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Changes in success rates of smoking cessation treatment associated with take up of a national evidencebased training programme

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ABSTRACT

Objective. The English 'stop smoking services' provide behavioural support to some 700,000 smokers annually. Success rates of the services varied considerably before 2010 and had been in slight decline so, to improve performance, a national programme of evidence-based practitioner training was developed to improve knowledge and skills-based competences. This study evaluated whether uptake of the training was associated with improvements in success rates of services.

Methods. Mean 4-week biochemically verified abstinence rates were compared for 146 (of 151) stop smoking services between 2008–10 (before roll-out of training) and 2011–13 (after roll-out), and the change in success rates for each service was regressed on to the number of practitioners per service trained in a) knowledge (online) and b) skills (face-to-face).

Results. Success rate across all services improved between the two periods (34.1% to 36.5%, $p = 0.01$ 1-tailed; 95% CI for difference 0.44–4.48). The magnitude of improvement for each service was associated with the number of practitioners who completed the knowledge and skills training (beta = 0.22, $p = 0.005$ 1-tailed), and marginally with the number who completed the knowledge training (beta = 0.14, $p = 0.047$ 1-tailed).

Conclusion. English stop smoking services that have greater uptake of a national evidence-based training programme showed greater improvements in success rates.

Introduction

Smoking is one of the most important causes of premature morbidity, mortality and health inequalities globally (Institute for Health Metrics and Evaluation, 2013). Most smokers report that they would like to stop and in many countries, such as the UK and the US, a substantial proportion (about 40%) attempt to do so in a given year (Borland et al., 2012; Kotz et al., 2009; West and Brown, 2014). Unfortunately, about 95% of those attempting to quit without support relapse within a year after their quit attempt (Hughes et al., 2004). A growing number of countries are therefore offering support to improve the success of quit attempts (Pine-Abata et al., 2013).

In 1999, England was the first country to set up a national network of stop smoking services; each service is a stand-alone service providing support to the regional population. As part of the NHS, services are free at the point of access and deliver a combination of behavioural support and medication to support smokers making quit attempts. Support is delivered by practitioners with a wide range of professional backgrounds, including but not limited to healthcare practitioners and pharmacists. Practitioners can be directly employed by a service for the purpose of delivering smoking cessation support or provide this alongside their main role. Services are under local direction; areas can configure their service as they see fit, but they are encouraged to follow national guidance (Department of Health, 2010, 2011, 2012). Services have been required to submit quarterly data to the Department of Health on the number of quit dates set, characteristics of smokers using the services, treatment provided and short-term abstinence rates (four weeks after the quit date) (Department of Health, 2010, 2011, 2012). Although only a small proportion of smokers make use of the services, this nevertheless amounts to about 750,000 quit attempts in about 700,000 smokers supported by the services each year (The Health and Social Care Information Centre, 2013; The NHS Information Centre, 2009, 2010, 2012).

Stop smoking services significantly increase success rates and provide an extremely cost-effective life-saving intervention (West et al., 2013). However, it was noted in 2007 that success rates overall were somewhat less than would be expected from randomised controlled trial evidence, the success rates had declined slightly from 2004, and

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there was substantial variability across the 151 local services covering England (West and Michie, 2013).

A large part of this variability can be attributed to differing extents to which services follow evidence-based practice (Brose et al., 2011; West et al., 2013). To address this variability, the Department of Health in England commissioned the National Centre for Smoking Cessation and Training (NCSCT) in 2009 to a) identify the competences required to deliver, manage, and commission smoking cessation support; b) develop and implement methods of assessment to ensure that practitioners, managers, and commissioners possess these competences; and c) commission and provide training and continuing support to allow staff to achieve the required level of competence. A standard treatment programme and evidence-based training was developed (for details see 'Intervention' section). The training programme has been shown to significantly improve knowledge required to deliver effective stop smoking interventions; it raised practitioners with all levels of prior knowledge and experience to the same, improved, level of knowledge (Brose et al., 2012a). The training has also been shown to lead to a significant and sustained improvement in practitioners' confidence in their ability to deliver smoking cessation support (Brose et al., 2012b). The Department of Health recommends that all stop smoking practitioners are trained to this standard (Department of Health, 2012).

National monitoring data suggest that the NCSCT has been successful: In the first three years of its work, success rates across the services increased and variance reduced, with improvements primarily in services that had been performing less well (West and Michie, 2013). If improvements are due to the NCSCT, there should be an association between practitioners completing training and improved success rates of individual stop smoking services as practitioners' increased knowledge and confidence translate to increased success rates.

Hence, the aim of this study was to assess whether services who had greater uptake among their staff of NCSCT training would be those that showed the greatest improvement in success rates.

Methods

Sample

We included data from 146 services (96.7% of all services) identified in the online training and with outcome data recorded for 2008 to 2013 (The Health and Social Care Information Centre, 2013; The NHS Information Centre, 2009, 2010, 2012). Data were not available for five services.

Intervention

Knowledge- and skills-based competences required to deliver behavioural and pharmacological support for smoking cessation have been identified from guidance documents and randomised controlled trials published in Cochrane reviews (Michie et al., 2011). Stop smoking service manuals were coded for these competences and a subset of 16 competences were found to be associated with short-term success rates of stop smoking services (West et al., 2010, 2011).

Informed by this work on competences for the delivery of stop smoking support, a training programme was developed. Knowledge-based competences are trained through an online training and assessment programme (http://www.ncsct.co.uk/pub_training.php). Using text, videos and assessment questions, it addresses smoking in the population, smoking and health, why people smoke and find it hard to stop, the process of how smokers manage to stop, effective ways to help people stop smoking, medication use, and how to plan and deliver a programme of support. A certificate of completion can be achieved by passing a knowledge assessment and an additional practice assessment. Trainees determine how much time they spend on the training; in a first evaluation, trainees spent an average of 2.5 h before attempting the knowledge assessment (Brose et al., 2012a) Non-mandatory booster training of skills-based competences is delivered in the form of two-day face-to-face courses in groups of 20 to 30 practitioners with special focus on five of the 16 key competences: building rapport, medications, carbon monoxide (CO) monitoring as a motivational tool, eliciting commitment from the client, and the 'not-a-puff' rule. The 'not-a-puff' rule states that smokers do not smoke at all after their quit date, not even a single puff. The online knowledge training and assessment programme was released in September 2010 and the face-to-face skills courses were rolled out from late 2010, with a large number of courses taking place in 2011. Initially, services to be offered skills training were selected on the basis of low success rates in 2008–2010 and high economic deprivation and smoking prevalence in the area they served.

Measures

The outcome measure, service-level CO-validated short-term success rates, was obtained from routine monitoring data published annually (The Health and Social Care Information Centre, 2013; The NHS Information Centre, 2009, 2010, 2012). CO-validated short-term success rates were calculated for each included service for the two years before the training started (April 2008 to March 2010) and for the two years after the initial roll-out of the training (April 2011 to March 2013). A quit attempt is 'successful' if the client reports abstinence for at least 2 weeks prior to the 4-week follow-up and has an expired-air CO reading of less than 10 parts per million (Department of Health, 2011; West et al., 2005). As is standard practice in smoking cessation (West et al., 2005), service users who did not return for the 4-week session or for whom an expired-air CO reading was not available were counted as having resumed smoking.

During registration for the online training, trainees indicate if they work as a practitioner for a stop smoking service and if they do, which service they work for. This information was cross-referenced with attendance registers at face-to-face training courses to determine the number of practitioners from each service who, by December 2011, had completed the online (knowledge) training and the number of practitioners from each service who had attended a face-to-face (skills) course. Completion of the knowledge training is a requirement for attending a face-to-face course.

Statistical analyses

All analyses used service-level data. The distribution of CO-validated success rate across all included 146 services was assessed descriptively and significance of the change assessed using a paired t-test with confirmation by a Wilcoxon Signed-Rank test. Multiple linear regression was conducted with change in success rates as outcome predicted by the number of practitioners from each service who completed the online (knowledge) and the face-to-face (skills) training. Significance level for all analyses was set at $p < 0.05$. One-tailed tests were used because of the a priori directional hypothesis. SPSS version 21.0 was used for analyses.

Results

Overall, about a fifth of practitioners who completed the online (knowledge) training also completed the face-to-face (skills) training (Table 1).

The improvement in the average success rates across all services from 2008–10 to 2011–13 (Table 1) was significant ($t = 2.41$, $p = 0.01$, 95% confidence interval of difference: 0.44 to 4.48, effect size $d = 0.25$). Fig. 1 illustrates the shift towards higher success rates across the services.

The magnitude of the improvement for each service was predicted by the number of practitioners who completed the face-to-face (skills) training from that service whilst adjusting for the number of practitioners who completed the online (knowledge) training (Table 2). This means that on average, for every increase of one practitioner in a local service who completed the face-to-face training, there was an additive increase of 0.22 points in the success rate. The association of improvement with the number of practitioners who completed the online (knowledge) training was marginal (Table 2).

Discussion

Biochemically validated success rates improved significantly by about 2.5 percentage points across all services between the period of 2008–2010 and the period of 2011–2013. In between these two periods of time, a national training and assessment programme for stop smoking practitioners was instigated and rolled out across England. Improvements in service-level success rates were associated with higher numbers of practitioners completing the skills training. Skills training required

Table 1
Sample description (146 services in England).

	Mean (standard deviation)	Median	Range
Number of practitioners who completed online (knowledge) training	22.7 (31.9)	13	0 to 217
Number of practitioners who completed face-to-face (skills) training	4.3 (5.0)	2	0 to 20
Carbon monoxide validated short-term success rates 2008–2010 (%)	34.1 (10.6)	35.6	3.4 to 59.9
Carbon monoxide validated short-term success rates 2011–2013 (%)	36.5 (9.2)	37.6	4.7 to 58.8
Change in success rates from 2008–10 to 2011–13	2.5 (12.3)	2.5	−32.6 to 43.6

demonstration of a minimum level of knowledge by completing the first stage of the training. If knowledge training (the first stage) alone had any effect on success rates, this appeared to be a marginally negative effect.

This provides further evidence for the effectiveness of the complete training. Taken together with a wider improvement of service outcomes following roll-out of the training (West and Michie, 2013), these results strongly suggest that the establishment of a national training centre has increased the effectiveness of stop smoking services and the number of life-years saved.

The cost per life-year saved can be estimated using existing tables (Stapleton and West, 2012). An absolute difference in abstinence rates of 2.5% at 4-week follow-up is expected to translate to a difference of about 0.7% after 12 months (Stapleton, 1998). Setting up and running of the NCSCT for its initial three years cost £3 million. In three years, about 2.3 million smokers were treated by the English Stop Smoking Services, resulting in an incremental cost per smoker of £1.29 (about $2.15 as of March 2014). This means that if all of the improvement were accounted for by the NCSCT, the cost per life-year saved would be about £180 (about $300). Even with only a smaller proportion accounted for by the NCSCT, this is an extremely cost-effective intervention (National Institute for Clinical Excellence, 2007).

An important limitation of the present analysis is that services were not randomly allocated to training. Thus there was no 'control' group of services that did not receive the training and improvements may have been due to other changes in the period studied. However, we could not identify any significant policy change in relation to smoking in this period or other efforts to increase effectiveness or recording practices of services. More importantly, it is difficult to conceive how such events would have affected services with a higher uptake in training more than those with a lower uptake. A further limitation is that the number of practitioners trained per service reflects very different proportions of staff in services of different sizes but exact numbers of staff are not available for most services. Thus the data on uptake is subject to considerable unaccounted variation which would lead to an under-estimate of the effect size. The use of counts and not proportions may have also led to a bias to produce negative results. This may be partly accountable for the negative association found for the online knowledge training.

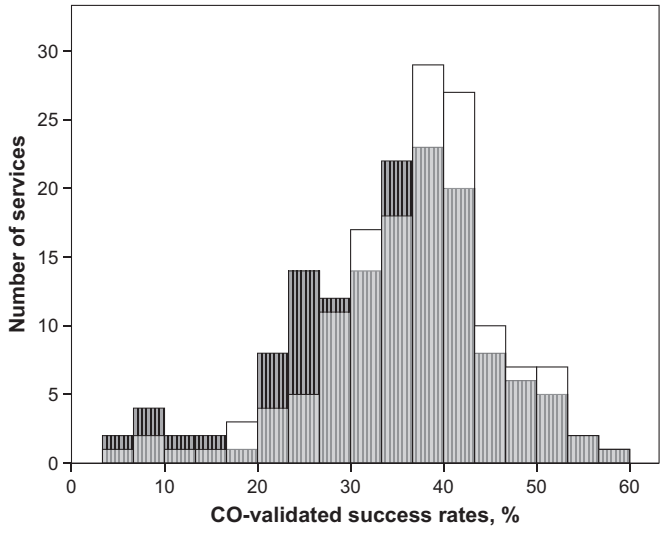

Fig. 1. Distribution of carbon monoxide-validated success rates of English Stop Smoking Services in 2008 to 2010 (striped bars in the back) and 2011 to 2013 (transparent white bars in front).

Generally, there is no evidence that the size of a service per se is associated with success. There is some evidence that throughput in terms of clients is negatively associated with success rates (West et al., 2013), but those findings could not be adjusted for the number of practitioners in a service. However, even if service size was associated with success, there is little reason to assume it would also be associated with change in success.

Finally, although dissemination of the training was concentrated in 2011, training was ongoing in the period of data collection for the outcome measure. Additional practitioners will have been trained during the follow-up period. Again, this will have diluted any effect so that the observed significant association is likely to be an underestimation.

Thus, the available data provide the best evidence we have for evaluating the effectiveness of an evidence-based practitioner training and suggest that it has improved the service delivered to smokers attempting to quit with a consequent increase in quit rates. However, despite this improvement over the last few years and the small decline in variability of outcomes across the services, effectiveness is still below what would be expected from randomised controlled trials, indicating room for further improvement.

The association between training and success rates is particularly striking as far more practitioners work in each service than completed the training. Routinely recorded data of a sample of 62 services for 2011/12 indicates that each service on average recorded 114 practitioners providing support (standard deviation = 82.5, range 8–377, median 95). Service-level improvement resulting from a small number of practitioners completing training is likely due to two factors. One is that individual success rates of practitioners who completed the training improved and raised the mean success rates as these practitioners were likely to have been the ones supporting a larger number of clients within the service. Secondly, it could be that practitioners completing training may have triggered wider improvements in the service by disseminating good practice, guidelines and improved knowledge and skills. The mechanisms of service-level improvement could be teased apart if individual practitioner's success rates and training status could be linked.

The results suggest that commissioners and managers of stop smoking services in the UK and other countries should require and support a minimum standard of training. Policy makers should also encourage minimum training standards for practitioners delivering stop smoking support and support the dissemination of evidence-

Table 2
Association of training with change in CO-validated success rates from 2008–10 to 2011–13.

	B (SE)	Beta	*p*-value (1-sided)
Number of practitioners who completed online (knowledge) training	0.55	0.22	0.005
Number of practitioners who completed face-to-face (skills) training	−0.06	−0.14	0.047

$R^2 = 0.05$.

based training. Further research could elucidate the effect of training on individual practitioners' success rates and evaluate characteristics associated with practitioner effectiveness as well as identify effective ingredients of the training.

Conclusion

English stop smoking services that have greater uptake of a national evidence-based training programme show greater improvements in success rates, thus training provides a cost-effective way of increasing the number of lives saved by the services.

Conflict of interest statement

AMc, SM and RW are directors of the NCSCT. AMc has received travel funding, honorariums and consultancy payments from manufacturers of smoking cessation products (Pfizer Ltd, Novartis UK and GSK Consumer Healthcare Ltd) and hospitality from North51 who provide online and database services. He also receives payment for providing training to smoking cessation specialists; receives royalties from books on smoking cessation and has a share in a patent of a nicotine delivery device. LB's post from 2010 to 2013 was funded by the NCSCT.

Appendix A. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.ypmed.2014.08.021.

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