence from two before and after studies, one in the USA **(Wheeler 2007 [-]** and one in Spain **(Fernandez 2008 [+]**), one interrupted time series in Spain **(Martinez 2008 [+])** and one cohort study in the USA **(Stillman 1990 [USA +])** about the impact of local-level policy and national legislation for smokefree on air quality in an **acute and maternity setting**.

UK Applicability: This evidence was conducted outside the UK and the policy or national legislation covered in most (indoor smokefree) is already national legislation in the UK, however one study's policy covers smokefree grounds and buildings (a policy implemented in parts of the UK); there is no reason to believe the effect is not applicable to the UK setting.

(a) There is **moderate** evidence from one before and after study in Spain (**Fernandez 2008 [+]**) and one cohort study in the USA (**Stillman 1990 [+]**) using objective measures that local-level policy and national legislation for smokefree implementation with supporting strategies decreases atmospheric nicotine vapour measurements. **Fernandez 2008 [+]** in Spain reported that median nicotine concentration levels declined significantly in all seven locations measured across the 44 hospitals over the 4 months pre-implementation to the same period 1 year post-implementation of national indoor smokefree legislation in Spain. The overall median nicotine concentration level significantly declined from pre- to post-implementation ($p<0.01$). There were no sub-group differences in median nicotine concentrations before and after indoor smokefree legislation implementation by the type or size of hospital and number of employees. ***Supporting strategies*** *included cessation support to professionals, patients and visitors, staff training in tobacco control and guaranteeing common follow up and evaluation*. In the USA, **Stillman 1990 [USA +]** reported a significant decrease in median levels of nicotine concentrations 8 months after the local (hospital board's) smokefree buildings policy was implemented, compared with 8 months before implementation: in visitor/patient waiting areas and in cafeterias (both $p<0.001$); in staff lounges and in offices (both $p<0.01$); in corridors and elevators and in patient areas (both $p<0.05$). ***Supporting strategies*** *included written policies, an implementation committee, cessation support, an internal media and educational campaign and free health checks for employees*.

(b) There is **weak** evidence from one before and after study in the USA (**Wheeler 2007 [-]**) and one interrupted time series in Spain (**Martinez 2008 [+]**) that local-level policy and national legislation for smokefree implementation with supporting strategies decreases perceived or actual exposure to environmental tobacco smoke (subjective measures). In the USA, **Wheeler 2007 [USA -]** reported significantly fewer employees claiming that they had to walk through cigarette smoke on campus 10 months after the implementation of a local (university hospital board's) smokefree indoors and outdoors policy, than 3 months before the policy ($p<0.0001$). ***Supporting strategies*** *included written policies, an implementation committee, posters, staff meetings, letters in staff payslips, patient appointments letters, cessation support, pharmacotherapies and announcements in local media*. In Spain, **Martinez 2008 [+]** reported the proportion of employees who claimed to work in a smokefree environment increased significantly from 2 years pre- to 1 year post-implementation of national indoor smokefree legislation in Spain, 95% CI: 26.2-39.7 in 2001 to 95% CI: 87.3-94.6 in 2006. The

proportion who reported they were exposed for <1 hour and for 1-4 hours decreased significantly from pre to post ban. ***Supporting strategies*** *included the closure of smoking rooms and staff training*.

3.1.3.6 Other Indicators of Smokefree Compliance (Acute & Maternity)

One cohort study used other indicators of compliance with local-level smokefree buildings policy. It measured the quantity of cigarette butts in ashtrays, and examined records for fire incidents due to negligent smoking.

Cigarette Butts from Ashtrays

One cohort study in an acute and maternity setting reported outcomes relating to the presence of cigarette butts from ashtrays (see study descriptions in Figure 3.1 and Table 2.2 above). The study found mixed results but an increase in indicators of compliance with local-level smokefree policy in most of the locations measured.

In a **cohort study, Stillman 1990 [USA +]**, morning and afternoon counts of cigarette butts from ashtrays at the hospital's elevator lobbies, waiting lounges and hospital entrances at the parking garages were conducted monthly in the 6 months before implementation of a local (hospital board's) smokefree buildings policy and at one, 3 and 6 months following implementation. (Ashtrays remained in place after implementation as they were wall-mounted). A significant reduction of 80.7% in counts was recorded in the elevator lobby areas after smokefree implementation (from n=958 to n=184, $p<0.01$) and a significant decrease of 96.8% was recorded in the waiting lounges after implementation (from n=342 to n=11, $p<0.01$). There was a non-significant increase of 7.7% in the number of butts recorded in ashtrays at the hospital entrances at the parking garages (from n=90 to n=97); the change was only significant ($p<0.05$) for the morning count in this location which increased by 88.2% (from n=17 to n=32).

Fire Incidents Due to Negligent Smoking

One cohort study in an acute and maternity setting reports outcomes relating to fires caused by negligent smoking (see study descriptions in Figure 3.1 and Table 2.2 above), which showed an increase in compliance with local-level smokefree buildings policy.

Stillman's 1990 [USA +] cohort study reports that in the 4 years preceding the implementation of a local (hospital board's) smokefree buildings policy, there was an average of 20 fire incidents per year in the hospital (range, 12-29 incidents). There were no fire incidents due to negligent smoking within the first year of the smokefree policy.

Other Indicators of Smokefree Compliance (Acute & Maternity)

Evidence statement 1.8: There is **inconsistent** evidence from one cohort study in the USA (**Stillman 1990 [+]**) in an **acute and maternity setting** that implementation of the local smokefree buildings policy with supporting strategies decreases the presence of cigarette butts in ashtrays. In the USA, **Stillman 1990 [+]** found a significant reduction in counts in indoor locations: the elevator lobby areas ($p<0.01$) and waiting lounges ($p<0.01$) in the 6 months after smokefree implementation of the local (hospital board's) smokefree buildings policy compared with the 6 months before. There was a non-significant increase in the number of butts recorded in ashtrays at the hospital entrances at the parking garages and the change was only significant ($p<0.05$) for the morning count in this location.

Supporting strategies *included written policies, an implementation committee, cessation support, an internal media and educational campaign and free health checks for employees*.

UK Applicability: This evidence was conducted outside the UK and the policy covered (indoor smokefree) is already national legislation in the UK. However there is no reason to believe the effect is not applicable to the UK setting.

Evidence statement 1.9: There is **weak** evidence from one cohort study in the USA **(Stillman 1990 [+])** in an **acute and maternity setting** that implementation of the local (hospital board's) smokefree buildings policy with supporting strategies decreases fire incidents due to negligent smoking between the total 4 years before implementation to the total 1 year after implementation. ***Supporting strategies*** *included written policies, an implementation committee, cessation support, an internal media and educational campaign and free health checks for employees.*

UK Applicability: This evidence was conducted outside the UK and the policy covered (indoor smokefree) is already national legislation in the UK. However there is no reason to believe the effect is not applicable to the UK setting.

3.1.4 Supporting strategies and indicators of compliance with smokefree policy: Mental Healthcare Settings

This section covers studies conducted in mental health settings, and is organised into the following three measured outcome sub-headings: patient compliance with smokefree: requests to terminate smoking; patient compliance with smokefree: smoking-related contraband; and air quality in mental healthcare settings.

Figure 3.2: Study descriptions for studies with supporting strategies and indicators of compliance with smokefree policy: mental healthcare settings

Erwin 1991 [USA -] interrupted time series
This study presents the reactions of 29 nursing staff members on two inpatient psychiatric wards at a Veterans Affairs hospital who experienced the transition to smoke-free status with the introduction of a local (US Department of Veterans Affairs) smokefree buildings policy. Assessments were conducted before implementation, and at 1 week and 4 weeks following implementation. Outcomes relevant to this review were only reported for two post-implementation time points. Nursing interventions included encouraging patients to participate in smoking cessation groups and addressing patients with the urge to smoke to support the strategy.

Patten 1995 [USA +] uncontrolled before and after study (with different sample)
This study evaluates the effect of a local (hospital board's) smokefree buildings and smokefree grounds policy on the behaviour of inpatients. Hospital chart data were examined for the 3 months prior to implementation and the 3 months post implementation. The strategy was supported by an implementation committee, weekly patient cessation support groups, pharmacotherapies, written information for patients and staff education sessions on the treatment of nicotine dependence.

Matthews 2005 [USA -] uncontrolled before and after study (with different sample)
This study aimed to evaluate the implementation of a local (hospital's) smokefree buildings policy on an acute crisis stabilization (psychiatric) unit for men. Assessments were conducted with 14 staff 3 months prior to implementation and 13 staff 3 months post-implementation. The strategy was supported by patient education about nicotine addiction and withdrawal and pharmacotherapies.

Rauter 1997 [USA +] cohort study
This study described the effects of a local (hospital's) smokefree buildings policy (introduced on January 1st 1991) in a major 145-bed psychiatric hospital, focussing on assault rates and other indicators. Assessments were made twice pre implementation at 15 months (Oct '89-Mar '90) and 3 months (Oct '90-Dec '90), immediately after implementation (Jan '91-Mar '91) and 1 year post implementation (Jan '92-Jun '92). Patients wishing to participate in smoking reduction workshops were urged to do so, but no other supporting strategies for the policy were reported.

Etter 2008 [Switzerland +] uncontrolled before and after study (with different sample)
This study compares the acceptability and efficacy of a partial and total smoking ban (via the local (hospital administration's) smokefree buildings policy) amongst 240 patients and staff in an inpatient psychiatric hospital. Assessments were conducted prior to implementation, 2 months post partial implementation, 20 months post partial implementation/pre total implementation and 3 to 5 months post total implementation of the smokefree buildings policy. The strategy was supported by posters and/or signage, cessation support, pharmacotherapies, closure of smoking rooms and staff training.

Vorspan 2009 (before and after study in different sample and cross sectional study, France, +)
This study evaluated smoking exposure in employees of a psychiatric facility in France, after the implementation of national indoor smokefree legislation in France. Assessments were conducted 1 month before and 1 month after the introduction of the policy. Supporting strategies included pharmacotherapies for patients and staff, closure of smoking rooms and evaluation of patients for smoking breaks.

3.1.4.1 Patient Compliance with Smokefree: Requests to Terminate Smoking (Mental Healthcare)

One interrupted time series and one before and after study in a mental healthcare setting reported outcomes relating to patients' compliance by requests from staff to terminate their smoking (see study descriptions in Figure 3.2 and Table 2.1 above). All showed a decrease in indicators of compliance with local-level smokefree policy.

In **Erwin's 1991 [USA -] interrupted time series**, there was an increase in the proportion of nursing staff reporting that they requested patients to terminate smoking a lit cigarette, from 30% and 20% (Wards A and B) 1 week post-implementation to 63% and 40% respectively 4 weeks post-implementation of a local (US Department of Veterans Affairs) smokefree buildings policy (no p values calculated). In **Patten's 1995 [USA +] uncontrolled before and after study** examining hospital chart data, there was a significant increase in the frequency of smoking in the hospital room from zero to 18 instances between 3 months pre- and 3 months post-implementation of a local (hospital board's) smokefree buildings and smokefree grounds policy ($p<0.05$).

Inpatient Compliance with Smokefree: Requests to Terminate Smoking (Mental Healthcare)

Evidence statement 1.10: There is **weak** evidence from one interrupted time series in the USA **(Erwin 1991 [-])** and one before and after study in the USA (**Patten 1995 [+]**) that implementation of local smokefree policies, one indoors only **(Erwin 1991 [-])** and one indoors and outdoors (**Patten 1995 [+]**, both in the USA), with supporting strategies may increase inpatient smoking violations in a **mental healthcare setting.**

UK Applicability: This evidence was conducted outside the UK and the policy covered in one (indoor smokefree) is already national legislation in the UK however the other study's policy covers smokefree grounds and buildings (a policy implemented in parts of the UK); there is no reason to believe the effect is not applicable to the UK setting.

One interrupted time series (**Erwin 1991 [USA -]**) reported an increase in nursing staff requesting inpatients cease smoking a lit cigarette, between 1 week post-implementation and 4 weeks post-implementation of a local (US Department of Veterans Affairs) smokefree buildings policy (no p values calculated). ***Supporting strategies*** *were based around nursing interventions, including encouraging patients to participate in smoking cessation groups and addressing patients with the urge to smoke*. One before and after study (**Patten 1995 [USA +]**) found that the frequency of smoking in the hospital room according to chart reports increased significantly between 3 months pre- and 3 months post-implementation of a local (hospital board's) smokefree buildings and smokefree grounds policy ($p<0.05$). ***Supporting strategies*** *included an implementation committee, weekly patient cessation support groups, pharmacotherapies, written information for patients and staff education sessions on the treatment of nicotine dependence*.

3.1.4.2 Patient Compliance with Smokefree: Smoking-Related Contraband (Mental Healthcare)

One before and after study, one cohort study and one interrupted time series, all in a mental healthcare settings reported outcomes relating to patient's smoking-related contraband (see study descriptions in Figure 3.2 and Table 2.1 above). All showed a decrease in indicators of compliance with local-level smokefree policy.

In an **uncontrolled before and after study (with different sample) (Matthews 2005 [USA -])**, two of the 14 nursing staff respondents anticipated an increase in male inpatients' smoking-related contraband 3 months before the local (hospital's) smokefree buildings policy was implemented. There was a significant increase to seven of 13 respondents reporting a perceived increase in contraband post-implementation ($p=0.05$). No significant differences were found between the 3 months before and after the ban was implemented related to the total number of instances of contraband.

Rauter's 1997 [USA +] cohort study, using data from hospital incident reports found 25 reports of possession of unauthorised cigarettes or matches in the 3 months prior to the implementation of a local (hospital's) smokefree buildings policy, 20 of these reports in the final month. There was an increase to 36 reports of contraband possession in the first 3 months of the smokefree policy. For the same period 1 year later, 12 incidents of contraband possession were recorded. (No further statistical analysis was provided.)

In **Erwin's 1991 [USA -] interrupted time series**, there was a decline in the proportion of nursing staff reporting that they had discouraged family or significant others from "smuggling" cigarettes to inpatients, from 40% and 75% (Wards A and B) 1 week post-implementation to 20% and 60% respectively 4 weeks post-implementation of a local (US Department of Veterans Affairs) smokefree buildings policy (no p values calculated).

Inpatient Compliance with Smokefree: Smoking-Related Contraband (Mental Healthcare)

Evidence statement 1.11: There is **weak** evidence from one before and after study in the USA (**Matthews 2005 [-]**), one interrupted time series in the USA **(Erwin 1991 [-])** and one cohort study in the USA **(Rauter 1997 [+])** in **mental health settings** that local policies for smokefree implementation indoors with supporting strategies increases occurrences of inpatient's smoking related contraband, although this is not maintained.

UK Applicability: This evidence was conducted outside the UK and the policy covered (indoor smokefree) is already national legislation in the UK. However there is no reason to believe the effect is not applicable to the UK setting.

Matthews 2005 [-] in the USA reported that 3 months after the implementation of a local (hospital's) smokefree buildings policy, there was a rise in nursing staff respondents reporting a *perceived* increase in male inpatients' smoking-related contraband post-implementation compared with respondents *anticipating* an increase in male inpatients' smoking-related contraband 3 months pre-implementation (p=0.05). No significant differences were found between the total number of recorded instances of contraband related to the 3 months before and 3 months after the smokefree policy was implemented. ***Supporting strategies*** *included patient education about nicotine addiction and withdrawal and pharmacotherapies*. **Erwin 1991 [-]** in the USA reported a decline in nursing staff reporting that they had discouraged family or significant others from "smuggling" cigarettes to inpatients, between 1 week post-implementation and 4 weeks post-implementation of a local (US Department of Veterans Affairs) smokefree buildings policy (no p values were calculated). ***Supporting strategies*** *were based around nursing interventions, including encouraging patients to participate in smoking cessation groups and addressing patients with the urge to smoke*. **Rauter 1997 [-]** in the USA reported instances of possession of unauthorised cigarettes and matches were raised in the 3 months before a local (hospital's) smokefree buildings policy was initiated in the psychiatric hospital's buildings, and in the first 3 months of smokefree. For the same period 1 year later, recorded incidents of contraband possession had dropped by two-thirds (no statistical analysis reported). *Patients wishing to participate in smoking reduction workshops were urged to do so, but no other supporting strategies for the policy were reported*.

3.1.4.3 Air Quality in Mental Healthcare Settings

Two before and after studies in a mental healthcare setting reported outcomes relating to perceived or actual exposure environmental tobacco smoke (ETS); and one of these before and after studies also reported outcomes relating to annoyance from (ETS) (see study descriptions in Figure 3.2 and Table 2.1 above). All showed an increase in indicators of compliance with local-level smokefree policy or national smokefree legislation.

In **Etter's 2008 [Switzerland +] uncontrolled before and after study** (with different samples), between 2003 (2 years pre-) and 2006 (1 year post-implementation of a local (hospital administration's) smokefree buildings policy), there was a significant increase in the percentage of non-smoker inpatients reporting that they were 'absolutely not' annoyed by ETS in their unit in bedrooms (61.5% to 76.9%, p=0.108), in dining rooms (38.5% to 80.8%, p=0.007) and in corridors (38.5% to 69.2%, p=0.162). For the same time period, there was a significant increase in the percentage of non-smokers staff reporting that they were 'absolutely not' annoyed by ETS in their unit in dining rooms (31.0% to 81.00%, p<0.001) and a significant increase in bedrooms (23.8% to 45.2%, p=0.095), and in corridors (23.8% to 52.4%, p=0.023). After the 2006 total ban, 15.8% of non-smokers (staff and inpatients) reported that they were 'a lot' or 'somewhat' annoyed by ETS in their

unit in bedrooms, 13.6% in corridors and 1.8% in dining rooms (no p values given). Non-smoker staff reported more annoyance from ETS than inpatients across all surveys.

The same study (**Etter 2008 [Switzerland +]**) examined perceived or actual exposure to environmental tobacco smoke. Between 2003 (2 years pre-) and 2006 (1 year post-implementation of a local (hospital administration's) smokefree buildings policy), there was a non-significant increase in the percentage of non-smoker inpatients reporting that they were 'never' exposed to ETS in their unit in bedrooms (69.2% to 88.5%, p=0.058), in dining rooms (30.8% to 73.1%, p=0.09) and in corridors (23.1% to 65.4%, p=0.029). Over the same time period, there was a significant increase in the proportion of non-smoker staff reporting that they were 'never' exposed to ETS in their unit in bedrooms (16.7% to 31.0%, p=0.041), in dining rooms (26.2% to 71.4%, p=0.004) and in corridors (9.5% to 38.1%, p=0.006). After the 2006 total ban, 31% of non-smokers (staff and inpatients) reported that they were 'often' or 'sometimes' exposed to ETS in their unit in bedrooms, 12.0% were 'often' exposed to ETS in corridors (no p values given) and none reported that they were 'often' exposed to ETS in dining rooms and offices. Non-smoker staff reported more exposure to ETS than inpatients across all surveys.

In a before and after study, with the same sample after (**Vorspan 2009 [France +]**), reported that 1 month before the implementation of national indoor smokefree legislation in France, 83% (n=34) of non-smoking staff in the psychiatry department had a median of 0ng/ml cotinine level, thus defined as "non-exposed" to ETS at work (cotinine ≤25ng/ml); 17% (n=7) of the staff had cotinine levels >25ng/ml and were defined as "exposed" to ETS at work pre-legislation. (Exposed sub-sample characteristics: none lived with a smoker; occupation: nurse-assistant (n = 4), nurse (n = 2), pharmacist (n = 1); mean age 47 years; n=5 women; all worked on the ground floor (44% ground floor staff)). One month after the implementation of a national indoor smoking legislation, 83% (n=34) of non-smoking staff in the psychiatry department remained "non-exposed" to ETS at work (median of 0ng/ml cotinine level). In the sub-sample of "exposed" non-smokers (n=7), 1 month after the implementation of an indoor smoking legislation there was a significant 8ng/ml decrease in mean cotinine level from 40 (SD=17) ng/ml pre-legislation to 32 (SD=8) ng/ml post-legislation (p=0.045) but this sub-sample remained "exposed" (>25ng/ml) cotinine.

Air Quality in Mental Healthcare Settings

Evidence statement 1.12: There is **moderate** evidence from two before and after studies, one in Switzerland **(Etter 2008 [+]** and one in France **(Vorspan 2009 [+])**, about the impact of local-level policy and national legislation for smokefree implementation on air quality in a **mental healthcare setting**. Both studies found that indoor smokefree implementation with supporting strategies decreases perceived or actual exposure to environmental tobacco smoke, whereas the Swiss study (**Etter 2008 [+])** also reported that non-smoking inpatient and staff reports of annoyance from environmental tobacco smoke also decreased after the implementation of the local indoor smokefree policy.

UK Applicability: This evidence was conducted outside the UK and the policy or national legislation covered (indoor smokefree) is already national legislation in the UK however there is no reason to believe the effect is not applicable to the UK setting.

(a) Impact on Hospital Staff: From 2 years pre- to 1 year post-implementation of a local (hospital administration's) smokefree buildings policy, **Etter 2008 [+]** in Switzerland found there was a significant increase in the percentage of non-smokers staff reporting that they were 'absolutely not' annoyed by ETS in their unit in dining rooms (p<0.001) and corridors (p=0.023). Between 2003 (no

indoor smokefree policy) and 2006 (total indoors smokefree), there was a significant increase in the proportion of non-smoker staff reporting that they were 'never' exposed to ETS in their unit in bedrooms (p=0.041), dining rooms (p=0.004) and corridors (p=0.006). Non-smoker staff reported more exposure to ETS than patients across all surveys. ***Supporting strategies*** *included signage, cessation support, pharmacotherapies, closure of smoking rooms and staff training*. **Vorspan 2009 [+]** in France reported that in a sub-sample of staff classified as "exposed" [to ETS] non-smokers pre-ban, 1 month after the implementation of national indoor smokefree legislation in France there was a significant decrease in mean cotinine level (p=0.045). ***Supporting strategies*** *included pharmacotherapies for patients and staff, closure of smoking rooms and evaluation of patients for smoking breaks*.

(b) Impact on Inpatients: From 2 years pre- to 1 year post-implementation of a local (hospital administration's) smokefree buildings policy, **Etter 2008 [+]** in Switzerland found there was a significant increase in the percentage of non-smoker inpatients reporting that they were 'absolutely not' annoyed by ETS in their unit in dining rooms (p=0.007). Between 2003 (no indoor smokefree policy) and 2006 (total indoors smokefree), there was a non-significant increase in the percentage of non-smoker inpatients reporting that they were 'never' exposed to ETS in their unit in corridors (p=0.029). ***Supporting strategies*** *included signage, cessation support, pharmacotherapies, closure of smoking rooms and staff training*.

3.2 Q2: Are There Any Unintended Consequences from Adopting Smokefree Approaches in Acute And Maternity Care Settings?

Nine studies were identified and included in the review which addressed this question. The outcomes measures of effects of smokefree implementation for each study are presented in Table 3.2 and the studies are summarised in full detail in the evidence tables in Appendix 7.

This section covers studies conducted in secondary care acute and maternity settings, and is organised into the following two measured outcome sub-headings: other consequences from smokefree for patients; and other consequences from smokefree for staff. The findings from the studies are presented (studies are annotated with the country and internal validity score in parentheses following the citation).

Table 3.2: Outcome measures of other consequences from smokefree by type of ban & study

Title Study design	Type of ban	Outcomes measured: other consequences from smokefree implementation
Smokefree Grounds		
Hudzinski 1990 [USA +] **Uncontrolled before-and-after study (with same sample after intervention)**	Smokefree building(s) Smokefree "other description": *A "comprehensive campus-wide smokefree environment"* Ban exclusions: *Patient smoking permitted on the acute psychiatry inpatient unit by physician approval*.	Number of staff by smoking behaviours (smoking status, cigs per day, smoking during/after work hours) (all self-reported using Likert-scales) Number of staff by cessation intention and behaviour (all self-reported using Likert-scales)
Gadomski 2010 [USA +] **Uncontrolled before-and-after study (with different sample after intervention)** ***Patient sample*** **Uncontrolled before-and-after study (with same sample after intervention)** ***Staff sample***	Smokefree building(s) Smokefree doorways/entrances Smokefree grounds *No description of how comprehensive grounds ban is.*	Number of patients signing out against medical advice (hospital records) Mean inpatient volume per month (hospital records) Rates of inpatients smoking (self-report to admitting nurse) Number of NRT prescriptions for inpatients (hospital records) Rates of staff smoking (self-reported)
Wheeler 2007 [USA -] **Uncontrolled before-and-after study (with different sample after intervention)**	Smokefree building(s) Smokefree vehicles Smokefree grounds Smokefree "other description":	Hospital utilisations (Monthly occupancy rates calculated using licensed bed and staffed bed counts, Mean patient bed days and Mean daily censuses) (hospital records). Number of employees reporting they are 'currently a cigarette smoker' (self-report).

	All property owned or leased.	Cessation support utilisation Mean employee resignations/terminations (hospital records). Mean employee new hires (hospital records).
Kvern 2006 [Canada -] **Uncontrolled before-and-after study (with different sample after intervention)**	Smokefree building(s) Smokefree doorways/entrances Smokefree grounds	Volume of nicotine patches and gum dispensed to in-patients (hospital records). Measured but no pre-comparator; excluded from review: *volume of requests from staff for smoking cessation medication costs reimbursements (data records).*
Ripley-Moffitt 2010 [USA +] **Interrupted time series**	Smokefree buildings Smokefree grounds *"100% tobacco-free hospital campus"*	Proportion of employee smokers by current quitting status (self-reported measure)
Smokefree Indoors Only		
Daughton 1992 [USA -] **Uncontrolled before-and-after study (with same sample after intervention)** ***(Post-sample is a sub-sample of the pre-sample*)**	Smokefree building(s) *A "total indoor smoking ban"*	Number of staff trying to quit smoking (self-reported). Mean number of cigarettes during work hours; during work days; during non-work days (self-reported measures). Measured but no pre-/post- comparator; excluded from review: *percentage of staff reporting decreased work productivity (self-reported): percentage of staff reporting changed eating locations to smoke (self-reported).*
Donchin 2004 [Israel +] **Uncontrolled before-and-after study (with different sample after intervention)**	Smokefree building(s)	Mean cigs/day smoked by staff (self-reported measure) Mean cigs/working hours smoked by staff (self-reported measure) Proportion of staff smokers by readiness to quit (based on self-reported answers to series of questions related to Prochaska's stages of change model)
Stillman 1990 [USA +] **Cohort study** ***Prospective descriptive study***	Smokefree building(s)	Rate of current smoking by employees (self-reported measure) Measured but no post-comparator; excluded from review: *employee quit rates (self-reported measure)*
Martínez 2008 [Spain +] **Interrupted time series** ***4 surveys between 2001-2006***	Smokefree "other description": *The Hospital became "entirely smoke-free" in 2005*	Rate of current smoking by employees (self-reported measure). Number of cigs/day smoked by employee smokers (self-reported measure). Proportion of employee smokers reporting at least one previous attempt to quit smoking (self-reported measure). Proportion of employee smokers expressing their readiness to plan to quit (self-reported measure).

Figure 3.2: Study descriptions for studies with supporting strategies and indicators of other consequences from adoption of smokefree: acute and maternity settings

Gadomski 2010 [USA +] uncontrolled before and after study (with same sample – staff; with different sample – patients)
This study investigates the effect of a local (hospital's) smokefree buildings and smokefree grounds policy on inpatient smoking rates, number of patients signing out against medical advice, and the extended effects of the ban on employee smoking rates. Assessments were conducted before and after implementation at a single time point with staff and multiple time points with patients. Supporting strategies included pharmacotherapies, cessation support, a campus map detailing smokefree borders, and staff, community and patient education.

Wheeler 2007 [USA -] uncontrolled before and after study
This study measured the impact of a local (university hospital board's) smokefree indoors and outdoors policy on employees and patients at 2 sites on a hospital campus. Pre ban assessments were conducted between 2003 and 2004; prior to full implementation at site one (a university hospital), and between the implementation of an employee only ban and full ban to also include patients and visitors at site 2 (a private children's hospital). Post ban assessments were conducted between August 2004 and October 2005. Supporting strategies included written policies, an implementation committee, posters, staff meetings, letters in staff payslips, patient appointments letters, cessation support, pharmacotherapies and announcements in local media.

Kvern 2006 [Canada -] uncontrolled before and after study (with different sample)
This study evaluated the processes used to implement a local (regional health authority's) smokefree grounds policy. Assessments were conducted at a single time point before and after the implementation of the policy. Supporting strategies included written policies, an implementation committee, signage, staff meetings, notices in staff payslips, cessation support, pharmacotherapies, temporary abstinence support for inpatients, moving of ashtrays and shelters to the site periphery, staff training, media campaigns, bilingual information sheets for patients and the public and information on health organisations' websites.

Hudzinski 1990 [USA +] uncontrolled before and after study (with same sample)
This study investigated the effects of tobacco smoke on employees and patients at a healthcare institution, the acceptance of a smokefree policy and the consequences of the policy for employees who were smokers. Assessments were conducted 6 months before, and at 6 and 12 months after the implementation of a local (medical foundation's) smokefree (campus) buildings and grounds policy. Supporting strategies included an implementation committee.

Donchin 2004 [Israel +] uncontrolled before and after study (with different sample)
This study was a process and outcome evaluation of implementation of a local (hospital board's) smokefree buildings policy using 2 successive random-sample surveys among hospital employees, assessing attitudes towards the policy, changes in employee smoking behaviour and short term impact on smoking in unauthorised areas. Assessments were conducted 3 months before and between 6 and 9 months after the policy was introduced. Supporting strategies included an implementation committee, cessation support, smoking shelters erected outside the hospital building, bans on the sale of tobacco products on site, an information campaign 2 months before the policy was introduced, a press conference launch and fines for violations.

Stillman 1990 [USA +] cohort study
This study evaluated a local (hospital board's) smokefree buildings policy in a large urban medical centre among employees at the hospital and school of medicine. Assessments were conducted

before and after implementation of the policy. Supporting strategies included written policies, an implementation committee, cessation support, an internal media and educational campaign and free health checks for employees.

Martinez 2008 [Spain +] interrupted time series
This study examined the extent of compliance with smoking restrictions among hospital employees where a smokefree policy was progressively introduced, to comply with national indoor smokefree legislation in Spain. Assessments were conducted annually for 6 years after policy implementation. Supporting strategies included the closure of smoking rooms and staff training.

Daughton 1992 [USA -] uncontrolled before and after study (with same sample)
This study examined the early and long term influence of a local (hospital's) smokefree buildings policy on smoking cessation rates, smoker behaviour and comfort in a hospital setting. Assessments were conducted at 5 and 17 months after policy implementation. Supporting strategies included an implementation committee, employee bulletins and newsletters, cessation support and an in-house media campaign.

Ripley-Moffitt 2010 [USA +] interrupted time series
This study examined the influence of a local (hospital's) smokefree (campus) buildings and grounds policy on smoking behaviour amongst employees. Assessments were conducted immediately prior to the implementation of smokefree and at 6 months and 1 year after. Supporting strategies included posters, staff meetings, an employee newsletter and cessation support.

3.2.1 Other Consequences from Smokefree for Patients (Acute & Maternity)

This section is organised into the following sub-headings: hospital utilisation and patient retention; and patient NRT prescriptions and NRT use.

3.2.1.1 Hospital Utilization and Patient Retention (Acute & Maternity)

Hospital Utilizations

Two uncontrolled before and after studies report outcomes relating to the impact of local policy implementation for smokefree buildings and grounds with supporting strategies on hospital utilizations in acute or maternity care settings (see study descriptions in Figure 3.2 and Table 2.2 above). Both showed no adverse change in effects from local-level smokefree policy implementation.

Gadomski's 2010 [USA +] uncontrolled before and after study (with different patient samples) observes that for the 18 months before implementation of a local (hospital's) smokefree buildings and smokefree grounds policy, there was an average of 959 inpatients admitted per month and for the 23 months post-ban, there was an average of 988 inpatients admitted per month. The authors state "*no adverse effects were observed on inpatient volume*" (no statistical analysis presented). Inpatients were screened for smoking status by the admitting nurse. The monthly average of admitted patients who smoke was approximately 21.6% following the ban. The authors note that "*There has been little variation in the percentage of inpatients who smoke pre-ban and post-ban except for the start-up period in 2006 and the onset of the 2007 respiratory illness season*", however precise data is not reported.

In **Wheeler's 2007 [USA -] uncontrolled before and after study** at Site 1 (a university hospital), the 12-month mean licensed bed occupancy increased slightly from 57.0% before implementation of a

local (university hospital board's) smokefree indoors and outdoors policy to 58.1% post-implementation, similarly the 12-month mean staffed bed occupancy increased slightly from 87.2% pre-implementation to 87.8% post-implementation. Over the measured 24 months, the mean monthly occupancy rate using staffed beds and licensed beds was 87.4% and 57.5%, respectively. Comparing the 12-month means before and after smokefree implementation, the mean monthly number of patient bed days at site 1 was 7,012, with a low of 6,649 occurring before policy implementation (Nov 03) and a high of 7,409 occurring after implementation (Jul 05) (no statistical analysis presented). The Mean Daily Census for the 12 months pre-implementation was 228.2 and for post-implementation was 232.6. Over the 24 months of the study period, the Mean Daily Census was 230.1, with the lowest census (218.9) and the highest census (244.4) both occurring prior to implementation (in Aug 03 and Feb 04 respectively) (no statistical analysis presented). At site 2 (a private children's hospital) in **Wheeler's 2007 [USA -]** study, comparisons of the 6-month averages before and after implementation local (university hospital board's) smokefree indoors and outdoors policy show that the licensed bed occupancy rate increased slightly after implementation (from 73.3% to 74.7%) and the staffed bed occupancy rate declined slightly after implementation (from 79.3% to 71.6%). (There was a concurrent increase in the number of staffed beds over this period due to hospital expansion activities.) The mean monthly occupancy rate using staffed beds was 74.4%, with the lowest being 69.4% in May 2005 (post-implementation) and the highest being 82.8% in June 2004 (pre-implementation). The equivalent mean monthly occupancy rate for licensed beds was 73.8%, the lowest being 70.4% in August 2004 (pre-implementation) and the highest being 76.8% in June 2005 (post-implementation). Comparisons of the 6-month averages before and after implementation of the campus-wide smoke-free policy at site 2 show that the mean patient bed days increased slightly after implementation (from 6298 to 6413). During that period, the mean monthly patient days at site two were 6,305, with a low of 5,766 in Feb 05 and a high of 6,590 in May 04, both pre-implementation. The overall Mean Daily Census was 206.7, with August 2004 having the lowest Mean Daily Census (197.1, pre-implementation) and June 2005 having the highest Mean Daily Census (215.3, post-implementation). Comparisons of the six-month averages before and after implementation of the campus-wide smoke-free policy at site two show that the Mean Daily Census increased slightly after implementation (from 205.4 to 209.2). Overall demand for hospital services increased after implementation as indicated by 2% in mean patient bed days and mean daily censuses (no statistical analysis presented).

Patients Signing Out Against Medical Advice

One uncontrolled before and after study reported outcomes relating to the impact of local policy implementation for smokefree buildings and grounds with supporting strategies on patients signing out against medical advice in acute or maternity care settings (see study descriptions in Figure 3.2 and Table 2.2 above). It showed no adverse change in effects from local-level smokefree policy implementation.

In **Gadomski 2010 [USA +]**, the proportion of inpatients signing out against medical advice giving the reason of 'having to smoke' varied little between 6 months pre- and 6 months post-implementation of a local (hospital's) smokefree buildings and smokefree grounds policy (13.8% pre ban, 13.6% post ban); dropping to 0% in 2007. Smoking amongst all inpatients signing out against medical advice increased from 48.3% 6 months pre ban, to 59% 6 months post ban and 50.8% 2007 (no statistical analysis presented).

Other Impacts on Patients: Hospital Utilization and Inpatient Retention (Acute & Maternity)

Evidence statement 2.1: There is **weak** evidence from two uncontrolled before and after studies in the USA **(Gadomski 2010 [+], Wheeler 2007 [-]**) about the impact of local policy implementation for smokefree buildings and grounds with supporting strategies on hospital inpatient admissions in an **acute and maternity setting**.

UK Applicability: This evidence was conducted outside the UK, however the policies include smokefree grounds and buildings (a policy implemented in parts of the UK), the papers were published in the last 5 years, and there is no reason to believe the effect on patients is not applicable to the UK setting.

(a) There is **weak** evidence from two uncontrolled before and after studies in the USA (**Gadomski 2010 [+], Wheeler 2007 [-]**) in an **acute and maternity setting** that local smokefree buildings and grounds policy implementation with supporting strategies does not adversely change the number or characteristics of inpatients admitted to hospital. **Gadomski 2010 [+]** in the USA observed no adverse effects on inpatient volume in the 18 months before implementation of the local (hospital's) smokefree buildings and smokefree grounds policy, and in the 23 months post-implementation and there was little variation in the proportion of inpatients who smoked before and after implementation. ***Supporting strategies*** *included pharmacotherapies, cessation support, a campus map detailing smokefree borders, and staff, community and patient education*. **Wheeler 2007 [-]** in the USA reported that the 12-month mean licensed bed occupancy and the 12-month mean staffed bed occupancy increased slightly from pre-to post-implementation of a local (university hospital board's) policy for smokefree indoors and outdoors with supporting strategies. ***Supporting strategies*** *included written policies, an implementation committee, posters, staff meetings, letters in staff payslips, patient appointments letters, cessation support, pharmacotherapies and announcements in local media*.

(b) There is **weak** evidence from one uncontrolled before and after study in the USA (**Gadomski 2010 [+]**) in an **acute and maternity setting** that implementation of a local (hospital's) smokefree buildings and smokefree grounds policy with supporting strategies does not change the number of inpatients signing out against medical advice (AMA) due to 'having to smoke' in the 6 months before and 6 months after implementation (no p values given). Smoking amongst all inpatients signing out AMA increased between 6 months pre-smokefree and 6 months post-smokefree but returned to the pre-smokefree baseline 1 year later (no statistical analysis presented). ***Supporting strategies*** *included pharmacotherapies, cessation support, a campus map detailing smokefree borders, and staff, community and patient education*.

3.2.1.2 Patient NRT Prescriptions and NRT Use (Acute & Maternity)

Two uncontrolled before and after studies report outcomes relating to the impact of local policy implementation for smokefree with supporting strategies (including pharmacotherapy provision) on patient prescriptions for NRT or patients' use of NRT in acute or maternity care settings (see study descriptions in Figure 3.2 and Table 2.2 above). Both showed an increase in effects from local-level smokefree policy or national smokefree legislation implementation.

In **Gadomski's 2010 [USA +] uncontrolled before and after study (with different patients sample)**, NRT prescriptions for inpatients increased from *n*=832 in the 2 years prior (April 1st 2004-March 31st 2006) to the implementation of a local (hospital's) smokefree buildings and smokefree grounds policy, to *n*=2,475 in the 2 years after the policy (April 1st 2006-March 31st 2008). In a time series

analysis of the NRT orders, there was a highly significant increase in prescriptions for inpatients between May and June 2006, 1 month prior to ban (p=0.008), with the linear rise continuing to climb more steeply in the following months. In **Kvern's 2006 [Canada -] uncontrolled before and after study (with different sample)**, evaluating a local (regional health authority's) smokefree grounds policy, from a pre-implementation utilisation level of zero for NRT support for inpatients, one hospital reported using just under *n*=150 NRT patches and a tertiary care facility reported using approximately *n*=550 NRT patches and *n*=650 pieces of NRT gum during the first 3 months of the policy.

Other Impacts on Patients: Inpatient NRT Prescriptions and NRT Use (Acute & Maternity)

Evidence statement 2.2: There is **weak** evidence from two uncontrolled before and after studies with different samples, one in the USA (**Gadomski 2010 [+])** and one in Canada (**Kvern 2006 [-]**), that **local smokefree policy implementation** with the supporting strategies of cessation support and pharmacotherapies/NRT provision increases the use of NRT by inpatients who smoke in an **acute or maternity care setting**.

UK Applicability: This evidence was conducted outside the UK, however the policies include smokefree grounds (a policy implemented in parts of the UK), and there is no reason to believe the effect on patients is not applicable to the UK setting.

Gadomski 2010 [+] in the USA reported that NRT prescriptions for inpatients increased in the 18 months before and 23 months after implementation of a local (hospital's) smokefree buildings and smokefree grounds policy, with a significant increase in prescriptions 1 month prior to implementation (p=0.008). ***Other supporting strategies*** *included cessation support, a campus map detailing smokefree borders, and staff, community and patient education*. **Kvern 2006 [-]** in Canada reported that NRT usage for inpatient support increased between before implementation of a local (regional health authority's) smokefree grounds policy and 3 months post-implementation. ***Other supporting strategies*** *included written policies, an implementation committee, signage, staff meetings, notices in staff payslips, cessation support, temporary abstinence support for inpatients, moving of ashtrays and shelters to the site periphery, staff training, media campaigns, bilingual information sheets for patients and the public and information on health organisations' websites*.

3.2.2 Other Consequences from Smokefree for Staff (Acute & Maternity)

This section is organised into the following sub-headings: staff smoking; staff quitting activity; staff readiness to quit; and employee resignations and hires.

3.2.2.1 Staff Smoking and Quitting Activity (Acute & Maternity)

Staff Smoking Rates

Three before and after studies, one cohort study and one interrupted time series report outcomes relating to the impact of local policy implementation for smokefree buildings and grounds and national legislation for smokefree implementation with supporting strategies on staff smoking in acute or maternity care settings (see study descriptions in Figure 3.2 and Table 2.2 above). All showed an increase in beneficial effects from local-level smokefree policy or national smokefree legislation implementation.

In an **uncontrolled before and after study (with same sample)**, **Hudzinski 1990 [USA +]** found that 6 months before and after a local (medical foundation's) smokefree (campus) buildings and grounds policy was implemented was implemented, 22% and 20% respectively, of hospital staff self-reported that they smoked, and this was reduced to 14% of hospital staff 12 months after the policy was implemented (Chi-square=11.53, p<0.003). In an **uncontrolled before and after study (with same staff sample), Gadomski 2010 [USA +]** reported that among a cohort of 489 staff, there was a 12% smoking prevalence in 2005, this decreased significantly to 7.5% in 2006 after implementation of a local (hospital's) smokefree buildings and smokefree grounds policy (p<0.001). Among all employees, smoking prevalence was 14.3% March-June 2005, 14.8% March-June 2006, decreasing significantly to 9.4% March-June 2007 (p<0.0002). **Wheeler 2007's [USA -] uncontrolled before and after study** finds that significantly fewer employees reported they were 'currently a cigarette smoker' after implementation of a local (university hospital board's) smokefree indoors and outdoors policy than before implementation (2.6% vs. 9.6%, p<0.0001). As the authors were concerned that the rates in the survey were biased by smokers who did not report their behaviours, they attempted to validate their results using other self-report surveys with that hospital's employees and found pre-implementation prevalence of 16.4%, and a further survey report post-implementation prevalence of 8% (no statistical analysis presented). **Stillman 1990's [USA +] cohort study** reports that during the year between surveys, the reported cross sectional smoking prevalence declined by 25%, from 21.7% 8 months pre- to 16.2% 6 months post-implementation of a local (hospital board's) smokefree buildings policy (p=0.0001).

Martinez 2008's [Spain +] interrupted time series around the implementation of national indoor smokefree legislation in Spain in 2005, found a non-significant decrease in employee smoking prevalence from 34.5% (95% CI: 27.7-41.2) in 2001 (before the complete ban) to 30.6% (95% CI: 24.7-36.4) in 2006 (after the complete ban). There were non-significant decreases in occupational sub-groups: smoking prevalence among doctors decreased from 20.0% in 2001 (95% CI: 6.7-33.2) before the complete ban implementation to 15.2% in 2006 (95% CI: 2.9-27.4), after the complete ban implementation (not significant); decreased among nurses, from 34.0% in 2001 (95% CI: 24.4-43.5) to 32.6% in 2006 (95% CI: 22.8-42.3) (not significant); decreased among administrative employees, from 56.0% in 2001 (95% CI: 36.5-75.4) to 37.0% in 2006 (95% CI: 18.7-55.2) (not significant); and remained the same among other employees at 35.3% in 2001 (95% CI: 19.1-51.2) and 35.7% in 2006 (95% CI: 21.2-50.2) (not significant).

Staff Smoking by Number of Cigarettes

Three before and after studies and one interrupted time series report outcomes relating to the impact of local policy implementation for smokefree and national legislation for smokefree with supporting strategies on the number of cigarettes smoked by staff in acute or maternity care settings (see study descriptions in Figure 3.2 and Table 2.2 above). All showed an increase in beneficial effects from local-level smokefree policy or national smokefree legislation implementation.

In **Donchin 2004's [Israel +] uncontrolled before and after study (with different sample)**, there was no appreciable change in the mean number of cigarettes smoked (in total or during work hours only) before and after implementation of a local (hospital board's) smokefree buildings policy. (Mean total cigarettes per day 13.6 (SD=10.4) (pre-), 12.9 (SD=10.4) (post-); mean cigarettes smoked during work hours 5.38 (SD=4.7) (pre-) 4.9 (SD=4.7) (post-), no further statistical analysis presented.) In an **uncontrolled before and after study (with same sample)** by **Daughton 1992 [USA -]**, 5 months after implementation and 17 months after implementation of a local (hospital's) smokefree buildings policy, there was a significant decrease in mean cigarette consumption during work hours by staff, from 7.3 cigarettes (SD=0.45) to 4.2 cigarettes (SD=0.26) (p<0.0001); during workdays, from 15.6 cigarettes (SD=0.83) to 12.7 cigarettes (SD=0.69), p<0.001; and during non-workdays, from 19.6

cigarettes (SD=0.92) to 18.6 cigarettes (SD= 0.89), p<0.01. This significant decrease in mean cigarette consumption mostly occurred amongst staff self-reported as moderate to heavy smokers (≥10 cigs/day) who reduced from 21.1 (SD=0.93) to 14.7 (SD=0.80) cigarettes, p<0.001. Light smokers (<10 cigs/day) day) showed only a slight decrease in mean daily cigarette consumption from 4.8 (SD=0.39) to 4.4 (SD=0.44) cigarettes, p<0.05. In a second **uncontrolled before and after study (with same sample)**, **Hudzinski 1990 [USA +]** 12 months after a local (medical foundation's) smokefree (campus) buildings and grounds policy was implemented, fewer cigarettes were smoked by staff in comparison to the previous year's data; after 12 months, 81% of smokers reported using <8 cigarettes per day (no other data reported). Approximately 1 in 4 staff smokers self-reported that they no longer smoked cigarettes during work hours 6 and 12 months after policy implementation. Approximately 40% of staff smokers self-reported that their cigarette consumption after work hours remained unchanged at both 6 and 12 months after policy implementation.

Martinez 2008's [Spain +] interrupted time series of annual assessments around the implementation of national indoor smokefree legislation in Spain in 2005, found that one year after the complete ban was implemented, in 2006 48.8% employees smoked <10 cigs/day (95% CI: 35.3-60.7), an increase from 30.8% in 2001 (95% CI: 24.8-51.19) (not significant). In 2001, 61.5% of employee smokers smoked 10-20 cigs/day (95% CI: 47.7-74.3), decreasing to 37.2% in 2006 (95% CI: 24.6-49.3), a year after complete ban implementation (not significant). Hospital employees smoking >20 cigs/day increased between 2001 (pre-implementation of the complete ban) and 2006 (post-implementation) from 7.7% (95% CI: 0.7-13.2) to 14.0% (95% CI: 5.1-22.8) (not significant).

Other Impacts on Staff: Staff Smoking (Acute & Maternity)

Evidence statement 2.3: There is evidence from five before and after studies, four in the USA **(Hudzinski 1990 [+], Gadomski 2010 [+], Wheeler 2007 [-], Daughton 1992 [+])**, and one in Israel **(Donchin 2004 [+])**, one cohort study in the USA (**Stillman 1990 [+]**) and one interrupted time series in Spain (**Martinez 2008 [+]**) about the impact of local-level policy and national legislation for smokefree implementation on staff smoking in an **acute and maternity setting**.

UK Applicability: This evidence was conducted outside the UK, however nearly half the studies test smokefree grounds and buildings (a policy implemented in parts of the UK); the others test indoor smokefree already national legislation in the UK. There is no reason to believe the effect on staff is not applicable to the UK setting.

(a) Staff Smoking Rates: There is **moderate** evidence from three before and after studies in the USA (**Hudzinski 1990 [+], Gadomski 2010 [+], Wheeler 2007 [-]**), one cohort study in the USA (**Stillman 1990 [+]**) and one interrupted time series in Spain (**Martinez 2008 [+]**) to suggest that local-level policy and national legislation for smokefree implementation with supporting strategies **decreases** smoking rates amongst staff in an **acute and maternity setting**.

Hudzinski 1990 [+] in the USA reported that the proportion of hospital staff who self-reported that they smoked significantly decreased from 6 months pre- to 6 months post-implementation of a local (medical foundation's) smokefree (campus) buildings and grounds policy (Chi-square=11.53, p<0.003). ***Supporting strategies*** *included a Smoke-Free Task Force (with clinicians, psychologists, and administrative personnel from public affairs and employee relations departments)*. **Gadomski 2010 [+]** in the USA reported a decrease in employee smoking prevalence from 1 year pre- to 1 year post-implementation of a local (hospital's) smokefree buildings and smokefree grounds policy (p<0.001). ***Supporting strategies*** *included pharmacotherapies, cessation support, a campus map detailing smokefree borders, and staff, community and patient education*. **Wheeler 2007 [-]** in the

USA reported significantly fewer employees reporting that they were a current smoker 10 months after the implementation of a local (university hospital board's) policy for smokefree indoors and outdoors than 3 months before implementation (p<0.0001). ***Supporting strategies*** *included written policies, an implementation committee, posters, staff meetings, letters in staff payslips, patient appointments letters, cessation support, pharmacotherapies and announcements in local media*. **Stillman 1990 [+]** in the USA reported a significant decline in staff smoking prevalence from 8 months pre- to 6 months post-implementation of a local (hospital board's) smokefree buildings policy (p=0.0001). ***Supporting strategies*** *included written policies, an implementation committee, cessation support, an internal media and educational campaign and free health checks for employees*. Following implementation of national indoor smokefree legislation in Spain in 2005, **Martinez 2008 [+]** in Spain found a non-significant decrease in employee smoking prevalence from 4 years before the smokefree legislation (95% CI: 27.7-41.2) to 1 year after the legislation (95% CI: 24.7-36.4). ***Supporting strategies*** *included the closure of smoking rooms and staff training*.

(b) Staff Smoking by Number of Cigarettes: There is **moderate** evidence from three before and after studies, one in the USA (**Hudzinski 1990 [USA +], Daughton 1992 [-]**) and one in Israel (**Donchin 2004 [+]**), and one interrupted time series in Spain (**Martinez 2008 [+]**) to suggest that local-level policy and national legislation for smokefree implementation with supporting strategies **decreases** the number of cigarettes smoked by staff both during working hours and overall in an **acute and maternity setting**. **Hudzinski 1990 [+]** in the USA reported a decrease in the number of cigarettes staff reported smoking from 6 months pre- to 6 months post-implementation of a local (medical foundation's) smokefree (campus) buildings and grounds policy (data not reported). ***Supporting strategies*** *included a Smoke-Free Task Force (with clinicians, psychologists, and administrative personnel from public affairs and employee relations departments)*. **Donchin 2004 [+]** in Israel reported no change in the mean number of cigarettes smoked, either in during work hours or in total following the implementation of a local (hospital board's) smokefree buildings policy, measured 3 months before and 6-9 months after implementation. ***Supporting strategies*** *included an implementation committee, cessation support, smoking shelters erected outside the hospital building, bans on the sale of tobacco products on site, an information campaign 2 months before the policy was introduced, a press conference launch and fines for violations*. Following implementation of a local (hospital's) smokefree buildings policy, **Daughton 1992 [-]** in the USA reported a significant decrease in mean cigarette consumption during work hours (p<0.0001), during workdays (p<0.001) and during non-workdays (p<0.01) by staff between 5 months and 17 months post-implementation. The significant decrease in mean cigarette consumption mostly occurred amongst staff self-reported as moderate to heavy smokers (≥10 cigs/day) (p<0.001); Light smokers (<10 cigs/day) day) showed only a slight decrease in mean daily cigarette consumption (p<0.05). ***Supporting strategies*** *included an implementation committee, employee bulletins and newsletters, cessation support and an in-house media campaign*. After the implementation of national indoor smokefree legislation in Spain in 2005, **Martinez 2008 [+]** in Spain reported a non-significant increase in the number of employees self-reporting they smoked <10 cigs/day after the implementation 1 year after the legislation (95% CI: 35.3-60.7) compared with 4 years before (95% CI: 24.8-51.19). There was a non-significant decrease in the number of employees who smoked 10-20 cigs/day and a non-significant increase in those who smoked >20 cigs/day 1 year after the legislation (95% CI: 24.6-49.3 and 95% CI: 5.1-22.8 respectively) compared with 4 years before (95% CI: 47.7-74.3 and 95% CI: 0.7-13.2 respectively). ***Supporting strategies*** *included the closure of smoking rooms and staff training*.

Staff Quitting Activity

Two before and after studies and two interrupted time series report outcomes relating to the impact of local policy implementation for smokefree and national legislation for smokefree with supporting strategies on staff quitting activity in acute or maternity care settings (see study descriptions in

Figure 3.2 and Table 2.2 above). There were inconsistent results showing no change or a decrease in beneficial effects from local-level smokefree policy or national smokefree legislation implementation.

In an **uncontrolled before and after study (with same sample)** by **Daughton 1992 [USA -]**, 5 months after the implementation of a local (hospital's) smokefree buildings policy, 39% of the surveyed staff smokers (n=79) self-reported trying to quit: 22 enrolled in a stop-smoking program and 57 used a non-program approach. Of those enrolled in a smoking program, 32% (n=7) reported abstinence ≥6 months and of those using a non-program approach, 16% (n=9) reported being smokefree ≥3 months. Of the 284 ex-smokers sampled, 7% (n=20) had stopped smoking in the year pre-ban, which was only slightly lower than the 8% quit rate (16 of 203) achieved during the ban year (non-significant). Seventeen months after implementation of a total indoor ban on smoking at the hospital, 41% staff smokers (n=36) self-reported trying to quit during the second year of the ban. Two years after the policy was announced, 8% staff smokers (n=7) were reportedly smoke-free for ≥3 months (a similar rate to both pre-ban and ban-year institutional quit rates). In an **uncontrolled before and after study (with same sample)**, **Hudzinski 1990 [USA +]** report that 6 months before a local (medical foundation's) smokefree (campus) buildings and grounds policy was implemented, 28% of staff smokers reported that they intended to stop smoking if the institution implemented a policy; 12 months post-Implementation, "most who expressed that interest had attempted to do so" (no data given). Twenty-five percent and 21% of staff smokers reported that they tried to stop smoking at 6 and 12 months post-implementation respectively.

Martinez 2008's [Spain +] interrupted time series around the implementation of national indoor smokefree legislation in Spain in 2005, found a non-significant decrease in the proportion of hospital employee smokers reporting having attempted to quit smoking at least once decreased from 64.6% in 2001 (95% CI: 52.0-76.0), before the implementation of a complete ban, to 42.4% in 2006 (95% CI: 29.8-55.0), 1 year after the implementation of a complete ban.

Ripley-Moffitt's 2010 [USA +] interrupted time series, was conducted 1 month prior to the implementation of a local (hospital's) smokefree (campus) buildings and grounds policy and at 6 months and 12 months post-implementation. At 1 month before implementation, 31 participants (15%) reported that they had quit smoking in the previous 6 months pre-implementation. Of the 179 current smokers, 45% reported a quit attempt within the previous 6 months. Six months after the policy took effect, 33 participants (15.7%) reported not smoking; this included 16 who reported quitting more than 6 months previously, plus 17 who reported quitting during the intervening 6 months. Among the 133 participants who reported currently smoking, 53% reported quit attempts in the intervening 6 months (no statistical analysis presented). Among the 117 who reported current smoking at the 12-month survey, 48% reported attempts to quit smoking in the preceding 6 months. At each survey, approximately 60% of employees who currently smoked reported plans to quit smoking in the next 30 days or 6 months (no statistical analysis presented). The majority of employees who had self-reported either not smoking or making quit attempts stated that the smokefree (campus) buildings and grounds policy had some influence on their behaviour. Over a third (39%) of those not smoking reported a strong influence of the policy at baseline, and 36% indicated a strong influence at 6- and 12-month follow ups. Those who smoked also reported a strong influence of the policy on their quit attempts (20% at baseline, and 24% and 20% at follow-up surveys).

Other Impacts on Staff: Staff Quitting Activity (Acute & Maternity)

Evidence statement 2.4: There is **inconsistent** evidence from two before and after studies from the USA **(Daughton 1992 [-], Hudzinski 1990 [+])**, and two interrupted time series, one from Spain (**Martinez 2008 [+])** and one from the USA (**Ripley-Moffitt 2010 [+])**, about the impact of local-level policy and national legislation for smokefree implementation with supporting strategies on staff quit attempts in an **acute and maternity setting**.

UK Applicability: This evidence was conducted outside the UK and the policy covered in three studies (indoor smokefree) is already national legislation in the UK, however the other study's policy is for smokefree grounds and buildings (a policy implemented in parts of the UK). There is no reason to believe the effect on staff is not applicable to the UK setting.

(a) Quit attempts: There is **inconsistent** evidence from two before and after studies from the USA (**Daughton 1992 [-], Hudzinski 1990 [+]**) and two interrupted time series, one in Spain (**Martinez 2008 [+]** and one in the USA (**Ripley-Moffitt 2010 [+]**), to suggest that smokefree implementation with supporting strategies decreases or has no effect on the number of quit attempts by staff.

Three studies found no change or a decrease post-implementation. **Hudzinski 1990 [+]** in the USA reported that the proportion of hospital staff smokers who reported that they intended to stop smoking if the institution implemented a policy was slightly higher than the proportion that staff who reported that they tried to stop smoking at six and 12 months post-implementation a local (medical foundation's) smokefree (campus) buildings and grounds policy. ***Supporting strategies*** *included a Smoke-Free Task Force (with clinicians, psychologists, and administrative personnel from public affairs and employee relations departments)*. Following implementation of a local (hospital's) smokefree buildings policy, **Daughton 1992 [-]** in the USA reported **no change** in the rate of staff smokers self-reporting trying to quit (around two-fifths) between 5 months and 17 months post-implementation. ***Supporting strategies*** *included an implementation committee, employee bulletins and newsletters, cessation support and an in-house media campaign*. Following implementation of national indoor smokefree legislation in Spain in 2005, **Martinez 2008 [+]** in Spain reported a non-significant decrease the proportion of hospital employee smokers reporting having attempted to quit smoking at least once from 4 years before the smokefree legislation (95% 95% CI: 52.0-76.0) to 1 year after the legislation (95% CI: 29.8-55.0). ***Supporting strategies*** *included the closure of smoking rooms and staff training*.

One study found an increase post-implementation. **Ripley-Moffitt 2010 [+]** in the USA reported an increase in current smokers self-reporting to have made a quit attempt in the preceding 6 months from the month pre-implementation of a local (hospital's) smokefree (campus) buildings and grounds policy to 6 months post-implementation, the proportion falling at 12 months post-implementation but still a higher than before smokefree was in place. There was no change in the proportion of employees who currently smoked who reported plans to quit smoking in the next 30 days or 6 months across all three surveys; it was always higher than the proportion who made quit attempts. ***Supporting strategies*** *included posters, staff meetings, an employee newsletter and cessation support.*

(b) Successful quitting: There is **weak** evidence from one before and after study in the USA (**Daughton 1992 [-]**) and one interrupted time series in the USA (**Ripley-Moffit 2010 [+]**) to suggest that implementation of a local smokefree policy for buildings or buildings and grounds with supporting strategies does not change the proportion of staff who quit smoking. **Daughton 1992 [-]** in the USA found a similar quit rate for staff who remain smoke-free for ≥3 months in the year pre-policy, at 5 months post-policy and at 7 months post-policy. ***Supporting strategies*** *included an*

implementation committee, employee bulletins and newsletters, cessation support and an in-house media campaign. **Ripley-Moffitt 2010 [+]** in the USA reported no change in the proportion of staff reporting that they had quit smoking in the previous 6 months at the month pre-implementation of a local (hospital's) smokefree (campus) buildings and grounds policy to those reporting at 6 months post-implementation. ***Supporting strategies*** *included posters, staff meetings, an employee newsletter and cessation support.*

Staff Readiness to Quit

One before and after study and one interrupted time series report outcomes relating to the impact of local policy implementation for smokefree and national legislation for smokefree with supporting strategies on staff readiness to quit[10] in acute or maternity care settings (see study descriptions in Figure 3.2 and Table 2.2 above). There were inconsistent results showing some increases and decreases in beneficial effects from local-level smokefree policy or national smokefree legislation implementation.

In **Donchin 2004's [Israel +] uncontrolled before and after study (with different sample)**, the majority of staff smokers in both surveys, one pre- and one post- implementation of a local (hospital board's) smokefree buildings policy, were classified in the pre-contemplation stage (49.2% pre- and 57.4% post-policy); few were classified in the preparatory stage (12.7% pre- and 8.2% post-policy). The distribution by stages of change was not associated with age, gender, education or occupation, or with degree of compliance to the new policy (no further statistical analysis presented). **Martinez 2008's [Spain +] interrupted time series** around the implementation of national indoor smokefree legislation in Spain in 2005, found a significant increase in hospital employee smokers expressing readiness to quit increased significantly from 40.3% in 2001 (95% CI: 28.4-52.2), in 2001 (before the complete ban) to 58.6% in 2006 (95% CI: 55.4-61.8), in 2006 (after the complete ban) ($p<0.05$).

Other Impacts on Staff: Staff Readiness to Quit (Acute & Maternity)

Evidence statement 2.5: There is **inconsistent** evidence from one before and after study in Israel (**Donchin 2004 [+]**) and one interrupted time series in Spain (**Martinez 2008 [+]**) that that smokefree implementation with supporting strategies may increase the number of staff smokers' readiness to quit in an acute or maternity care setting.

UK Applicability: This evidence was conducted outside the UK and the policy covered (indoor smokefree) is already national legislation in the UK. However there is no reason to believe the strategy's effect is not applicable to the UK setting.

Martinez 2008 [+] in Spain found a significant increase in hospital employee smokers expressing readiness to quit after the implementation of national indoor smokefree legislation in Spain in 2005 compared with before ($p<0.05$). ***Supporting strategies*** *included the closure of smoking rooms and staff training*. Whereas **Donchin 2004 [+]** in Israel reported an increase in staff smokers classified in the pre-contemplation stage, and a smaller decrease in those classified in the preparatory stage, following the implementation of a local (hospital board's) smokefree buildings policy, measured 3 months before and 6-9 months after implementation, indicating less readiness to quit. ***Supporting strategies*** *included an implementation committee, cessation support, smoking shelters erected outside the hospital building, bans on the sale of tobacco products on site, an information campaign 2 months before the policy was introduced, a press conference launch and fines for violations*. The evidence from **Donchin 2004 [+] in Israel** could be due to those who were most motivated to quit

[10] Prochaska JO, DiClemente CC, Velicer WF, Rossi JS (1993). Standardized, individualized, interactive, and personalized self-help programs for smoking cessation. *Health Psychology*, 12(5): 399-405.

doing so as a result of smokefree, leaving the least motivated group; alternatively smokefree had an effect that made staff smokers less likely to want to quit.

3.2.2.2 Other Impacts on Staff (Acute & Maternity)

Employee Resignations and Hires

One uncontrolled before and after study reports outcomes relating to the impact of local policy implementation for smokefree indoors and outdoors with supporting strategies on employee resignations and hires in acute or maternity care settings (see study descriptions in Figure 3.2 and Table 2.2 above). The study showed no adverse change in effects from local-level smokefree policy implementation.

One **uncontrolled before and after study** (**Wheeler 2007 [USA -]**) reports no discernible changes in mean employee resignations/terminations after implementation of the local (university hospital board's) policy for smokefree indoors and outdoors at either site. At site 1, the mean resignations/terminations rate for the 6 month period pre- implementation was 6.14% of all active employees, this decreased slightly to 6.05% for the 6 month period post-implementation. There were no discernible changes in rate of new employee hires after implementation of the campus smoking ban at either site. More employees stated that they were likely to stay as a result of the policy (more than 30% in both years) or were unaffected by the policy (60% or greater in both years) than those who said they were likely to leave because of the policy (less than 5% in both years). Researchers were "*concerned that underrepresentation of smokers, who may have chosen not to return the survey, might have influenced results*" and reweighted the data (more weight to smokers to bring the prevalence in April 2004 (2 months pre-implementation) and May 2005 up to 15% and reduced weights to non-smokers). On reanalysis of the 'likelihood to leave as a result of the new policy' variable, percentages changed proportionally in both years, but only by 2-3% without any effect on significance testing. No further statistical analysis presented.

Other Impacts on Staff: Employee Resignations and Hires (Acute & Maternity)

Evidence statement 2.6: There is **weak** evidence from one uncontrolled before and after study in the USA (**Wheeler 2007 [-]**) that implementation of a local (university hospital board's) policy for smokefree indoors and outdoors with **extensive** supporting strategies does not change the mean number of the number of employee resignations/terminations, the likelihood of employees leaving as a result of the policy, or the rate of new employee hired in an acute or maternity care setting.

UK Applicability: This evidence was conducted outside the UK, however the policy covers smokefree grounds and buildings (a policy implemented in parts of the UK) and there is no reason to believe the effect is not applicable to the UK setting.

Wheeler 2007 [-] in the USA found no discernible changes in mean employee resignations/terminations or new employee hires after implementation of a local (university hospital board's) policy for smokefree indoors and outdoors. More employees stated that they were likely to stay as a result of the policy or were unaffected by the policy than those who said they were likely to leave because of the policy. ***Supporting strategies*** *included written policies, an implementation committee, posters, staff meetings, letters in staff payslips, patient appointments letters, cessation support, pharmacotherapies and announcements in local media*.

3.3 Q3: Are There Any Unintended Consequences from Adopting Smokefree Approaches in Mental Healthcare Settings?

Fifteen studies were identified and included in the review which addressed this question. The outcomes measures of effects of smokefree implementation for each study are presented in Table 3.3 and the studies are summarised in full detail in the evidence tables in Appendix 7.

This section covers studies conducted in secondary care mental healthcare settings, and is organised into the following two measured outcome sub-headings: other consequences from smokefree for patients; and other consequences from smokefree for staff. The findings from the studies are presented (studies are annotated with the country and internal validity score in parentheses following the citation).

Table 3.3: Outcome measures of other consequences from smokefree by type of ban & study

Title **Study design**	**Type of ban**	**Outcomes measured: other consequences from smokefree implementation**
Smokefree Grounds		
Kempf 1996 **[USA +]** **Randomised controlled trial**	**Intervention campus (18 month therapeutic community model):** Smokefree building(s) Smokefree doorways/entrances Smokefree grounds **Control campus (6 month chemical dependency model):** Smokefree building(s) *Designated outdoor areas for smoking*	Recruitment into treatment programme (declined admission to the tobacco-free programme) (records data). Programme retention rates at 2 days and 2 weeks (records data).
Hempel 2002 **[USA +]** **Uncontrolled before-and-after study (with same sample after intervention)**	Smokefree building(s) Smokefree "other description": *States "on hospital property"*	Verbal aggression incidents: behaviour viewed by staff as hostile or threatening and directed towards a person or object without the application of physical force (patient's chart data). Physical aggression incidents: behaviour viewed by staff as hostile or threatening toward a person or object with the application of physical force. (patient's chart data). Instances of PRN medication for agitation (irritability or restlessness) (patient's chart data). Instances of PRN medication for verbal or physical aggression (patient's chart data). Instances of restraint (physical or chemical) and seclusion (quiet room under observation) (patient's chart data).

		Instances of sick call (visit of patient to medical doctor for a physical complaint) (patient's chart data).
Quinn 2000 **[USA -]** **Uncontrolled before-and-after study (with same sample after intervention)**	Smokefree "other description": *"Tobacco could not be used on any part of the hospital campus" (applied to patients, staff and visitors)*	Rate of verbal acts of aggression per month (chart data). Rate of physical acts of aggression per month (chart data).
Shetty 2010 **[UK +]** **Uncontrolled before-and-after study (with same sample after intervention)**	Smokefree building(s) Smokefree grounds Smokefree "other description": *All in-patients in medium secure units were required to abstain from tobacco (unenforceable for small number with unescorted community leave)* Ban exclusions: *If the clinical team agreed there was a clinical reason not to enforce abstinence (in practice, none) or for the small number of patients who had unescorted community leave*.	Incidents of smoking-related verbal aggression (from chart data and hospital records) Incidents of smoking-related physical aggression (from chart data and hospital records) PRN tranquillising medication levels (from chart data and hospital records) Clozapine serum levels (from chart data and hospital records) Use of NRT (from chart data and hospital records) Measured but no pre- comparator; excluded from review: p*atients' smoking cessation course attendance*
Cormac 2010 **[UK +]** **Uncontrolled before-and-after study (with different sample after intervention)** *Pre- and post-ban responses not linked but most sample the same (n=298 patients for study duration)*	Smokefree building(s) Smokefree grounds	Rate of violent incidents by patient (including self-harm (threats or actual), verbal abuse (or aggression or threats), physical aggression (attempted or actual), damage to property) (patient's chart data). Rate of patient episodes of seclusion due to threatening behaviour, attacks on staff, attacks on fellow patients (patient's chart data). Average daily dose of 4 classes of psychotropic medication: regular antipsychotics, regular benzodiazepines, PRN antipsychotics, PRN benzodiazepines (patient's chart data). Number of patients receiving NRT (patient's chart data).
Haller 1996 **[USA +]** **Uncontrolled before-and-after study (with different sample after intervention)**	Smokefree building(s) Smokefree grounds	Proportion of 8 hours shifts with and without aggressive behaviour: physical aggression against other people Proportion of 8 hours shifts with and without aggressive behaviour: physical aggression against objects Proportion of 8 hours shifts with and without

		aggressive behaviour: physical aggression against self Proportion of 8 hours shifts with and without aggressive behaviour: verbal aggression Proportion of patients secluded Proportion of patients restrained Proportion of patients received p.r.n. medication Proportion of patients discharged against medical advice Proportion of patients eloped
Patten 1995 **[USA +]** **Uncontrolled before-and-after study (with different sample after intervention)**	Smokefree building(s) Smokefree grounds Ban exclusions: *Patients with off-unit privileges, at an appropriate level, were granted brief passes to leave the building unaccompanied to smoke ("very few patients")*	Rate of patients in seclusion (data from patient charts) Rate of use of restraints for patients (data from patient charts) Total PRN medication use (data from patient charts) Proportion of patient days with PRN medication (data from patient charts) Number of patients who left against medical advice (data from patient charts) Patients' smoking status (self-reported) Number of patient consultations to the Nicotine Dependence Center (unit records) Number of recorded patient complaint investigations related to right to smoke (unit records) Measured but no pre- comparator; excluded from review: *patient use of cessation support during hospitalisation; and patient use of cessation support following hospital discharge (self-reported).*
Smokefree Indoors Only		
Erwin 1991 **[USA -]** **Interrupted time series**	Smokefree "other description": *Smokefree acute psychiatric wards (presume from the paper's introduction, the rest of hospital is smokefree)*	Frequency of nursing staff reporting they intervened verbally or physically to prevent a patient who demanded to smoke from harming self or others (self-report measure). Frequency of nursing staff reporting they encouraged room "time outs" to decrease stimulation (self-report measure). Frequency of nursing staff reporting they offered medications as needed (p.r.n. medications) (self-report measure). Frequency of nursing staff reporting they encouraged patients to participate in smoking cessation groups (self-report measure).
Etter 2008 **[Switzerland +]** **Uncontrolled before-and-after study (with different sample after intervention)**	Smokefree building(s) *Patients (except those in locked rooms) and staff were allowed to leave the unit to smoke outside*	Smoking behaviour of patients who smoke (self-report measures: mean cigs/day, now; mean cigs/day, before admission; smoke more/less/same since admission) Frequency of use of smoking cessation by patients who smoke Measured but no pre- comparator; excluded from

(The staff sample consisted of largely the same people who answered successive surveys, although results not linked)		review: *provision of smoking cessation interventions for patients by staff*
Joseph 1993 **[USA +]** **Cohort study**	Smokefree building(s)	Patient smoking/quitting status (self reported measure). Patient smoking habits at time of interview compared with at hospital admission (less, the same, more) (self reported measure).
Matthews 2005 **[USA -]** **Uncontrolled before-and-after study (with different sample after intervention)**	Smokefree "other description": *Described as "smoking ban"*	Number of patients who committed at least one episode of assault or self-harm (clinical data). Number of episodes of assault or self-harm (clinical data). Number of patients who required seclusion or restraint (clinical data). Number of episodes of seclusion or restraint (clinical data). Number of callouts (i.e., scheduled staff not coming in for their shift, absenteeism) (HR records).
Rees 2008 **[USA +]** **Uncontrolled before-and-after study (with different sample after intervention)**	Smokefree "other description": *Ban on tobacco and discontinuation of patient smoke breaks.*	Rates of patients leaving the unit against medical advice (records). Rates of patient transfers to other inpatient facilities (records). Number of programme admissions (records). Average length of patient stay (records). Rates of seizure among patients (records).
Rauter 1997 **[USA +]** **Cohort study**	Smokefree building(s) Other: *Designated open-air smoking areas established outside the buildings*	Number of assault rates involving a patient (incident reports). Number of smoking-related assault rates involving a patient (incident reports). Average monthly patient acuity level (from one, most acute, to five, ready for discharge) (recorded daily by nurses). Recorded patient complaint investigations related to smoking & perceived rights violations (incident reports).
Sterling 1994 **[USA -]** **Cohort study**	Smokefree building(s)	Proportion of 'premature terminators' (drop-outs) from program (program records). Average number of outpatients attending groups (program records). Average number of daily new admissions per week (program records).
Velasco 1996 **[USA -]** **Cohort study**	Smokefree "other description": *Prohibited cigarette smoking of inpatients.*	Number of verbal assaults (openly expressed anger such as threats, personal insults, or other derogatory remarks directed at other patients or staff) per shift (records).

		Number of physical assaults per shift (records). Number of applications of patient seclusion per shift (records). Number of applications of leather restraints (wrist or ankle bindings) per shift (records). Number of applications of soft restraints (cloth devices e.g. poesy vest) per shift (records). Number of security calls (for help from security officers) per shift (records). Number of administrations of PRN medication for anxiety per day (records). Number of discharges against medical advice each day (records). Number of patients who received nicotine gum or transdermal nicotine per day (records).

Figure 3.3: Study descriptions for studies with supporting strategies and indicators of other consequences from adoption of smokefree: mental healthcare settings

Erwin 1991 [USA -] interrupted time series
This study presents the reactions of 29 nursing staff members on two inpatient psychiatric wards at a veterans affairs hospital who experienced the transition to smoke-free status with the introduction of a local (US Department of Veterans Affairs) smokefree buildings policy. Assessments were conducted before implementation, and at 1 week and 4 weeks following implementation. Outcomes relevant to this review were only reported for two post-implementation time points. Nursing interventions included encouraging patients to participate in smoking cessation groups and addressing patients with the urge to smoke to support the strategy.

Hempel 2002 [USA +] uncontrolled before and after study (with same sample)
This study investigated the effects of a total smoking ban via a local (hospital board's) smokefree (campus) buildings and smokefree grounds policy on the behaviour of 140 forensic patients in a maximum security psychiatric hospital. Assessments were conducted 4 weeks prior to, and 4 weeks after implementation. Staff were provided with education about potential withdrawal symptoms, and any tobacco products found on patients were seized. Patient charts were reviewed for records of 'disruptive behaviours' including verbal or physical aggression towards a person or object and loss of privileges as a result of disruptive behaviours.

Quinn 2000 [USA -] uncontrolled before and after study (with same sample)
This study investigated rates of verbal and physical aggression amongst inpatients, and compared the number of incidents before (November 1998) and after (January 1999) the implementation of a local (hospital's) smokefree (campus) buildings and smokefree grounds policy. Written policies supported the strategy, and pharmacotherapy and cessation support education about smoking and tobacco addiction recovery were provided.

Shetty 2010 [UK +] uncontrolled before and after study (with same sample)
This study retrospectively evaluates changes in behaviour, incidents and medication requirements of 56 patients in a medium secure male hospital smokefree due to national indoor smokefree legislation in England and a local (NHS Trust's) smokefree grounds policy. Assessments were conducted 3 months prior to the implementation of policy and at three and 12 months post implementation. The strategy was supported by posters/signage, group and individual cessation support, pharmacotherapies, closure of smoking rooms and staff training.

Cormac 2010 [UK +] uncontrolled before and after study (with different sample)
This study evaluates the impact of a total smoking ban, due to national indoor smokefree legislation in England and a local (NHS Trust's) smokefree grounds policy, on 298 patients in buildings and grounds of a high secure psychiatric hospital. Assessments were conducted prior to implementation in December 2006 and March 2007, and post implementation in April and July 2007. The strategy was supported by pharmacotherapy, cessation support, staff training and patient surrender of smoking materials.

Haller 1996 [USA +] uncontrolled before and after study (with different sample)
This study investigates the effect of a complete smoking ban via a local (hospital's) smokefree buildings and smokefree grounds policy on patient or ward disruption on a 16 bed locked psychiatric unit. Patient charts were assessed 1 month prior to implementation (n=26), and at 1, 2, 3 and 4 months post implementation (n=135). The strategy was supported by pharmacotherapies, staff education to recognise and treat nicotine withdrawal and written information for patients.

Matthews 2005 [USA -] uncontrolled before and after study (with different sample)
This study aimed to evaluate the implementation of a local (hospital's) smokefree buildings policy on an acute crisis stabilization (psychiatric) unit for men. Assessments were conducted with 14 staff 3 months prior to implementation and 13 staff 3 months post-implementation. The strategy was supported by patient education about nicotine addiction and withdrawal and pharmacotherapies.

Rauter 1997 [USA +] cohort study
This study described the effects of a local (hospital's) smokefree buildings policy (introduced on January 1st 1991) in a major 145-bed psychiatric hospital, focussing on assault rates and other indicators. Assessments were made twice pre implementation at 15 months (Oct '89-Mar '90) and 3 months (Oct '90-Dec '90), immediately after implementation (Jan '91-Mar '91) and 1 year post implementation (Jan '92-Jun '92). Patients wishing to participate in smoking reduction workshops were urged to do so, but no other supporting strategies for the policy were reported.

Velasco 1996 [USA -] cohort study
This study examines the effect of a local (hospital's) smokefree buildings policy on the behaviour of patients on a 25 bed locked psychiatric inpatient unit. Assessments of daily recorded data were made over a 6 week period immediately before and over a 6 week period immediately after the implementation of the smoking ban on October 1st 1991, and again 2 years later in 1993. Patients were notified of the ban prior to admission in support of the policy.

Patten 1995 [USA +] uncontrolled before and after study (with different sample)
This study evaluates the effect of a local (hospital board's) smokefree buildings and smokefree grounds policy on the behaviour of inpatients. Hospital chart data were examined for the 3 months prior to implementation and the 3 months post implementation. The strategy was supported by an implementation committee, weekly patient cessation support groups, pharmacotherapies, written information for patients and staff education sessions on the treatment of nicotine dependence.

Rees 2008 [USA +] uncontrolled before and after study
This study examined whether a local (university hospital's) smokefree buildings policy in its inpatient medical detoxification unit would deter patients. Assessment of patient records was carried out for the 12 month period before (n=516) and after (n=561) the ban. Patients were informed of the smoking ban as part of their admission screening process but no other strategies to support the policy was reported.

Sterling 1994 [USA -] cohort study
This study examined the impact of adopting a local (facility's) smokefree buildings policy on admissions and attendance on 204 admissions to a cocaine treatment programme offering outpatient group therapy sessions for 3 half days per week. Assessments were conducted at 1 and 3 months pre and post implementation. Outpatients were informed of the ban by a therapist and posters were displayed to support the strategy.

Kempf 1996 [USA +] randomised controlled trial
This study assesses the effect of a local (facility's) smokefree campus policy on adolescent patient intake and retention in a 350-bed residential substance abuse treatment facility. One hundred and fifty five adolescents admitted had smoking data available, 105 of which were allocated to the tobacco-free programme (smokefree indoors and outdoors), 50 to the other programme (smoking permitted in designated outdoor areas). No strategies to support the policy were reported.

Etter 2008 [Switzerland +] uncontrolled before and after study (with different sample)
This study compares the acceptability and efficacy of a partial and total smoking ban (via the local (hospital administration's) smokefree buildings policy) amongst 240 patients and staff in an inpatient psychiatric hospital. Assessments were conducted prior to implementation, 2 months post partial implementation, 20 months post partial implementation/pre total implementation and 3 to 5 months post total implementation of the smokefree buildings policy. The strategy was supported by posters and/or signage, cessation support, pharmacotherapies, closure of smoking rooms and staff training.

Joseph 1993 [USA +] cohort study
This study investigated the potential impact of local (facility's) smokefree buildings policy and smoking interventions on the results of treatment for drug and alcohol use among 314 male inpatients. Assessments were made before implementation with one patient cohort's (admitted during January-May 1998) chart data retrospectively reviewed and interviewed 14-21 months after discharge; and after implementation with a second patient cohort's (July-December 1988) chart data retrospectively reviewed and interviewed 8-19 months after discharge. Inpatients in the smokefree cohort were informed of the policy and cessation programme prior to admission, and were required to agree in writing to nicotine abstinence during the treatment but no other supporting strategies are reported.

3.3.1 Other Consequences from Smokefree for Patients (Mental Healthcare)

This section is organised into the following sub-headings: violent incidents/aggression; seclusion and restraint; security calls for help; medication changes; disruptive behaviours; admittance and length of stay; complaint investigations; smoking and quitting behaviours; and other health impacts on patients.

3.3.1.1 Violent Incidents/Aggression (Mental Healthcare)

Six uncontrolled before and after, two cohort studies and one interrupted time series(report outcomes relating to the impact of local policy or national legislation for implementation of smokefree buildings and/or grounds with supporting strategies on violent incidents and aggression in mental healthcare settings (see study descriptions in Figure 3.3 and Table 2.1 above). There were inconsistent results showing no change, a decrease or an increase in beneficial effects from local-level smokefree policy or national smokefree legislation implementation.

In **Erwin's 1991 [USA -]** interrupted time series, there was a decline in the proportion of nursing staff reporting that they intervened verbally or physically to prevent a patient who demanded to smoke from harming self or others, from 20% and 37% (Wards A and B) 1 week post-implementation to 20% and 10% respectively 4 weeks post-implementation of a local (US Department of Veterans Affairs) smokefree buildings policy (no p values calculated).

In **Hempel's 2002 [USA +]** before and after study with the same sample of forensic patients assessed 4 weeks prior to, and 4 weeks after implementation a local (hospital board's) smokefree (campus) buildings and smokefree grounds policy, there was a significant post-implementation decline in verbal aggression in heavy smokers (≥19 cigarettes/day) ($Z = -2.12$, $p=0.034$). There were no significant changes post-implementation in verbal aggression for light (1-9 cigarettes/day) and moderate smokers (10-18 cigarettes/day) and a decline in non-smokers closely approached significance ($Z = -1.91$, $p=0.056$). There were no significant changes 4 weeks after implementation of the smokefree policy in physical aggression for non-smokers, light smokers, moderate smokers or heavy smokers, compared with 4 weeks pre-implementation.

In **Quinn's 2000 [USA -] uncontrolled before and after study (with same sample)**, there were n=1,184 verbal acts of aggression during the month of November 1998, the month before implementation of the local (hospital's) smokefree (campus) buildings and smokefree grounds policy on 1st December 1998. There were n=656 verbal acts of aggression a month later, during January 1999, which corresponded to a significant 45% decrease ($p<0.01$). One month pre-implementation, there were n=266 physical acts of aggression and 1 month post-policy, there were n=133 physical acts of aggression, which corresponded to a significant 50% decrease ($p<0.01$).

One **uncontrolled before and after study** (with the same sample) set in England (**Shetty 2010 [UK +])** found a reduction in the number of recorded physical aggression incidents by male patients from 3 months before implementing the national indoor smokefree legislation and a local (NHS Trust's) smokefree grounds policy, to 3 months after (20 incidents versus 11 incidents); the change in rates of physical aggression was not statistically significant ($p=0.6$). Twelve months post-implementation, there was no recorded physical aggression by male patients directly related to nicotine withdrawal. Three months pre-implementation of the national indoor legislation and local outdoors policy, n=3 male patients threatened violence to staff or other patients if forced to abstain, however none of the patients who threatened violence were involved in any aggressive incident during the follow-up period. There was a reduction in the number of recorded verbal aggression incidents by male patients from 3 months before implementation to 3 months after (29 incidents versus 16 incidents); the change in rates of verbal aggression was not statistically significant ($P=0.9$). Three months post-implementation, n=2 male patients were involved in verbal outbursts attributed to nicotine withdrawal during the first month after policy implementation. Twelve months post-implementation, there was no recorded verbal aggression by male patients directly related to nicotine withdrawal.

In **Cormac's 2010 [UK +] uncontrolled before and after study (with a different patient sample)**, there were significantly more violent incidents for pre-ban smokers in July 2007 (n=198) after implementation of the national indoor smokefree legislation in England and a local (NHS Trust's) smokefree grounds policy than in December 2006 before its implementation (n=158) ($p=0.01$). Other results were not significant for comparisons between pre-ban smokers or non-smokers or all patients for either time period comparison.

In an **uncontrolled before and after study, Haller 1996 [USA +]** reported there was no significant change in the proportion of 8-hour shifts in which physical aggression against other people or

physical aggression against objects occurred over the month preceding a local (hospital's) smokefree buildings and smokefree grounds policy and during the 4 months following its implementation. The proportion of 8-hour shifts in which physical aggression against self occurred increased during the second month of the smokefree policy (from 1.2% to 17.9%), then returned to the pre-implementation level by 3 months (1.2%) and 4 months (14.3%) into its implementation ($p<0.01$). The proportion of 8-hour shifts in which verbal aggression occurred decreased 1 month following the policy's implementation (from 35.7% to 21.4%), increased during the second month (60.7%), and returned to the pre-implementation levels at 3 (23.8%) and 4 months (35.7%) ($p<0.01$).

In an **uncontrolled before and after study (with different sample) (Matthews 2005 [USA -])**, no significant differences were found in the 3 months before and 3 months after the local (hospital's) smokefree buildings policy was implemented related to the total number of patients who committed at least 1 episode of assault or self-harm. No significant differences were found in the total number of episodes of assault or self-harm between the time periods pre- and post- policy implementation.

Rauter's 1997 [USA +] cohort study found that the highest frequency of assaults was during the 6 months of baseline period one (15 months prior to the implementation of a local (hospital's) smokefree buildings policy), with an average of 49 incidents per month. The first 3 months of the ban showed a decrease in the average monthly assault rate (46.30 incidents) when compared to the same time 1 year previously (58.67 incidents). One year after implementation, an average of 28.5 monthly assault rates occurred in the first 6 months of the year. No further statistical analysis reported. A sub-set of recorded patient assaults were related to smoking. Three smoking-related assaults occurred in the final month of baseline period two (3 months prior to the ban) and four smoking-related assaults occurred in the first 3 months of the policy. One year after smokefree implementation, four smoking-related assaults occurred in the first 6 months of the year.

Another cohort study in the USA (**Velasco 1996 [USA -]**) reported that the mean number of verbal assaults during the period immediately after implementation of a local (hospital's) smokefree buildings policy in 1991 was significantly higher than in the period before implementation ($F=8.80$, $df=2,109$, $p<0.001$), but there was no difference in the number of assaults before implementation and in the 1993 follow up. The mean number of physical assaults did not change significantly between any of the three time periods; 6 weeks immediately before implementation of the ban, 6 weeks immediately after the 1991 ban, and the 1993 follow up.

Other Impacts on Patients: Inpatient Violent Incidents/Aggression (Mental Healthcare)

Evidence statement 3.1: There is **moderate** evidence from four before and after studies, three in the USA (**Hempel 2002 [+], Quinn 2000 [-], Haller 1996 [+])** and one in the UK **(Shetty 2010 [+]**) that smokefree implementation with supporting strategies may decrease or have no effect on inpatient verbal aggression in a mental healthcare setting. One cohort study in the USA (**Velasco 1996 [-]**) showed an immediate significant increase in verbal aggression, but this was not maintained in the long term.

UK Applicability: Evidence comes from one recent UK study but mostly from outside the UK. However nearly half the studies test smokefree grounds and buildings (a policy implemented in parts of the UK), the others test indoor smokefree already national legislation in the UK. There is no reason to believe the effect is not applicable to the UK setting.

In the USA, **Hempel 2002 [+]** reported a significant decline in verbal aggression in heavy smokers (≥19 cigs/day) ($Z = -2.12$, $p=0.034$) 4 weeks after implementation a local (hospital board's) smokefree

(campus) buildings and smokefree grounds policy compared with 4 weeks prior to implementation. There were no significant changes for non-smokers, light smokers (1-9 cigs/day) and moderate smokers (10-18 cigs/day). ***Supporting strategies*** *included education for staff about potential withdrawal symptoms, and any tobacco products found on patients were seized.*

In the USA, **Quinn 2000 [-]** reported a significant decrease in verbal acts of aggression 1 month post-implementation of a local (hospital's) smokefree (campus) buildings and smokefree grounds policy compared to the month prior to implementation ($p<0.01$). ***Supporting strategies*** *included written policies, pharmacotherapy and patient education about smoking and tobacco addiction recovery.*

In the USA, **Haller 1996 [+]** reported a significant decrease in verbal aggression 1 month following a local (hospital's) smokefree buildings and smokefree grounds policy, an increase during the second month, and a return to pre-policy levels at 3 and 4 months following the policy's implementation ($p<0.01$). **Supporting strategies** were pharmacotherapies, staff education to recognise and treat nicotine withdrawal and written information for patients.

In the UK, **Shetty 2010 [+]** reported a non-significant reduction in the number of recorded verbal aggression incidents by male patients from 3 months before implementing the national indoor smokefree legislation and a local (NHS Trust's) smokefree grounds policy, to 3 months after ($P=0.9$). Two male patients were involved in verbal outbursts attributed to nicotine withdrawal during the first month after implementation, however 12 months after implementation, there was no recorded verbal aggression directly related to nicotine withdrawal. ***Supporting strategies*** *were posters, group and individual cessation support, pharmacotherapies, closure of smoking rooms and staff training.*

In the USA, **Velasco 1996 [-]** reported that the mean number of verbal assaults during the 6-week period immediately after implementation of local (hospital's) smokefree buildings policy in 1991 was significantly higher than in the 6-week period before implementation ($p<0.001$). ***The supporting strategy*** *was that patients were notified of the indoor smoking ban prior to admission.*

Evidence statement 3.2: There is **inconsistent** evidence from six before and after studies in the USA (**Hempel 2002 [+], Quinn 2000 [-], Haller 1996 [+], Matthews 2005 [-])** and the UK (**Shetty 2010 [+], Cormac 2010 [+],**) two cohort studies in the USA (**Rauter 1997 [+], Velasco 1996 [-]**) and one interrupted time series in the USA (**Erwin 1991 [-]**) that smokefree implementation with supporting strategies may affect inpatient physical aggression in a **mental healthcare setting**.

UK Applicability: Evidence comes from two recent UK studies but mostly from outside the UK. However over half the studies test smokefree grounds and buildings (a policy implemented in parts of the UK), the others test indoor smokefree already national legislation in the UK. There is no reason to believe the effect is not applicable to the UK setting.

One before and after study in the UK (**Cormac 2010 [+]**) showed a significant increase in inpatient violent incidents for pre-implementation smokers 4 months after implementation of the national indoor smokefree legislation in England and a local (NHS Trust's) smokefree grounds policy compared with 4 months before implementation ($p=0.01$). There was no significant difference between pre-ban smokers assessed 1 month pre- and 1 month post-implementation. ***Supporting strategies*** *were pharmacotherapy, cessation support, staff training and patient surrender of smoking materials.*

Five studies that reported significance values found that smokefree implementation with supporting strategies either significantly decreases inpatient physical aggression (**Quinn 2000 [-]**), or has no

significant effect on inpatient physical aggression (**Hempel 2002 [+]**, **Haller 1996 [+]**, **Matthews 2005 [-]**, **Velasco 1996 [-]**). Three further studies reported a non-significant decline in inpatient physical aggression (**Shetty 2010 [+]**, **Rauter 1997 [-]**) or a decline in inpatient physical aggression (without providing the p values) (**Erwin 1991 [-]**) in a **mental healthcare setting**.

One interrupted time series in the USA (**Erwin 1991 [-]**) reported a decline in the proportion of nursing staff reporting that they intervened verbally or physically to prevent a patient who demanded to smoke from harming self or others, between 1 week post-implementation and 4 weeks post-implementation of a local (US Department of Veterans Affairs) smokefree buildings policy (no p values calculated). ***Supporting strategies*** *were based around nursing interventions, including encouraging patients to participate in smoking cessation groups and addressing patients with the urge to smoke*.

In the USA, **Hempel 2002 [+]** reported no significant changes in physical aggression in non-smokers or smokers 4 weeks after implementation a local (hospital board's) smokefree (campus) buildings and smokefree grounds policy compared with 4 weeks prior to implementation. ***Supporting strategies*** *included education for staff about potential withdrawal symptoms, and any tobacco products found on patients were seized.*

In the USA, **Quinn 2000 [-]** reported a significant decrease in physical acts of aggression 1 month post-implementation of a local (hospital's) smokefree (campus) buildings and smokefree grounds policy compared to the month prior to implementation ($p<0.01$). ***Supporting strategies*** *included written policies, pharmacotherapy and patient education about smoking and tobacco addiction recovery.*

In the UK, **Shetty 2010 [+]** reported a non-significant reduction in the number of recorded physical aggression incidents by male patients from 3 months before implementing the national indoor smokefree legislation and a local (NHS Trust's) smokefree grounds policy, to 3 months after ($P=0.6$). ***Supporting strategies*** *were posters, group and individual cessation support, pharmacotherapies, closure of smoking rooms and staff training.*

In the USA, **Haller 1996 [+]** reported no significant change in physical aggression against other people or physical aggression against objects occurred over the 1 month preceding the local (hospital's) smokefree buildings and smokefree grounds policy or the 4 months following its implementation. There was a significant increase in physical aggression against self during the second month post-policy and a decrease to pre-policy levels at 3 and 4 months following the policy's implementation ($p<0.01$). ***Supporting strategies*** *were pharmacotherapies, staff education to recognise and treat nicotine withdrawal and written information for patients.*

In the USA, **Matthews 2005 [-]** reported no significant differences between the number of episodes or total number of patients who committed at least 1 episode of assault or self-harm in the 3 months before and 3 months after the local (hospital's) smokefree buildings policy was implemented. ***Supporting strategies*** *included patient education about nicotine addiction and withdrawal and pharmacotherapies.*

In the USA, **Rauter 1997 [-]** reported a decrease in the average monthly assault rate for the first three months of the implementation of a local (hospital's) smokefree buildings policy when compared to the same time 1 year previously. ***Supporting strategies*** *included smoking reduction workshops and patients wishing to participate were urged to do so.*

In the USA, **Velasco 1996 [-]** reported no significant change in the mean number of physical assaults between any of the three time periods: 6 weeks immediately before implementation of the local (hospital's) smokefree buildings policy, 6 weeks immediately after the 1991 ban, and the 1993 follow up. ***The supporting strategy*** *was that patients were notified of the indoor smoking ban prior to admission.*

3.3.1.2 Seclusion and Restraint (Mental Healthcare)

Six before and after studies, one with a cross sectional component, and one cohort study report outcomes relating to the impact of local policy or national legislation for implementation of smokefree buildings and/or grounds with supporting strategies on patient seclusion and restraint in mental healthcare settings (see study descriptions in Figure 3.3 and Table 2.1 above). There was generally a decrease or no change in adverse effects from local-level smokefree policy or national smokefree legislation implementation.

All studies reporting outcome measures for the application of restraints are from the USA. The most recent guidance for the application of mechanical (or physical) restraints in the UK, states that "*Mechanical restraints are not a first-line response or standard means of managing disturbed/violent behaviour in acute mental health care settings. In the event that they are used, it must be a justifiable, reasonable and proportionate response to the risk posed by the service user, and only after a multidisciplinary review has taken place. Legal, independent expert medical and ethical advice should be sought and documented*" (NCC-NSC, 2005: p. 99). The Guidance notes that mechanical restraints are used only in "exceptional circumstances" in the UK, and there is limited evidence for their use[11].

In **Cormac's 2010 [UK +] uncontrolled before and after study (with a different patient sample)**, there were no significant results for comparisons of the numbers of seclusions between 1 month before and 1 month after implementation of the national indoor smokefree legislation in England and a local (NHS Trust's) smokefree grounds policy, nor between 4 months before and 4 months after implementation, for smokers or non-smokers or all patients for either time period comparison.

In **Erwin's 1991 [USA -]** interrupted time series, there was little change in nursing staff reporting that they had encouraged room "time outs" to decrease stimulation, from 40% and 88% (Wards A and B) 1 week post-implementation to 60% and 70% (Wards A and B) 4 weeks post-implementation of a local (US Department of Veterans Affairs) smokefree buildings policy (no p values calculated).

In an **uncontrolled before and after study, Haller 1996 [USA +]** reported there were no significant changes (to $p<0.05$ level) in the proportion of patients who were secluded 1 month prior to a local (hospital's) smokefree buildings and smokefree grounds policy (26% of n=27) and during the 4 months following its implementation (23% of n=26 patients 1 month after implementation, 20% of n=30 patients 2 months after, 25% of n=36 patients 3 months after and 14% of n=43 patients 4 months after implementation). Nor were there significant changes (to $p<0.05$ level) in the proportion of patients who were restrained (19% of n=27 patients 1 month prior, 15% of n=26

[11] An update of the guideline is currently in the process of being scheduled into the work programme, however no new evidence relating to the safe use of physical interventions (seclusion or restraint) in health and social care settings for short term management of violent/aggressive psychiatric patients which may potentially change the current recommendation(s) was identified (http://www.nice.org.uk/nicemedia/live/10964/58082/58082.pdf, accessed 15th October 2012).

patients 1 month post, 7% of n=30 patients 2 months post, 6% of n=36 patients 3 months post and 7% of n=43 patients 4 months post implementation).

Hempel's 2002 [USA +] before and after study assessed the same sample of forensic patients 4 weeks prior to, and 4 weeks after implementation of a local (hospital board's) smokefree (campus) buildings and smokefree grounds policy. There were no significant changes in the mean instances per week of seclusion or restraint prior to the policy and following its implementation for non-smokers, light smokers (1-9 cigarettes/day), moderate smokers (10-18 cigarettes/day), or heavy smokers (≥19 cigarettes/day).

In an **uncontrolled before and after study (with different sample) (Matthews 2005 [USA -])**, no significant differences were found in the 3 months before and 3 months after the local (hospital's) smokefree buildings policy was implemented related to the total number of patients who required seclusion or restraint.

In **Patten's 1995 [USA +] uncontrolled before and after study** examining hospital chart data, there was no significant change in the use of restraints between 3 months pre- and 3 months post-implementation of a local (hospital board's) smokefree buildings and smokefree grounds policy ($p=0.175$). Seclusion rates, however, were significantly lower post-implementation ($p<0.05$).

In **Velasco's 1996 [USA -] cohort study**, the number of applications of soft restraints (cloth devices e.g. poesy vest) was significantly higher during the 1993 follow up period than during the period before implementation of the local (hospital's) smokefree buildings policy ($F=14.36$, $df=2,105$, $p<0.001$). The mean number of leather wrist or ankle bindings did not change significantly between any of the three time periods; 6 weeks immediately before implementation of the policy, 6 weeks immediately after the 1991 ban, and the 1993 follow up.

Other Impacts on Patients: Inpatient Seclusion and Restraint (Mental Healthcare)

Evidence statement 3.3: There is **moderate** evidence from five before and after studies, one in the UK (**Cormac 2010 [UK +])** and four in the USA **(Haller 1996 [+], Hempel 2002 [+], Matthews 2005 [-], Patten 1995 [+]**), and one interrupted time series in the USA (**Erwin 1991 [-]**) that the introduction of smokefree in mental healthcare settings decreases or has no significant effect on incidents of inpatient seclusion and restraint. One poor quality cohort study in the USA (**Velasco 1996 [-]**) showed a significant increase for soft restraints but no difference for leather restraints.

UK Applicability: Evidence comes from one recent UK study but mostly from outside the UK. However over half the studies test smokefree grounds and buildings (a policy implemented in parts of the UK), the others test indoor smokefree already national legislation in the UK. The use of mechanical or physical restraints is not a first-line response in the UK and so this is of limited applicability in the UK.

Cormac 2010 [+] in the UK found no significant results for comparisons of the numbers of seclusions between pre-ban smokers or non-smokers or all patients for between 1 month before and 1 month after implementation of the national indoor smokefree legislation in England and a local (NHS Trust's) smokefree grounds policy, nor between 4 months before and 4 months after implementation. ***Supporting strategies*** *were pharmacotherapy, cessation support, staff training and patient surrender of smoking materials.*

Haller 1996 [+] in the USA reported no significant changes in the proportion of patients who were secluded or the proportion of patients who were restrained over the 1 month preceding the local (hospital's) smokefree buildings and smokefree grounds policy or the 4 months following its implementation. ***Supporting strategies*** *were pharmacotherapies, staff education to recognise and treat nicotine withdrawal and written information for patients.*

Hempel 2002 [+] in the USA reported no significant changes in mean instances per week of seclusion or restraint in non-smokers or smokers 4 weeks after implementation a local (hospital board's) smokefree (campus) buildings and smokefree grounds policy compared with 4 weeks prior to implementation. ***Supporting strategies*** *included education for staff about potential withdrawal symptoms, and any tobacco products found on patients were seized.*

Matthews 2005 [-] in the USA reported no significant differences between the total number of patients who required seclusion or restraint in the 3 months before and 3 months after the local (hospital's) smokefree buildings policy was implemented. ***Supporting strategies*** *included patient education about nicotine addiction and withdrawal and pharmacotherapies.*

One before and after study in the USA (**Patten 1995 [+]**) found no significant change in the use of restraints between 3 months pre- and 3 months post-implementation of a local (hospital board's) smokefree buildings and smokefree grounds policy ($p=0.175$). Seclusion rates, however, were significantly lower post-implementation ($p<0.05$). ***Supporting strategies*** *included an implementation committee, weekly patient cessation support groups, pharmacotherapies, written information for patients and staff education sessions on the treatment of nicotine dependence*.

One interrupted time series in the USA (**Erwin 1991 [-]**) reported little change in nursing staff reporting that they had encouraged room "time outs" to decrease stimulation, between 1 week post-implementation and 4 weeks post-implementation of a local (US Department of Veterans Affairs) smokefree buildings policy (no p values calculated). ***Supporting strategies*** *were based around nursing interventions, including encouraging patients to participate in smoking cessation groups and addressing patients with the urge to smoke*.

In the USA, **Velasco 1996 [-]** reported that the number of applications of soft restraints was significantly higher during the 1993 follow up period than during the period before implementation of the local (hospital's) smokefree buildings policy ($p<0.001$). The mean number of leather wrist or ankle bindings did not change significantly between any of the three time periods; 6 weeks immediately before and after implementation of the policy and the 1993 follow up. ***The supporting strategy*** *was that patients were notified of the indoor smoking ban prior to admission.*

3.3.1.3 Security Calls for Help (Mental Healthcare)

One cohort study reported outcomes relating to the impact of local policy for implementation of smokefree buildings with supporting strategies on security calls in mental healthcare settings (see study descriptions in Figure 3.3 and Table 2.1 above). There was no change in adverse effects from local-level smokefree policy or national smokefree legislation implementation.

In **Velasco's 1996 [USA -] cohort study**, the mean number of security calls (for help from security officers) did not change significantly between any of the three time periods: 6 weeks immediately before implementation of the local (hospital's) smokefree buildings policy, 6 weeks immediately after the 1991 ban, and the 1993 follow up.

Other Impacts on Patients: Security Calls (Mental Healthcare)

Evidence statement 3.4: There is **weak** evidence from one cohort study in the USA (**Velasco 1996 [-]**) that recorded security calls (for help from security officers) may not increase with the introduction of smokefree in mental healthcare settings.

UK Applicability: This evidence was conducted outside the UK and the policy covered (indoor smokefree) is already national legislation in the UK. However there is no reason to believe the strategy's effect is not applicable to the UK setting.

In the USA, **Velasco 1996 [-]** reported no significant change in the mean number if security calls for help from security officers between any of the three time periods: 6 weeks immediately before implementation of the local (hospital's) smokefree buildings policy, 6 weeks immediately after the 1991 ban, and the 1993 follow up. ***The supporting strategy*** *was that patients were notified of the indoor smoking ban prior to admission.*

3.3.1.4 Medication Changes (Mental Healthcare)

Five before and after studies, one before and after and cross sectional study and one cohort study report outcomes relating to the impact of local policy or national legislation for implementation of smokefree buildings and/or grounds with supporting strategies on changes in medications in mental healthcare settings (see study descriptions in Figure 3.3 and Table 2.1 above). Almost all related to as required (PRN) medications, although one (**Shetty 2010 [UK +]**) also reported changes to serum clozapine (an antipsychotic drug) levels and one (**Cormac 2010 [UK +]**) reported changes to regular antipsychotics and benzodiazepines. There were inconsistent results showing no change, a decrease or an increase in adverse effects from local-level smokefree policy or national smokefree legislation implementation.

In **Cormac's 2010 [UK +] uncontrolled before and after study (with a different patient sample)**, there was a significant decline in mean dose of regular antipsychotic medication for smokers from 1 month before (M=64.1, SD 39.4) to 1 month after (M=61.2, SD 37.4, 95% CI 0.37-5.42; p=0.025) implementation of the national indoor smokefree legislation in England and a local (NHS Trust's) smokefree grounds policy. Other results were not significant for comparisons of mean dose of regular or PRN antipsychotics or benzodiazepines between pre-ban smokers or non-smokers for either time period comparison (1 month pre- versus 1 month post-implementation and 4 months pre- versus 4 months post implementation).

In **Erwin's 1991 [USA -] interrupted time series**, there was a reduction in the number of patients offered PRN medications, from 60% and 75% (Wards A and B) 1 week post-implementation to 40% and 40% (Wards A and B) 4 weeks post-implementation of a local (US Department of Veterans Affairs) smokefree buildings policy (no p values calculated).

In an **uncontrolled before and after study, Haller 1996 [USA +]** reported there were no significant changes (to $p<0.05$ level) in the proportion of patients who received PRN medications 1 month prior to a local (hospital's) smokefree buildings and smokefree grounds policy (74% of n=27) and during the 4 months following its implementation (62% of n=26 patients 1 month after implementation, 70% of n=30 patients 2 months after, 61% of n=36 patients 3 months after and 51% of n=43 patients 4 months after implementation).

Hempel's 2002 [USA +] before and after study assessed the same sample of forensic patients 4 weeks prior to, and 4 weeks after implementation of a local (hospital board's) smokefree (campus)

buildings and smokefree grounds policy. There were no significant changes in the mean instances per week of PRN for agitation and PRN for aggression prior to the policy and following its implementation for non-smokers, light smokers (1-9 cigarettes/day), moderate smokers (10-18 cigarettes/day), or heavy smokers (≥19 cigarettes/day).

In **Patten's 1995 [USA +] uncontrolled before and after study** examining hospital chart data, there were no significant differences in total PRN medication use (p=0.249) or in the percentage of patient days with PRN medication (p=0.166) between 3 months pre- and 3 months post-implementation of a local (hospital board's) smokefree buildings and smokefree grounds policy. Seclusion rates, however, were significantly lower post-implementation (p<0.05).

One **uncontrolled before and after study** (with the same sample) set in England (**Shetty 2010 [UK +])** found no statistically significant change in rates of PRN tranquilisers for male patients from 3 months before implementing the national indoor smokefree legislation and a local (NHS Trust's) smokefree grounds policy, to 3 months after (p=0.6 for lorazepam and p=0.4 for haloperidol). Twenty-three male patients received clozapine (it was not specifically reported at which time point), all of whom were smokers; the increase in serum clozapine levels was significant post-implementation (p=0.006). It was necessary to reduce the dose in four patients (it was not specifically reported at which time point).

In **Velasco's 1996 [USA -] cohort study**, the use of PRN medication for agitation, including anxiety, was significantly higher during the 6 week period immediately after implementation of the local (hospital's) smokefree buildings policy than during the 6 week period immediately before (F=2.89, df=2,107, p<0.06).

Other Impacts on Patients: Inpatient Medication Changes (Mental Healthcare)

Evidence statement 3.5: There is **inconsistent** evidence from five before and after studies, two in the UK (**Cormac 2010 [+], Shetty 2010 [+])** and three in the USA **(Haller 1996 [+], Hempel 2002 [+], Patten 1995 [+]**), one interrupted time series in the USA (**Erwin 1991 [-]**) and one cohort study in the USA (**Velasco 1996 [-]**) that the introduction of smokefree legislation may change the required doses of inpatient PRN medication. Five before and after studies, two in the UK (**Cormac 2010 [+], Shetty 2010 [+])** and three in the USA **(Haller 1996 [+], Hempel 2002 [+], Patten 1995 [+]**) and one interrupted time series in the USA (**Erwin 1991 [-]**) suggest that required doses of inpatient PRN medications do not change or may decrease, whereas one cohort study in the USA (**Velasco 1996 [-]**) suggests that required doses of inpatient PRN medications for agitation and aggression may increase with the introduction of smokefree in mental healthcare settings.

UK Applicability: Evidence comes from two recent UK studies but mostly from outside the UK. However over half the studies test smokefree grounds and buildings (a policy implemented in parts of the UK), the others test indoor smokefree already national legislation in the UK. There is no reason to believe the effect is not applicable to the UK setting.

In the UK, **Cormac 2010 [+]** found a significant decline in mean dose of regular antipsychotic medication for smokers from 1 month before to 1 month after (95% CI 0.37-5.42; p=0.025) implementation of the national indoor smokefree legislation in England and a local (NHS Trust's) smokefree grounds policy. Other results were not significant for comparisons of mean dose of regular or PRN antipsychotics or benzodiazepines between pre-ban smokers or non-smokers for the 1 month pre-post or the 4 month pre-post comparisons. ***Supporting strategies*** *were pharmacotherapy, cessation support, staff training and patient surrender of smoking materials.*

One interrupted time series in the USA (**Erwin 1991 [-]**) reported a reduction in the number of patients offered PRN medications, between 1 week post-implementation and 4 weeks post-implementation of a local (US Department of Veterans Affairs) smokefree buildings policy (no p values calculated). ***Supporting strategies*** *were based around nursing interventions, including encouraging patients to participate in smoking cessation groups and addressing patients with the urge to smoke*.

In the USA, **Haller 1996 [+]** reported no significant changes in the proportion of patients who received PRN medications over the 1 month preceding the local (hospital's) smokefree buildings and smokefree grounds policy or the 4 months following its implementation. ***Supporting strategies*** *were pharmacotherapies, staff education to recognise and treat nicotine withdrawal and written information for patients.*

In the USA, **Hempel 2002 [+]** reported no significant changes in mean instances per week of PRN for agitation and aggression in non-smokers or smokers 4 weeks after implementation a local (hospital board's) smokefree (campus) buildings and smokefree grounds policy compared with 4 weeks prior to implementation. ***Supporting strategies*** *included education for staff about potential withdrawal symptoms, and any tobacco products found on patients were seized.*

In the UK, **Shetty 2010 [+]** reported a non-statistically significant change in rates of PRN tranquilisers for male patients from 3 months before implementing the national indoor smokefree legislation and a local (NHS Trust's) smokefree grounds policy, to 3 months after (p=0.6 for lorazepam and p=0.4 for haloperidol). ***Supporting strategies*** *were posters, group and individual cessation support, pharmacotherapies, closure of smoking rooms and staff training.*

One before and after study in the USA (**Patten 1995 [+]**) reported no significant differences in total PRN medication use (p=0.249) or in the percentage of patient days with PRN medication (p=0.166) between 3 months pre- and 3 months post-implementation of a local (hospital board's) smokefree buildings and smokefree grounds policy. ***Supporting strategies*** *included an implementation committee, weekly patient cessation support groups, pharmacotherapies, written information for patients and staff education sessions on the treatment of nicotine dependence*.

In the USA, **Velasco 1996 [-]** reported that the use of PRN medication for anxiety was significantly higher during the 6-week period immediately after implementation of local (hospital's) smokefree buildings policy in 1991 was significantly higher than in the 6-week period before implementation (p<0.06). ***The supporting strategy*** *was that patients were notified of the indoor smoking ban prior to admission.*

Evidence statement 3.6: There is evidence from two before and after studies in the UK (**Cormac 2010 [+]**), **Shetty 2010 [+]**) about the impact of smokefree legislation on inpatient antipsychotic medication in a **mental healthcare setting**.

UK Applicability: The evidence comes from two recent UK studies thus is highly applicable.

There is **weak** evidence from one before and after study in the UK **(Cormac 2010 [+]**) that required doses of antipsychotic medication significantly decreases with the introduction of a national indoor smokefree legislation and local (NHS Trust's) smokefree grounds policy *(95% CI 0.37-5.42; p=0.025)*.

In the UK, **Cormac 2010 [+]** found a significant decline in mean dose of regular antipsychotic medication for smokers from 1 month before to 1 month after (95% CI 0.37-5.42; p=0.025) implementation of the national indoor smokefree legislation in England and a local (NHS Trust's)

smokefree grounds policy. Other results were not significant for comparisons of mean dose of regular or PRN antipsychotics between pre-ban smokers or non-smokers for the 1 month pre-post or the 4 month pre-post comparisons. ***Supporting strategies*** *were pharmacotherapy, cessation support, staff training and patient surrender of smoking materials.*

There is **weak** evidence from one before and after study in the UK (**Shetty 2010 [+]**) that serum levels of clozapine in male patients significantly increases with the introduction of smokefree *the* national indoor smokefree legislation and a local (NHS Trust's) smokefree grounds policy *(p=0.006)*.

In the UK, **Shetty 2010 [+]** reported a statistically significant increase in serum clozapine levels (p=0.006) for male patients from 3 months before implementing the national indoor smokefree legislation and a local (NHS Trust's) smokefree grounds policy, to 3 months after. ***Supporting strategies*** *were posters, group and individual cessation support, pharmacotherapies, closure of smoking rooms and staff training.*

3.3.1.5 Disruptive Behaviours (Mental Healthcare)

One before and after study reported outcomes relating to the impact of local policy for implementation of smokefree buildings and grounds with supporting strategies on a combined measure of disruptive behaviours in mental healthcare settings (see study descriptions in Figure 3.3 and Table 2.1 above). There was a decrease in adverse effects from local-level smokefree policy or national smokefree legislation implementation.

Hempel's 2002 [USA +] before and after study assessed the same sample of forensic patients 4 weeks prior to, and 4 weeks after implementation of a local (hospital board's) smokefree (campus) buildings and smokefree grounds policy. Instances of PRN for agitation, PRN for aggression, verbal aggression, physical aggression, loss of privileges, and restraint and seclusion were combined to give a total for instances of 'disruptive behaviours'. Overall, there was a significant 49% post-implementation decline in disruptive behaviours among the moderate smokers (10-18 cigarettes/day) (Z = -2.24 p=0.025) and heavy smokers (≥19 cigarettes/day) (Z = -2.71, p=0.007). There were no significant post-implementation changes in disruptive behaviours among the non-smokers or light smokers (1-9 cigarettes/day).

Other Impacts on Patients: Inpatient Disruptive Behaviours (Mental Healthcare)

Evidence statement 3.7: There is **weak** evidence from one before and after study in the USA (**Hempel 2002 [+]**) that combined measures of inpatient disruptive behaviours decreases with the introduction of smokefree in mental healthcare settings, particularly amongst moderate and heavy smokers. Instances of PRN for agitation, PRN for aggression, verbal aggression, physical aggression, loss of privileges, and restraint and seclusion were combined to give a total for instances of inpatient 'disruptive behaviours'. Overall, there was a significant post-ban local (hospital board's) smokefree (campus) buildings and smokefree grounds policy decline in inpatient disruptive behaviours among the moderate smokers, Z = -2.24 p=0.025 and heavy smokers, Z = -2.71, p=0.007. There were no significant post-ban changes in inpatient disruptive behaviours among the non-smokers or light smokers. ***Supporting strategies*** *include provision of education to staff about potential withdrawal symptoms, and any tobacco products found on patients were seized.*

UK Applicability: This evidence was conducted outside the UK however the study tests smokefree grounds and buildings (a policy implemented in parts of the UK). There is no reason to believe the strategy's effect is not applicable to the UK setting.

3.3.1.6 Admittance and Length of Stay (Mental Healthcare)

Four before and after studies and two cohort studies report outcomes relating to the impact of local policy for implementation of smokefree buildings and/or grounds with supporting strategies on patient attendance and premature terminators ('drop-outs') in mental healthcare settings (see study descriptions in Figure 3.3 and Table 2.1 above). In five of the studies, this was specifically related to inpatients signing out against medical advice (AMA), however one also reported the number of inpatients who eloped (**Haller 1996 [USA +]**) and one only reported premature terminators from the outpatient programme (**Sterling 1994 [USA -]**). There was no change in adverse effects from local-level smokefree policy or national smokefree legislation implementation.

In an **uncontrolled before and after study, Haller 1996 [USA +]** reported there were no significant changes (to $p<0.05$ level) in the proportion of patients who were secluded 1 month prior to a local (hospital's) smokefree buildings and smokefree grounds policy (4% of n=27) and during the 4 months following its implementation (zero of n=26 patients 1 month after implementation, 20% of n=30 patients 2 months after, 8% of n=36 patients 3 months after and 7% of n=43 patients 4 months after implementation). Nor were there significant changes (to $p<0.05$ level) in the proportion of patients who eloped (zero % of n=27 patients 1 month prior, 15 zero of n=26 patients 1 month post, 7% of n=30 patients 2 months post, 3% of n=36 patients 3 months post and zero of n=43 patients 4 months post implementation).

In **Patten's 1995 [USA +] uncontrolled before and after study** examining hospital chart data, it was reported that two patients left against medical advice 3 months post-implementation of a local (hospital board's) smokefree buildings and smokefree grounds policy. None were reported to have left during the 3 months pre-implementation however this difference was not significant ($p=0.500$).

In an **uncontrolled before and after study, Rees 2008 [USA +]** reported there was no evidence of increased rates of patients leaving the unit against medical advice, or transfers to other inpatient facilities among tobacco users between the 12 months before and 12 months after implementation of a local (university hospital's) smokefree buildings policy in its inpatient medical detoxification unit ($p>0.10$). The number of admissions appeared to remain stable, with 516 in the 12 months before, and 561 in the 12 months after implementation of the smokefree buildings policy the ban. The average length of stay significantly decreased after the implementation; in the 12 months pre-smokefree, the average stay was 5.15 days and in the 12 months post-smokefree, the average stay was 4.79 days ($p<0.05$). The decrease was similar for patients who used tobacco and those who did not ($p>0.10$). Patient demographics also remained similar before and after; mean age: pre-ban 36.7 years; post-ban 35.7 years, gender pre-ban 69.6% male, post-ban 73.6% male, tobacco users pre-ban 80.2%; post-ban 84.0%, European Americans; Pre-ban 72.7% Post-ban 76.5% (all not significant).

In **Sterling's 1995 [USA -] cohort study**, there was no significant increase in the proportion of outpatient premature terminators ('drop-outs') observed at 1 and 3 months following the implementation of a local (facility's) smokefree buildings policy compared with 1 and 3 months before ($p>0.05$). The average number of daily new admissions per week did not change significantly between the 3 months prior to smokefree buildings policy implementation (1.74 (SD=0.55)) and the 3 months following (1.43 (SD=0.59), $t(24)=1.40$, $p>0.05$). Results indicated that the average number of outpatients attending groups per week did not decrease significantly following the smokefree buildings policy implementation, with a mean of 21.75 (SD=2.18) group attendees for 1 and 3 months before, and 19.75 (SD=2.99) for 1 and 3 months following, ($t(24)=1.96$, $p> 0.05$).

In **Velasco's 1996 [USA -] cohort study**, the mean number of discharges against medical advice did not change significantly between any of the three time periods: 6 weeks immediately before implementation of the local (hospital's) smokefree buildings policy, 6 weeks immediately after the 1991 ban, and the 1993 follow up.

In a randomised controlled trial (**Kempf 1996 [USA +]**), 2% of 105 adolescents randomly assigned to the tobacco-free residential programme based at the intervention campus, with a local (facility's) smokefree buildings and grounds (campus) policy, declined admission compared to 5% of 105 adolescents randomly assigned to the residential programme based at the control campus, with a smokefree buildings and designated outdoor areas policy. Pre-allocation, 17% of 105 adolescents randomly assigned to the tobacco-free programme declined admission compared to 22% of those randomly to the programme based at the control campus, this difference was non-significant (p=0.38). Retention at 2 days was slightly higher in the programme based at the control campus compared with the intervention campus (95% vs. 91%), although this difference is non-significant (p=0.43). Retention at 2 weeks was slightly higher in the programme at the intervention campus with the smokefree campus policy (80% vs. 74%), although this difference is non-significant (p=0.37). Heavy smokers were much more likely to drop out in the first 2 days of treatment (p=0.005), although were equally likely to drop out of either programme (p=1.0).

Other Impacts on Patients: Patient Admittance and Length of Stay or Attendance (Mental Healthcare)

Evidence statement 3.8: Impact of smokefree legislation on patient admission and inpatient length of stay/outpatient length of attendance in a mental healthcare setting
There is evidence from three before and after studies in the USA (**Haller 1996 [+], Patten 1995 [+], Rees 2008 [+]**), one randomised controlled trial in the USA (**Kempf 1996 [+]**) and two cohort studies in the USA (**Sterling 1994 [-], Velasco 1996 [-]**) about the impact of smokefree legislation on patient admission and inpatient length of stay/outpatient length of attendance in a **mental healthcare setting**.

UK Applicability: This evidence was conducted outside the UK. Some of the studies test smokefree grounds and buildings (a policy implemented in parts of the UK), the others test indoor smokefree already national legislation in the UK. The age of the studies and the specific settings may not very applicable to the UK setting.

There is **moderate** evidence from one before and after study with inpatients in the USA (**Rees 2008 [+]**), one randomised controlled trial with inpatients in the USA (**Kempf 1996 [+]**) and one cohort study with outpatients in the USA (**Sterling 1994 [-]**) that the introduction of smokefree does not significantly impact on admission or retention to substance misuse treatment programmes.

In the USA, **Rees 2008 [+]** reported no significant changes in the number of admissions and patient demographics between the 12 months before and 12 months after implementation of a local (university hospital's) smokefree buildings policy in its inpatient medical detoxification unit. ***The supporting strategy*** *was that patients were informed of the indoor smoking ban as part of their admission screening process.*

In the USA, **Kempf 1996 [+]** reported that 2% of 105 adolescents randomly assigned to the tobacco-free residential programme based at the intervention campus, with a local (facility's) smokefree buildings and grounds (campus) policy, declined admission compared to 5% of 105 adolescents randomly assigned to the residential programme based at the control campus, with a smokefree

buildings and designated outdoor areas policy. Pre-allocation, there was no significant difference between adolescents randomly assigned to either programme who declined admission (p=0.38). There was no significant difference between the two programmes for retention at 2 days (p=0.43) or retention at 2 weeks (p=0.37) Heavy smokers were significantly more likely to drop out in the first 2 days of treatment (p=0.005), although were equally likely to drop out of either programme (p=1.0). ***No supporting strategies*** *were reported.*

In the USA, **Sterling 1995 [-]** reported no significant change in neither the average number of daily new admissions per week, nor average number of outpatients attending groups per week between 1 and 3 months before and 1 and 3 months after the implementation of a local (facility's) smokefree buildings policy (p>0.05). ***Supporting strategies*** *were that outpatients were informed of the ban by a therapist and posters were displayed.*

There is **weak** evidence from one before and after study in the USA (**Rees 2008 [+]**) that reported a significant decrease in the length of patient stay between the 12 months before and 12 months after implementation of a local (university hospital's) smokefree buildings policy in its inpatient medical detoxification unit (p<0.05). The decrease was similar for patients who used tobacco and those who did not (p>0.10). ***The supporting strategy*** *was that patients were informed of the indoor smoking ban as part of their admission screening process.*

There is **strong** evidence from three before and after studies with inpatients in the USA (**Haller 1996 [+], Patten 1995 [+], Rees 2008 [+]**) and two cohort studies in the USA, one with outpatients (**Sterling 1994 [-]**) and one with inpatients (**Velasco [-]**), that the introduction of smokefree in mental health care settings does not significantly impact on the number of discharges against medical advice or patient attendance.

In the USA, **Haller 1996 [+]** reported no significant changes in the proportion of patients who were discharged against medical advice or in the proportion of patients who eloped over the 1 month preceding the local (hospital's) smokefree buildings and smokefree grounds policy or the 4 months following its implementation. ***Supporting strategies*** *were pharmacotherapies, staff education to recognise and treat nicotine withdrawal and written information for patients.*

One before and after study in the USA (**Patten 1995 [+]**) reported a non-significant increase in the number of patients who left against medical advice (p=0.500) between 3 months pre- and 3 months post-implementation of a local (hospital board's) smokefree buildings and smokefree grounds policy. ***Supporting strategies*** *included an implementation committee, weekly patient cessation support groups, pharmacotherapies, written information for patients and staff education sessions on the treatment of nicotine dependence*.

In the USA, **Rees 2008 [+]** reported no significant changes in the rates of patients leaving the unit against medical advice, or transfers to other inpatient facilities among tobacco users (p>0.10) between the 12 months before and 12 months after implementation of a local (university hospital's) smokefree buildings policy in its inpatient medical detoxification unit. ***The supporting strategy*** *was that patients were informed of the indoor smoking ban as part of their admission screening process.*

In the USA, **Sterling 1995 [-]** reported no significant change in the proportion of outpatient premature terminators ('drop-outs') between 1 and 3 months before and 1 and 3 months after the implementation of a local (facility's) smokefree buildings policy (p>0.05). ***Supporting strategies*** *were that outpatients were informed of the ban by a therapist and posters were displayed.*

In the USA, **Velasco 1996 [-]** reported no significant change in the mean number of discharges

against medical advice between any of the three time periods: 6 weeks immediately before implementation of the local (hospital's) smokefree buildings policy, 6 weeks immediately after the 1991 ban, and the 1993 follow up. ***The supporting strategy*** *was that patients were notified of the indoor smoking ban prior to admission.*

3.3.1.7 Complaint Investigations (Mental Healthcare)

One cohort study and one before and after study reported outcomes relating to the impact of local policy for implementation of smokefree buildings and/or grounds with supporting strategies on patients' perceived violations of their right to smoke in mental healthcare settings (see study descriptions in Figure 3.3 and Table 2.1 above). There was a small increase in adverse effects from local-level smokefree policy or national smokefree legislation implementation.

Rauter's 1997 [USA +] cohort study found that the for the first 6 months of the local (hospital's) smokefree buildings policy, 15 formal patient complaints about smoking (from patients perceiving the smokefree building as a violation of their human rights) were submitted, the majority from recently admitted patients. For the same period the following year there were four complaints.

In **Patten's 1995 [USA +] uncontrolled before and after study** examining hospital chart data, it was reported that only one female patient made a complaint related to a smoking issue 3 months post-implementation of a local (hospital board's) smokefree buildings and smokefree grounds policy. No formal complaints were reported during the 3 months pre-implementation.

Other Impacts on Patients: Inpatient Complaint Investigations (Mental Healthcare)

Evidence statement 3.9: There is **moderate** evidence from one before and after study in the USA (**Patten 1995 [+]**) and one cohort study in the USA (**Rauter 1997 [+]**) that the introduction of smokefree in mental health care settings, results in a small number of formal complaints from inpatients about perceived violations of their right to smoke; complaints may be higher in number in the months immediately after implementation than 1 year later (**Rauter 1997 [+]**).

UK Applicability: This evidence was conducted outside the UK. One of the studies tests smokefree grounds and buildings (a policy implemented in parts of the UK), the other tests indoor smokefree already national legislation in the UK. Applicability to the UK could depend on the complaints structure for mental health inpatients in UK.

In the USA, **Rauter 1997 [-]** reported a decrease in formal inpatient complaints about smoking (from patients perceiving the smokefree building as a violation of their human rights) from the first 6 months of the implementation of a local (hospital's) smokefree buildings policy compared to the 1 year later. The majority from recently admitted patients. ***Supporting strategies*** *included smoking reduction workshops and patients wishing to participate were urged to do so.*

In the USA, **Patten 1995 [+]** reported that only one female inpatient made a complaint related to a smoking issue 3 months post-implementation of a local (hospital board's) smokefree buildings and smokefree grounds policy. No complaints were reported during the 3 months pre-implementation. ***Supporting strategies*** *included an implementation committee, weekly patient cessation support groups, pharmacotherapies, written information for patients and staff education sessions on the treatment of nicotine dependence*.

3.3.1.8 Smoking and Quitting Behaviours (Mental Healthcare)

Inpatient Smoking and Quitting Behaviours

One uncontrolled before and after study cohort study reported outcomes relating to the impact of local policy for smokefree buildings with supporting strategies on outcomes relating to patient smoking and cessation behaviours in mental healthcare settings (see study descriptions in Figure 3.3 and Table 2.1 above). There were inconsistent findings for adverse effects from local-level smokefree policy or national smokefree legislation implementation.

In **Etter's 2008 [Switzerland +] uncontrolled before and after study** (with different samples), there was no significant change in the cigarette consumption in the clinic of patients who smoked between 2003 (2 years pre-) and 2006 (1 year post-implementation of a local (hospital administration's) smokefree buildings policy) (24.1 to 23.7 mean cigarettes per day now (p=0.81) and 24.3 to 29.4 mean cigarettes per day before admission (p=0.17)). There was no significant change in smoking prevalence since admission in the clinic of patients who smoked between 2 years pre- and 1 year post-implementation of the smokefree buildings policy. Two years before implementation, 42.2% patients who smoked reported smoking more in the clinic than before admission compared with 39.6% 1 year post-implementation (no p values given).

In **Joseph's 1993 [USA +] cohort study**, 65% of smokers in the control group (pre-implementation of the local (facility's) smokefree buildings policy) and 61% of smokers in the intervention group (post-implementation) described their smoking habits at the time of interview as "the same" as on hospital admission. Twenty-two percent (control) and 22% (intervention) reported "less" smoking, and 10% (control) and 7% (intervention) reported "more" smoking than on admission. The differences between intervention and control groups were not significant. A significantly higher proportion of the intervention group (admitted after the smokefree policy was implemented) self-reported to have quit smoking for at least 1 week after discharge compared the control group (admitted before implementation): 19% (13 of 69) versus 6% (5 of 83), respectively (p=0.02).

Other Impacts on Patients: Inpatient Smoking and Quitting Behaviours (Mental Healthcare)

Evidence statement 3.10: There is **inconsistent** evidence from two before and after studies (one with a control group in the USA (**Joseph 1993 [+]**) and one uncontrolled in Switzerland (**Etter 2008 [+]**) that the introduction of smokefree in mental health care settings impacts on inpatient smoking and cessation behaviour outcomes in mental healthcare settings. There was no significant change in psychiatric inpatients' mean cigarette consumption or smoking prevalence in Switzerland (**Etter 2008 [+])** but in the USA **Joseph 1992 [+]** found significantly more male inpatients in substance abuse treatment quit for ≥1 week after discharge in the local (facility's) smokefree buildings policy (with supporting strategies) intervention group than the control group without smokefree premises.

UK Applicability: This evidence was conducted outside the UK and the policy covered (indoor smokefree) is already national legislation in the UK. However there is no reason to believe the effect is not applicable to the UK setting.

In the USA, **Joseph 1992 [+]** reports there were no significant differences between the proportion of smokers in the control group, admitted pre-implementation of the local (facility's) smokefree buildings policy), and the intervention group, admitted post-implementation, who reported currently smoking 'more', 'the same' or 'less' compared with smoking at admission 8-21 months earlier. A significantly higher proportion of the intervention group reported to have quit smoking for at least 1 week after discharge compared the control group (p=0.02). ***Supporting strategies*** *were*

that patients were informed of the policy and cessation programme prior to admission, and were required to agree in writing to nicotine abstinence during the treatment.

From 2 years pre- to 1 year post-implementation of a local (hospital administration's) smokefree buildings policy in Switzerland, **Etter 2008 [+]** reported no significant change in the cigarette consumption or smoking prevalence in the clinic of inpatients who smoked (p=0.81) and no significant change in smoking prevalence since admission to the clinic of inpatients who smoked. One year post-implementation, 2% fewer inpatients who smoked reported smoking more in the clinic than before admission compared with 2 years pre-implementation. ***Supporting strategies*** *included signage, cessation support, pharmacotherapies, closure of smoking rooms and staff training*.

Long Term Smoking Cessation (Mental Healthcare)

One before and after study and one cohort study reported outcomes relating to the impact of local policy for smokefree buildings with supporting strategies on long term smoking status in mental healthcare settings (see study descriptions in Figure 3.3 and Table 2.1 above). There were no changes for beneficial effects from local-level smokefree policy or national smokefree legislation implementation.

In **Patten's 1995 [USA +] uncontrolled before and after study** examining hospital chart data, 50 smokers (assessed at admission) were admitted to the psychiatric unit during the first 3 months of a local (hospital board's) smokefree buildings and smokefree grounds policy. Of these, n=19 were followed up 16-18 months after discharge. Ninety-five per cent (n=18) patients reported that they were current smokers; all of these patients reported resuming smoking immediately after hospital discharge; n=2 patients reported not smoking at 6 months and 12 months after discharge.

In **Joseph's 1993 [USA +] cohort study**, among the n=152 patients who smoked at admission (from retrospective viewing of chart data), ten self-reported they were not current smokers at the follow-up interview (8-19 months after discharge for the control group and 14-21 months after discharge for the intervention group); n=3 from the control (pre-implementation of the local (facility's) smokefree buildings policy) group and n=7 from the intervention (post-policy implementation) group.

Other Impacts on Patients: Long Term Smoking Cessation (Mental Healthcare)

Evidence statement 3.11: There is **moderate** evidence from one before and after study in the USA (**Patten 1995 [+]**) and one cohort study in the USA (**Joseph 1992 [+]**) that the introduction of smokefree with appropriate supporting strategies in mental health care settings minimal impact on long term smoking cessation.

UK Applicability: This evidence was conducted outside the UK and the policy covered in one study (indoor smokefree) is already national legislation in the UK, however the other study's policy is for smokefree grounds and buildings (a policy implemented in parts of the UK). There is no reason to believe the effect is not applicable to the UK setting.

In the USA, **Patten 1995 [+]** reported that amongst a sub-sample of patients who were current smokers at admission during the first 3 months of a local (hospital board's) smokefree buildings and smokefree grounds policy, then followed up 16-18 months post-discharge, all reported resuming smoking immediately after hospital discharge although 2 patients reported not smoking at 6 months

and 12 months after discharge. ***Supporting strategies*** *included an implementation committee, weekly patient cessation support groups, pharmacotherapies, written information for patients and staff education sessions on the treatment of nicotine dependence*.

Joseph's 1993 [+] study in the USA reported that among the n=152 patients who smoked at admission (from retrospective viewing of chart data), ten self-reported they were not current smokers at the follow-up interview (8-21 months after discharge); n=3 from the control (pre-implementation of the local (facility's) smokefree buildings policy) group and n=7 from the intervention (post-policy implementation) group. ***Supporting strategies*** *were that patients were informed of the policy and cessation programme prior to admission, and were required to agree in writing to nicotine abstinence during the treatment*.

Inpatient Prescriptions For or Use of NRT (Mental Healthcare)

Three uncontrolled before and after studies, one cohort study and one interrupted time series reported outcomes relating to the impact of local policy or national legislation for implementation of smokefree buildings and/or grounds with supporting strategies on patient use of smoking cessation support in mental healthcare settings (see study descriptions in Figure 3.3 and Table 2.1 above). There were no changes for beneficial effects from local-level smokefree policy or national smokefree legislation implementation.

In **Cormac's 2010 [UK +] uncontrolled before and after study (with a different patient sample)**, n=149 inpatients commenced NRT in the 4 months pre-implementation of the national indoor smokefree legislation in England and a local (NHS Trust's) smokefree grounds policy. Post-implementation, an additional n=18 patients commenced NRT (month measurement taken was not reported).

An **uncontrolled before and after study** (**Etter 2008 [Switzerland 2008]**) reported a significant increase in the inpatients who smoked reporting that during their current stay a physician or nurse provided medication (a patch, gum or Zyban) to quit smoking (5.1% to 52.2%, p<0.001) and non-significant increase in those reporting staff advised them to quit smoking (15.4% to 42.6%, p=0.006) and staff helped them to quit smoking (2.6% to 19.6%, p=0.015) between 2 years pre- and 1 year post-implementation of a local (hospital administration's) smokefree buildings policy. Two years before and one year after implementation of the policy, there was a significant increase in staff reporting that the proportion of inpatients to whom NRT was provided significantly increased from 42.3% to 74.5% in 2006 (p<0.001, OR 4.0, 95% CI 1.6-9.9). There was a significant increase in the proportion of inpatients to whom help was provided to quit smoking increased from 26.9% in 2005 (post-partial indoor ban) to 58.2% in 2006 (post-implementation of the smokefree buildings policy) (p=0.007, OR 3.8, 95% CI 1.6-9.3).

In **Velasco's 1996 [USA -] cohort study**, the number of inpatients who received NRT after the smoking ban compared with the period 6 weeks before the local (hospital's) smokefree buildings policy was higher both during the 6-week period immediately after implementation of the policy and for the 1993 follow up (F=8.09, df=2,106, p<0.001).

In **Erwin's 1991 [USA -] interrupted time series**, there was a decline in nursing staff reporting that they had encouraged inpatients to participate in smoking cessation groups from 80% and 100% (Wards A and B) 1 week post-implementation to 60% and 50% (Wards A and B) 4 weeks post-implementation of a local (US Department of Veterans Affairs) smokefree buildings policy (no p values calculated).

In **Patten's 1995 [USA +] uncontrolled before and after study** examining hospital chart data, there was no change in the number of inpatient consultations to the Nicotine Dependence Centre between 3 months pre- and 3 months post-implementation of a local (hospital board's) smokefree buildings and smokefree grounds policy. Thirteen inpatients attended the Centre's weekly support group.

Other Impacts on Patients: Inpatient Prescriptions For or Use of NRT (Mental Healthcare)

Evidence statement 3.12: Impact of smokefree legislation on patient use of smoking cessation support in a mental healthcare setting
There is evidence from three before and after studies, one in the UK (**Cormac 2010 [+])**, one in Switzerland **(Etter 2008 [+])** and one in the USA **(Patten 1995 [+]**), one interrupted time series in the USA (**Erwin 1991 [-]**) and one cohort study in the USA (**Velasco 1996 [-]**) about the impact of smokefree legislation on inpatient use of smoking cessation support in a **mental healthcare setting.**

UK Applicability: Evidence comes from one recent UK study but mostly from outside the UK. However the policy covered in most of the studies (indoor smokefree) is already national legislation in the UK, however the one study's policy is for smokefree grounds and buildings (a policy implemented in parts of the UK). There is no reason to believe the effect is not applicable to the UK setting.

There is **moderate** evidence from two before and after studies, one in the UK (**Cormac 2010 [+]** and one in Switzerland **(Etter 2008 [+]**), and one cohort study in the USA (**Velasco 1996 [-]**) that the introduction of smokefree, particularly when including cessation support and pharmacotherapy as supporting strategies, increases the amount of NRT dispensed or received by inpatients. There is **inconsistent** evidence from two before and after studies, one in Switzerland (**Etter 2008 [+]** and one in the USA **(Patten 1995 [+]**), and one interrupted time series in the USA (**Erwin 1991 [-]**) on the impact of smokefree on inpatient use of cessation support during hospitalisation.

One before and after study in the UK (**Cormac 2010 [+]**) reported an increase in inpatients who commenced NRT after implementation of the national indoor smokefree legislation in England and a local (NHS Trust's) smokefree grounds policy (no further details are reported). ***Supporting strategies*** *were pharmacotherapy, cessation support, staff training and patient surrender of smoking materials.*

From 2 years pre- to 1 year post-implementation of a local (hospital administration's) smokefree buildings policy, **Etter 2008 [+]** in Switzerland reported a significant increase in the inpatients who smoked reporting that during their current stay a physician or nurse provided medication (like a patch, gum or Zyban) to quit smoking ($p<0.001$), no significant change in those reporting that staff advised them to quit smoking ($p=0.006$) or helped them to quit smoking ($p=0.015$). Staff reported that the proportion of inpatients to whom NRT was provided significantly increased 2 years pre- to 1 year post implementation ($p<0.001$, OR 4.0, 95% CI 1.6-9.9) and the proportion of inpatients to whom help was provided to quit smoking significantly increased from 1 year pre- to 1 year post-implementation ($p=0.007$, OR 3.8, 95% CI 1.6-9.3). ***Supporting strategies*** *included signage, cessation support, pharmacotherapies, closure of smoking rooms and staff training*.

One interrupted time series in the USA (**Erwin 1991 [-]**) reported a decline in nursing staff reporting that they had encouraged inpatients to participate in smoking cessation groups, between 1 week post-implementation and 4 weeks post-implementation of a local (US Department of Veterans Affairs) smokefree buildings policy (no p values calculated). ***Supporting strategies*** *were based*

around nursing interventions, including encouraging patients to participate in smoking cessation groups and addressing patients with the urge to smoke.

In the USA, **Patten 1995 [+]** reported no change in the number of inpatient consultations to the Nicotine Dependence Centre between 3 months pre- and 3 months post-implementation of a local (hospital board's) smokefree buildings and smokefree grounds policy. ***Supporting strategies*** *included an implementation committee, weekly patient cessation support groups, pharmacotherapies, written information for patients and staff education sessions on the treatment of nicotine dependence*.

In the USA, **Velasco 1996 [-]** reported that the number of inpatients who received NRT during the 6-week period immediately after implementation of local (hospital's) smokefree buildings policy in 1991 and during the 1993 follow up was significantly higher than in the 6-week period before implementation ($p<0.001$). ***The supporting strategy*** *was that patients were notified of the indoor smoking ban prior to admission.*

3.3.1.9 Other Health Impacts on Patients (Mental Healthcare)

Inpatient Sick Calls (Mental Healthcare)

One before and after study reported outcomes relating to the impact of local policy implementation of smokefree buildings and grounds with supporting strategies on outcomes related to a visit of the patient by the medical doctor for a physical complaint (inpatient sick calls) in mental healthcare settings (see study descriptions in Figure 3.3 and Table 2.1 above). There was a decline in adverse effects from local-level smokefree policy implementation.

Hempel's 2002 [USA +] before and after study assessed the same sample of forensic patients 4 weeks prior to, and 4 weeks after implementation of a local (hospital board's) smokefree (campus) buildings and smokefree grounds policy. There was a significant 54% post-implementation decline in sick calls for moderate smokers (10-18 cigarettes/day) ($p=0.038$) and a significant 61% post-implementation decline in sick calls for heavy smokers (≥19 cigarettes/day) ($p=0.008$). There were no significant changes for non-smokers and light smokers (1-9 cigarettes/day).

Inpatient Acuity Level (Mental Healthcare)

One cohort study reported outcomes relating to the impact of local policy implementation of smokefree buildings with supporting strategies on outcomes related to patient acuity levels (intensive nursing requirements) in mental healthcare settings (see study descriptions in Figure 3.3 and Table 2.1 above). There was a decline in adverse effects from local-level smokefree policy implementation.

Rauter's 1997 [USA +] cohort study found that the average inpatient monthly acuity level (from one, most acute, to five, ready for discharge as recorded daily by nurses) for the period before implementation of a local (hospital's) smokefree buildings policy was significantly lower than the average level for the first 9 months of the ban (2.62 and 2.74 respectively, $t=2.57$, $p=0.03$).

Inpatient Seizure Rates (Mental Healthcare)

One before and after study reported outcomes relating to the impact of local policy implementation of smokefree buildings with supporting strategies on outcomes related to seizure rates in inpatients in mental healthcare settings (see study descriptions in Figure 3.3 and Table 2.1 above). There was a no change in adverse effects from local-level smokefree policy implementation.

In an **uncontrolled before and after study, Rees 2008 [USA +]** reported a non-significant decrease in inpatient seizure rates from 0.58% per year to 0.18% per year between the 12 months before and 12 months after implementation of a local (university hospital's) smokefree buildings policy in its inpatient medical detoxification unit.

Other Health Impacts on Patients (Mental Healthcare)

Inpatient Sick Calls (Mental Healthcare)
Inpatient Acuity Level (Mental Healthcare)
Inpatient Seizure Rates (Mental Healthcare)

Evidence statement 3.13: There is **weak** evidence from one before and after study in the USA (**Hempel 2002 [+]**) that implementation of a local smokefree buildings and smokefree grounds policy with supporting strategies results in a decline in the number of inpatient sick calls (for a physical complaint) for moderate and heavy smokers immediately following implementation in a mental healthcare setting.

UK Applicability: This evidence was conducted outside the UK, however the policy covers smokefree grounds (a policy implemented in parts of the UK) and there is no reason to believe the effect is not applicable to the UK setting.

In the USA, **Hempel 2002 [+]** reported a significant post-implementation decline in inpatient sick calls for moderate smokers (10-18 cigs/day) (p=0.038) and for heavy smokers ((≥19 cigs/day) (p=0.008) 4 weeks after policy implementation compared with 4 weeks prior to implementation. There were no significant changes for non-smokers and light smokers (1-9 cigs/day). ***Supporting strategies*** *included education for staff about potential withdrawal symptoms, and any tobacco products found on patients were seized.*

Evidence statement 3.14: There is **weak** evidence from one cohort study in the USA (**Rauter 1997 [+]**) that implementation of a local (hospital's) smokefree buildings policy with supporting strategies significantly decreases mean inpatient acuity levels, as recorded daily by nurses, between the pre-implementation period and 9 months post-implementation in a mental healthcare setting (p=0.03). ***Supporting strategies*** *included smoking reduction workshops and patients wishing to participate were urged to do so.*

UK Applicability: This evidence was conducted outside the UK and the policy covered (indoor smokefree) is already national legislation in the UK. However there is no reason to believe the effect is not applicable to the UK setting.

Evidence statement 3.15: There is **weak** evidence from one before and after study in the USA (**Rees 2008 [+]**) that a local (university hospital's) smokefree buildings policy in its inpatient medical detoxification unit with supporting strategies does not significantly change inpatient seizure rates in a mental healthcare setting, when seizure rates were measured during the 12 months before and 12 months after implementation. ***The supporting strategy*** *was that patients were informed of the indoor smoking ban as part of their admission screening process.*

UK Applicability: This evidence was conducted outside the UK and the policy covered (indoor smokefree) is already national legislation in the UK. However there is no reason to believe the effect is not applicable to the UK setting.

3.3.2 Other Consequences from Smokefree for Staff (Mental Healthcare)

This section has one measured outcome: staff absenteeism.

3.3.2.1 Staff Absenteeism

One before and after study reports outcomes relating to the impact of local policy implementation of smokefree buildings with supporting strategies on outcomes related to staff absenteeism in mental healthcare settings (see study descriptions in Figure 3.3 and Table 2.1 above). There was no change in effects from local-level smokefree policy implementation.

In an **uncontrolled before and after study (with different sample) (Matthews 2005 [USA -])**, no significant differences were found in the 3 months before and 3 months after the local (hospital's) smokefree buildings policy was implemented related to the number of callouts (i.e. scheduled staff not coming in for their shift at the acute crisis stabilization unit). Pre-implementation 36/252 shifts reported at least one callout and post-implementation 38/252 shifts reported at least one callout.

Other Impacts on Staff: Staff Absenteeism

Evidence statement 3.16: There is **weak** evidence from one before and after study in the USA (**Matthews 2005 [-]**) that implementation of a local (hospital's) smokefree buildings policy with supporting strategies has no significant effect on staff absenteeism in a mental healthcare setting.

In the USA, **Matthews 2005 [-]** reported no significant differences in staff absenteeism between the 3 months before and 3 months after the local (hospital's) smokefree buildings policy was implemented. ***Supporting strategies*** *included patient education about nicotine addiction and withdrawal and pharmacotherapies.*

UK Applicability: This evidence was conducted outside the UK and the policy covered (indoor smokefree) is already national legislation in the UK. It is unlikely to be applicable.

4. Discussion

4.1 Background

The current situation in England and Wales is that all indoor spaces in secondary care settings, including mental health and acute settings, are required to be smokefree (as of the 2007 legislation). There is no legislative requirement for smokefree grounds in England and Wales, although some individual institutions and Trusts such as Nottingham Healthcare Trust and Addenbrooke's Hospital in Cambridgeshire have introduced and trialled policies requiring smokefree grounds. A similar situation exists in Scotland where legislation banning smoking in enclosed public places came into force in 2006. However, psychiatric facilities are one of the few settings exempted by the legislation in Scotland.

This effectiveness review uses the World Health Organization's FTCT definition of smokefree as "air that is 100% smoke free. This definition includes, but is not limited to, air in which tobacco smoke cannot be seen, smelled, sensed or measured" (FTCT, 2008). The primary intention of smokefree policies and legislation is to protect non-smokers and smokers from second-hand smoke (SHS). Non-smokers (and smokers) can become exposed to SHS when they breathe this contaminated air (IARC, 2009). As contaminants from SHS can be absorbed (and later released) by materials in the environment (e.g. furniture coverings, curtains), the potential for SHS exposure lasts considerably longer than the act of smoking. There has been no safe level of SHS exposure identified.

Other potential consequences from the introduction of smokefree can be either positive or negative. Potential adverse consequences include: patients signing out against medical advice, a decrease in hospital utilisation, employees resigning, an increase in patient disruptive behaviours; while examples of potential beneficial consequences include: staff and patient quitting smoking, related health improvements; a decrease in patient disruptive behaviour and an improved working environment and healthful image of the hospital.

Recent cross-sectional studies conducted in English secondary care settings after the implementation of the (indoor) smokefree legislation with supporting strategies, have found restricted compliance in both settings of interest. In acute and maternity settings:

- Eighty-three per cent of surveyed representatives from English NHS Acute Trusts indicated 'at least daily' or 'at least weekly' reported and observed smokefree policy infringements at their institution (Ratschen et al., 2008). Observation data from acute site visits observed patients and visitors smoking in the grounds at 94% of sites and (identifiable) staff smokers at 35% (Ratschen et al., 2008).
- Sixty per cent of healthcare (medical and nursing) staff at an NHS hospital in Tyne and Wear reported awareness of other members of staff smoking on site seven months after smokefree site implementation (Shipley and Alcock, 2008). In terms of challenging smokers on the hospital site to comply with its smokefree policy, there was a trend towards hospital staff being more likely to have challenged patients smoking (25%) over visitors (13%) and over other staff (8%) smoking on site; and a trend towards never smokers staff stating they had challenged others smoking on the hospital site more often than ever smokers and current smokers staff.

In mental healthcare settings:

- Fifty per cent of surveyed representatives from English NHS mental health settings indicated 'at least daily' or 'at least weekly' reported and observed smokefree policy infringements at their institution (Ratschen et al., 2008).
- When surveyed four months after the introduction of smokefree legislation, 13% of staff surveyed at a medium secure psychiatric unit in West Yorkshire reported filling in an incident form if a patient violated the smoking ban. However, 51% of staff said they would not fill in an incident form (Garg et al., 2009).
- At a city mental health hospital in the Midlands, 59% of nursing staff agreed with the statement "The non-smoking policy causes secret smoking during work hours" (Bloor et al., 2006) and 94% of the nursing staff surveyed reported that they continued to smoke at work since the introduction of the smokefree policy.

Strategies and interventions to enhance the implementation of and compliance with smokefree are therefore important.

4.2 Findings

This review of the effectiveness of smokefree legislation in secondary healthcare settings comprises a relatively small body of evidence. Twenty-seven studies were identified, of which only one was a randomised controlled trial (Kempf 1996 [USA +]), the remainder were quantitative observational studies. Only two studies evaluated the effectiveness of a supporting strategy in ensuring compliance with smokefree legislation (Nagle 1996 [Australia +], Erwin 1991 [USA -]). The majority of studies were conducted in the USA, with only two conducted in a UK setting (Cormac 2010 [UK +], Shetty 2010 [UK +]) and a small number in Europe and the rest of the world. Around half of the studies were published before 2000. The methodological quality of studies varied from 'low' to 'moderate', with most rated as 'moderate'. The review presents 34 evidence statements.

The review of the evidence relating to implementation of outdoor smokefree policies and strategies identified a number of important findings:

- Examination of proxy indicators of compliance appear to show that smokefree legislation can be effective. Few studies showed a decrease in 'compliance', although one study (Nagle 1996 [Australia +]) found a *decrease* in compliance in its evaluation of the effectiveness of the introduction of 'No Smoking Outdoors' signs.
- The review is unable to provide conclusive evidence of the effectiveness of the impact of different supporting strategies. However, all but one of the studies described some level of support as part of the implementation process. An overall review of the findings suggests that there is no general pattern between the number (some studies reported on one, others multiple) and type of supporting strategies (some were structural changes, others education or information provisions, and others related to cessation) and overall effectiveness at sustaining compliance with the policy or legislation. One supporting strategy, the provision of NRT to patients or staff (used in 13 studies), was also a measured 'other consequence' of smokefree implementation ('Patient NRT Prescriptions and NRT Use', i.e. the changes in prescription and use before and after implementation) but nothing conclusive can be attributed to the strategy.
- Findings in mental health settings identified a number of concerns related to adverse consequences, including the need to monitor drug levels, increased abuse and aggression and increased discharges against medial advice. However, the review has shown that in most cases these detrimental effects were not realised. These findings are consistent with those found by Lawn and Pols (2005) in their review of effectiveness of smoking bans in inpatient psychiatric services. They found no increase in aggression, use of seclusion,

discharge against medical advice or increased use of PRN medication in most studies following smokefree implementation. Similarly, El-Guebaly et al.'s (2002) review of total and partial smoking bans in inpatient psychiatric or addiction settings (which included studies from 1987 to 2000) concluded that the evidence "suggests that policies that ban smoking have no major long-standing untoward effects in terms of the behavioral indicators of unrest or noncompliance" (p. 1621). However, as there is an absence of strong data on compliance it is not possible to confirm if these measures are true reflections, or just indicative.

- Similar patterns emerged from those studies conducted in acute and maternity settings. The largest positive effects appear to be in relation to staff smoking behaviour, with fewer negative effects found. However, as with studies conducted in mental health settings the lack of reliable compliance data makes verification of these effects difficult.

4. 3 Applicability to UK

Although much of the available evidence on effectiveness is relatively recently, there is limited evidence from the UK, which limits the review's applicability. However, all the included studies were conducted in similar high income countries.

In addition, there was also judged to be relatively strong applicability in terms of smokefree policy. Six studies in acute and maternity settings and seven studies in mental health settings examined the effects of smokefree grounds or smokefree grounds and buildings policies. The rest examined the effects of smokefree indoor policies or legislation; the same level as the current smokefree legislation requirements of the UK.

Like the studies conducted in England (Cormac 2010 +, Shetty 2010 +), studies conducted in both France (Vorspan 2009 +) and Spain (Fernandez 2008 +, Martinez 2008 +) had national indoor smokefree legislation as the impetus for smokefree. Israel brought in national legislation after Donchin's 2004 [+] study conducted, while the Australian study (Nagle 1996 +) had state-wide indoor smokefree legislation as its impetus. All of the other studies were based on localised policies, mostly localised to hospitals, but some to wider regions or provinces. Both of the UK studies (Cormac 2010 +, Shetty 2010 +) also implemented local smokefree grounds/campus policies, reportedly because Nottinghamshire Healthcare NHS Trust brought in their regional policy in 2007.

All studies identified relating to the use of restraints in mental healthcare settings were conducted in the USA, however the use of mechanical or physical restraints in the UK is not a first-line response and so this evidence has particularly limited generalizability to the UK.

In UK mental health settings, smoking outdoors, but within the grounds of a hospital or facility, may not be a feasible option due to the nature of the hospital estate in terms of safe access for an inpatient or others to an outdoors smoking space; or whether it is appropriate for the patient to leave the ward at particular times, or at all. It was often unclear in the included studies in mental healthcare settings with only indoor smokefree policies or legislation in place (n=9 studies), all non-UK, whether inpatients were escorted to outdoor areas to smoke or whether outdoor smoking areas were secure or enclosed for detained patients. One study in a hospital psychiatric department in Switzerland (Etter 2008 +) stated that inpatients, except those in locked rooms, were allowed to leave the unit to smoke outside and that after the total ban some patients left the clinic to go out and buy cigarettes. No further details were given for those in locked rooms in the article. Another European study in a hospital psychiatry department in France (Vorspan 2009 +) reported that patients were evaluated for outdoor smoking breaks, ranging from none, limited and accompanied by a nurse, to unlimited. Finally, a USA study in a public inpatient psychiatric hospital (Rauter 1997 +), described the establishment of open-air smoking areas outside the buildings. Only one study in

the USA (Velasco 1996 -) described its setting as a secure ("locked") inpatient psychiatric service, but no further details were provided.

Included studies in mental healthcare settings with smokefree grounds policies or legislation in place (n=7 studies) rarely described whether inpatients left campus to smoke or were escorted off-campus to allow them to smoke. Two studies, one in a "medium secure unit" in the UK (Shetty 2010 +) and one in a "locked adult inpatient psychiatric unit" in the USA (Patten 1995 +), described smokefree as unenforceable for inpatients with unescorted community leave (the former study) and for inpatients with off-unit privileges who were granted brief passes to leave the building unaccompanied to smoke (the latter study).

4.4 Limitations and Gaps in the Evidence

A number of gaps and limitations in the evidence were identified:

- As already noted, the evidence from the UK, although recent, is extremely limited.
- There is no strong evidence from well-conducted trials, and there were limitations in the available evidence concerning which strategies best support compliance with smokefree policy. As a result, there are limitations to the advice that the review can give in this area. Of the two relevant studies, Erwin 1991 [USA -] was judged to be highly subjective and had a comparatively small sample, while Nagle 1996 [Australia +] found compliance to decrease post-implementation. The available evidence is further hindered by the way in which compliance with smokefree polices was assessed with few studies using objective outcome measures.
- Few studies directly answered the main research question to assess the effectiveness of support strategies. Most studies were designed to evaluate overall effect. Or, as one study (Gadomski et al., 2010) noted, the impact of the individual support strategies in their intervention, which included an inpatient cessation programme, staff education and an implantation plan could not be evaluated as "they were intentionally implemented simultaneously in order to achieve a synergistic effect" (p.53).
- While description of the smokefree supporting strategy was an inclusion criteria for this review, few studies reported in detail the individual supporting strategies used, the main exception to this being Kvern 2006, which was an evaluation report with no apparent word count limitations. Given these inclusion criteria it should be noted that this review does not address wider questions concerning the effectiveness of smokefree policy.
- Only one of the studies identified by the review used an experimental design. The remainder were observational studies, only one of which had a concurrent control group.
- There was a clear difference between study populations in the two review settings: studies in mental health settings tended to report on patient outcomes, and those in acute and maternity settings tended to report on staff outcomes. Outcomes relating to compliance with smokefree or other consequences of smokefree were limited for visitors, friends and relatives of inpatients in both settings.

5. References

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5.2 Review 6 Included Studies

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