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Should we provide oral health training for staff caring for people with intellectual disabilities in community based residential care? A cost-effectiveness analysis

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ABSTRACT

Oral health training is often introduced into community-based residential settings to improve the oral health of people with intellectual disabilities (ID). There is a lack of appropriate evaluation of such programs, leading to difficulty in deciding how best to allocate scarce resources to achieve maximum effect. This article reports an economic analysis of one such oral health program, undertaken as part of a cluster randomized controlled trial. Firstly, we report a cost-effectiveness analysis of *training care-staff* compared to *no training*, using incremental cost-effectiveness ratios (ICERs). Effectiveness was measured as change in knowledge, reported behaviors, attitude and self-efficacy, using validated scales (K&BAS). Secondly, we costed training as it was scaled up to include all staff within the service provider in question. Data were collected in Dublin, Ireland in 2009. It cost between €7000 and €10,000 more to achieve modest improvement in K&BAS scores among a subsample of 162 care-staff, in comparison to doing nothing. Considering scaled up first round training, it cost between €58,000 and €64,000 to train the whole population of staff, from a combined dental and disability service perspective. Less than €15,000–€20,000 of this was additional to the cost of doing nothing (incremental cost). From a dental perspective, a further, second training cycle including all staff would cost between €561 and €3484 (capital costs) and €5815 (operating costs) on a two yearly basis. This study indicates that the program was a cost-effective means of improving self-reported measures and possibly oral health, relative to doing nothing. This was mainly due to low cost, rather than the large effect. In this instance, the use of cost effectiveness analysis has produced evidence, which may be more useful to decision makers than that arising from traditional methods of evaluation. There is a need for CEAs of effective interventions to allow comparison between programs. Suggestions to reduce cost are presented.

1. Introduction and background

Poor oral hygiene leads to gum disease (Loe, Anerud, Boysen, & Morrison, 1986), which in turn, is implicated in the pathogenesis of pneumonia, cardiovascular disease, diabetes and other systemic diseases (Kinane & Bouchard, 2008; Scannapieco & Rethman, 2003). People with intellectual disabilities (ID), who are at particular risk from these systemic diseases, are often found to have poor oral hygiene and periodontitis (Anders & Davis, 2010; Davies & Whittle, 1990; Shaw, Shaw, & Foster, 1990; Machuca, Nieves, Sanchez, Machuca, & Bullon, 2007). In fact, periodontitis is considered the major cause of tooth loss for this population (Gabre, Martinsson, & Gahnberg, 1999). It is therefore important to prevent periodontal disease and promote the oral health of adults with ID. To do this, one must combine professional dental cleaning with regular disruption of microbial deposits by mechanical means: usually tooth-brushing and interdental cleaning (Loe, 2000).

Many people with intellectual disabilities rely on care-staff to either completely, or jointly clean their teeth (Mac Giolla Phadraig et al., 2014). Given care-staff's important role in preventing oral disease, they should receive training in oral care (British Society for Disability and Oral Health/Faculty of Dental Surgery of Royal College of Surgeons of England, 2012; Crowley et al., 2005; Rawlinson, 2001).

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1.1. Evaluation of oral health training in residential settings

It is unclear whether training carers is effective at preventing oral disease (Nicolaci & Tesini, 1982; Shaw & Shaw, 1991; Glassman, Miller, Wozniak, & Jones, 1994; Paulsson, Fridlund, Holmen, & Nederfors, 1998; Faulks & Hennequin, 2000; Lange, Cook, Dunning, Froeschle, & Kent, 2000; Frenkel, Harvey, & Newcombe, 2001; Machuca et al., 2007; Macentee et al., 2007; Avenali, Guerra, Cipriano, Corridore, & Ottolenghi, 2011; Fickert & Ross, 2012; Binkley et al., 2014). When measured, constructs such as reported staff knowledge, behavior, attitudes, and skills appear to improve fairly consistently following training (Davies & Whittle, 1990; Glassman et al., 1994; Paulsson et al., 1998; Faulks & Hennequin, 2000; Fickert & Ross, 2012). However, when measured, oral health outcomes are mixed. Some authors report positive (Nicolaci & Tesini, 1982; Lange et al., 2000; Binkley et al., 2014) and mixed results (Shaw & Shaw, 1991), while others failed to improve oral health significantly (Macentee et al., 2007; Mac Giolla Phadraig, Guerin, & Nunn, 2015). These studies are limited as most follow-up periods are short (often much less than a year) and there are concerns regarding the use of indices of periodontal health and plaque as meaningful outcomes (Watt & Marinho, 2005).

Researchers traditionally focused on the effectiveness of such interventions only. However, this fails to deliver the information needed by those who commission, design, implement and evaluate such interventions to make evidence-based decisions. This is because such decisions often require some consideration of economic impact because, in the real world, there are multiple demands on scarce resources. Unsurprisingly, there is growing emphasis on economic analysis as a basic component of oral health promotion evaluation, aimed at improving health behaviors (NICE, 2014). This is in line with guidance regarding the evaluation of complex interventions more generally (Craig et al., 2008) and in the field of periodontitis prevention, specifically (Braegger, 2005). Yet there are few examples of studies evaluating the economics of oral health promotion programs in the academic literature (Frenkel, Harvey, & Needs, 2002; Kobayashi, Chi, Coldwell, Domoto, & Milgrom, 2005; Grant, Roberts, Brown, & Quinonez, 2007; Wennhall, Norlund, Matsson, & Twetman, 2010).

1.2. Cost-effectiveness analysis

Economic evaluation is described as the comparative analysis of alternative courses of action in terms of both their costs and their consequences (Drummond, Stoddart, & Torrance, 1987). It involves identifying, valuing and comparing the costs and consequences of alternatives being considered. The most commonly used form of economic evaluation in healthcare programs is cost-effectiveness analysis (CEA). CEA describes the cost-effectiveness of a given therapy judged in relation to one or more alternatives. This may include "doing nothing" (Drummond & Sculpher, 2005). CEAs are scarce in the dental literature, particularly measuring the cost-effectiveness of interventions, which aim to improve knowledge, attitudes and behaviors (O'connell & Griffin, 2011). The current article aims to address this gap in the literature by reporting a CEA of an oral health program, undertaken alongside a cluster randomized controlled trial.

1.3. Intervention

The intervention reported here was a "Train the Trainer" program provided to care-staff, who cared for people with ID in community based residential units in Dublin, Ireland. A team of dental staff trained one representative of each residential unit. This was done in two small groups, taking seven hours each. Training aimed to develop skills and provide tools and status for these trainees. Initially, information regarding oral health and disease prevention was delivered by lecture. Psychomotor skills development followed, focusing on tooth brushing (on plastic models and volunteers) and denture care. Discussion followed, focusing on healthy eating practices. Trainees then underwent simulations to encourage transferable problem solving skills. Commonly encountered problems included limited mouth opening; exaggerated bite and gag reflexes; tongue thrusting and challenging behavior. Peer assessment was used throughout, to enhance self-efficacy. Finally, the dental team entered a moral agreement with trainees.

Trainees were then expected to train the staff with whom they worked in each included residential unit. Trainees were followed up to measure program fidelity, to see if and how they delivered the program. They provided training to their peers (staff) for an average 45 min, using specifically designed and provided training kits (Supplemental Fig. S1). Managers were more likely to deliver training to all staff than employees.

1.4. Program theory

According to program theory, training should lead to changes in the measured constructs among staff (the proximal outcome). These changes should modify staff behavior (the intermediate outcome). Examples of such behaviors include brushing clients' teeth and caring for clients' dentures more effectively. This change in staff behavior, it was hoped, would lead to improved oral hygiene and gingival health *among clients*, therefore improving the oral health of people with ID in community residential units (the distal outcome).

Using a pragmatic approach, the program was constructed using components of a number of health behavior models (Bandura, 1977; Ajzen, 1991; Croucher, 1993). Knowledge specifically of health risks and gains was selected because it is seen as a precondition for health behavior change (Bandura, 2004) and has conventionally been considered an intrinsic element in oral health related behavior change (Croucher, 1993). Self-efficacy, it seems, allows people to translate health knowledge into healthful behavioral practices by giving them perceived control over the behavior in question (Rimal, 2000). Many major health behavior theories are in part based on self-efficacy and attitude toward a behavior, and/or very similar constructs (Noar & Zimmerman, 2005). Therefore these elements were also incorporated into the program theory and evaluation.

1.5. Evaluation

The effectiveness of this intervention was evaluated using a cluster randomized, controlled trial. To facilitate this, the intervention was rolled out in a two-stage manner, thus providing a control group for initial analyses. This control group was later trained. Randomization was ensured using stratified selection and randomized allocation of units into a control and intervention group. The residential unit was the natural unit of randomization. Strata related to two types of residential units: nursing led or social led. Stratification was applied because these units differed on many important features such as level of staff education and employment role, staff to client ratio, client dependency level and client comorbidity. The intervention was found to be effective in changing staff knowledge, reported behavior, attitudes and self-efficacy (Mac Giolla Phadraig et al., 2013) but, importantly, did not improve the oral health of those for whom trainees cared, at a statistically significant level, in the timeframe allowed (Mac Giolla Phadraig et al., 2015). Given the apparent lack of clinical effect, the issue for the team delivering this training then shifted from whether this training was educationally and clinically effective to whether the continuation of this training was an efficient use of resources. This would allow the research and training team to