International Journal of Drug Policy 57 (2018) 42–50

Contents lists available at ScienceDirect

International Journal of Drug Policy

journal homepage: www.elsevier.com/locate/drugpo

Research Paper

The cost-effectiveness of seven behavioural interventions to prevent drug misuse in vulnerable populations

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ARTICLE INFO

Keywords:
Cost-effectiveness
Economic evaluation
Prevention
NICE

ABSTRACT

Background: The National Institute for Health and Care Excellence (NICE) developed a guideline on drug misuse prevention in vulnerable populations. Part of the guideline development process involved evaluating cost-effectiveness and determining which interventions represented good value for money.

Methods: Economic models were developed for seven interventions which aimed to prevent drug use in vulnerable populations. The models compared the costs (to the health and crime sectors) and health benefits (in quality-adjusted life years (QALYs)) of each intervention and its comparator. Sensitivity analysis explored the uncertainty associated with the cost of each intervention and duration of its effect.

Results: The reduction in drug use for each intervention partly offset the costs of the intervention, and improved health outcomes (QALYs). However, with high intervention costs and low QALY gains, none of the interventions were estimated to be cost-effective in the base case. Sensitivity analysis found that some of the interventions could be cost-effective if they could be delivered at a lower cost, or if the effect could be sustained for more than two years.

Conclusions: For drug misuse prevention to be prioritised by funders, the consequences of drug misuse need to be understood, and interventions need to be shown to be effective and cost-effective. Quantifying the wider harms of drug misuse and wider benefits of prevention interventions poses challenges in evaluating the cost-effectiveness of drug misuse prevention interventions. A greater understanding of the consequences of drug misuse and causal factors could facilitate development of cost-effective interventions to prevent drug misuse.

Introduction

In 2015, the Department of Health in England asked the National Institute for Health and Care Excellence (NICE) to develop guidance on drug misuse prevention (National Institute for Health & Care Excellence, 2017). The guideline scope focussed on interventions targeted at populations who were already using drugs occasionally, or were considered at most risk of starting to use drugs. The scope considered groups including (but not limited to) those with co-occurring mental health problems, those not in education, and children and young people whose parents used drugs. The guideline focussed on interventions that aimed to prevent or delay drug use and excluded interventions related to the supply of drugs, treatment of drug misuse or dependence and interventions to promote safer injecting (National Institute for Health & Care Excellence, 2015).

NICE follows a defined process in developing guidelines that considers evidence for the effectiveness and cost-effectiveness of interventions when making recommendations (National Institute for Health & Care Excellence, 2016). In considering cost-effectiveness evidence, NICE's preference is usually to conduct cost-utility analysis, using quality-adjusted life years (QALYs) as the outcome metric. QALYs combine quality of life with length of life, and therefore allow

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https://doi.org/10.1016/j.drugpo.2018.03.028
Received 25 April 2017; Received in revised form 3 January 2018; Accepted 27 March 2018
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comparison of outcomes across different health areas. An incremental cost-effectiveness ratio (ICER) can be calculated by dividing the difference in costs of an intervention and its comparator by the difference in QALYs. Judging the size of ICERs assists decision makers in determining whether an intervention represents good value for money. (It should be noted that cost-effectiveness is not the sole factor considered in NICE's decision making, and that other elements such as the fair distribution of resources should also be considered (National Institute for Health & Care Excellence, 2008a)).

A systematic review of the literature did not identify any articles that reported relevant cost-effectiveness evidence (Bates et al., 2016). Three reports summarising findings from a US-based cost-benefit model for interventions targeting relevant populations were identified from additional sources, but these were considered to have limited applicability to the UK setting. Given the absence of relevant cost-utility analysis from the literature, the development of new economic models was considered important in understanding which interventions aimed at drug misuse prevention represent good value for money. The economic models considered behavioural interventions identified in a systematic review of the literature. None of the interventions considered in the economic models were considered cost-effective using NICE's standard approach.

This article aims to explore why these interventions were not cost-effective and how future economic evaluations should consider interventions to prevent drug misuse. We do this by:

- providing an overview of the modelling approach and inputs and reporting the results of the analysis,
- providing sensitivity analysis to understand which parameters would need to change for interventions to be cost-effective, and
- discussing the challenges of economic evaluation of drug misuse prevention.

We draw comparison with alcohol and smoking, and refer to established challenges in economic evaluation in public health. We discuss the limitations of our analysis and suggest alternative approaches which could be used in future analyses, and areas in which further research would be particularly valuable.

Material and methods

General modelling approach

Economic modelling compares the costs and consequences of two alternative courses of action. Models combine data from multiple sources to estimate the total costs and benefits that would occur if each of the two courses of action were implemented. Decision tree models use 'branches' to represent the different pathways patients can follow or events that can happen, and multiply the probabilities of these events by the costs and consequences of the events (Brennan, Chick, & Davies, 2006; Briggs, Claxton, & Sculpher, 2006; Drummond, Sculpher, Torrance, O'Brien, & Stoddart, 2015; Morris, Devlin, & Parkin, 2007). Decision trees are commonly used in evaluating the cost-effectiveness of health interventions for drug or alcohol problems (Hoang et al., 2016). We developed decision tree models to compare the costs and QALYs associated with the change in drug use for each intervention and its comparator in the study. We performed literature searches to identify the events, costs and consequences which would be included in the models. These required numerical data comparing outcomes between drug use and non-drug use such as relative risks or odds ratios. Outcomes for which quantifiable effects could not be identified were excluded from the models. Included events were discussed and agreed with an advisory committee.

We adopted a partial public sector perspective, including costs to healthcare and criminal justice sectors. We did not include costs relating to employment, education or out-of-pocket expenses incurred by individuals. We considered health effects to the individuals at risk of drug misuse, using QALY losses to capture the impact of both reductions in quality-of-life, and of premature death. The costs and opportunity for QALY gains for each intervention were specific to the drug in question, as the potential consequences of cannabis, ecstasy and cocaine usage differ and no single source was identified which reported data for all drugs. Costs and QALYs were discounted at 3.5% per annum (National Institute for Health & Care Excellence, 2016). All costs were expressed in 2015 prices (GBP). The modelled time horizon (time period over which events, costs and consequences are considered) depended upon the duration of the study and evidence base for drug-related consequences, and was varied in scenario analyses. Details of all the models and inputs are available elsewhere (Collins et al., 2016).

Interventions

Interventions identified in a systematic literature review of the effectiveness of targeted prevention programmes (Novakovic et al., 2016) were included in the models if they reduced drug misuse, the source study included a comparator group, and the baseline characteristics of the population in the study were defined. A total of seven interventions met these criteria. These were:

1. Focus on Families: a multicomponent intervention with families of substance abusers (Catalano, Gainey, Fleming, Haggerty, & Johnson, 1999).
2. A web-based personalised feedback intervention based on brief motivational interviewing techniques, for college student cannabis users (Lee, Neighbors, Kilmer, & Larimer, 2010).
3. Familias Unidas: a group based multi-parent intervention for families of delinquent youth (Prado et al., 2012).
4. A single brief motivational interviewing session for regular ecstasy users (Martin & Copeland, 2010).
5. A brief motivational interviewing intervention to reduce both risky sex and drug use in young gay and bisexual men (Parsons, Lelutiu-Weinberger, Botsko, & Golub, 2014).
6. A motivational interviewing intervention to reduce club drug and HIV risk behaviours use among men who have sex with men (Morgenstern et al., 2009).
7. STRIVE (SupporT to Reunite, Involve and Value Each other): A family-based intervention to reduce substance use among newly homeless youth (Milburn et al., 2012).

The effectiveness of the interventions was derived from the effectiveness studies identified in the systematic review (Novakovic et al., 2016). Population, intervention, comparator and effectiveness data are presented in Table 1.

None of the studies provided UK costs for the interventions, so we estimated intervention costs by converting costs from other currencies to GBP, or by applying UK unit costs to reported resource use. UK practice may differ from the source studies, and there may be local variation in the implementation of the interventions, so the intervention costs were varied in sensitivity analysis. Estimates including lower and upper bounds are provided in Table 2.

Models focussing on cannabis use

Cannabis use was associated with an increased risk of psychotic disorders and of being arrested. The models assumed that cannabis use increased the rate of psychotic disorders from seven in 1000 to 14 in 1000 (Hall, 2015). Annual psychotic disorder-related costs included service costs (£13,136) and informal care costs (£4242). Psychotic disorders were assumed to reduce health related quality of life from 1 to 0.68 (McCrone et al., 2009) (where 1 is equivalent to full health and 0 is equivalent to being dead). It was estimated that there are 50.27 cannabis possession arrests per 1000 cannabis users based on police

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