Presenting information on dental risk: PREFER study protocol for a randomised controlled trial involving patients receiving a dental check-up

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ABSTRACT

Introduction: A new dental contract being tested in England places patients into traffic light categories according to risk (Red = High risk). This reflects health policy which emphasises patients' shared responsibility for their health, and a growing expectation that clinicians discuss health risk in consultations. Alongside this, there are technological developments such as scans and photographs which have generated new, vivid imagery which may be used to communicate risk information to patients. However, there is little evidence as to whether the form in which risk information is given is important.

Methods: The PREFER study is a pragmatic, multi-centre, three-arm, patient-level randomised controlled trial, based in four NHS dental practices, from which 400 high/medium risk patients will be recruited. The study compares three ways of communicating risk information at dental check-ups: 1) verbal only (usual care); 2) a Traffic Light graphic with verbal explanation; 3) a Quantitative Light-Induced Fluorescence (QLF) photograph showing, for example, patches of red fluorescence where dental plaque has been present for two days or more (with a verbal explanation). The study assesses patient preferences using the economic preference-based valuation methodology Willingness-to-Pay (WTP). Any changes in oral self-care (for example in tooth-brushing), will be measured by self-report, and clinical outcome data collected by clinicians and extracted from QLF photographs. Predictors and moderators of any behaviour change will be explored using demographic characteristics and psychological variables from the Extended Parallel Process Model. A cost-benefit framework will explore the financial implications for NHS dentistry of the three risk presentation methods.

1. Background

The communication of risk information is a fundamental part of nearly all health promotion interventions [1]; and the emphasis on this growing, given government values of freedom, fairness and responsibility articulated in recent health policy [2]. This is reflected in the NHS general dental practice context, where a new model of remuneration is being piloted, based on a care pathway approach which separates patients into 'Red' (high), 'Amber' (medium), and 'Green' (low) risk categories (RAG) [3]. The categorisation is intended to inform conversations about patient self-care behaviours such as eating less sugar and improving tooth-brushing, which are key lifestyle changes known to improve oral health [4].

However, although a link between clinician-patient communication and post-consultation outcomes has been established, the relationship is not straight forward, since relationships between communication behaviour, meaning and evaluation are complex [5]. Communicating disease risk is especially complex, given that risk judgements are 'imbued by emotion', and 'always interpreted via a social and cultural lens' [6]. Specifically, it is clear that patients do not think about risk as it objectively exists, as a continuum represented by numeric estimates [7,8]. Instead, patients use heuristics, simplified 'rules of thumb, that allow them to understand and make decisions [9–12]. Thus, the *form* in which risk information is presented to patients is especially important. Providing personalised information in a simplified and accessible way, such as the proposed RAG categories, therefore potentially influences

patients' responses to information on risk. However, little previous research has been undertaken on whether the *form* in which risk information is presented, matters [13]. In particular, no previous studies have compared patients' preferences for different forms of risk information given in a clinical setting [13].

Developments in medical technology means that the range of possible forms in which risk information can be presented to patients has grown - with routine scans and radiographs now able to demonstrate body fat, heart function, osteo-arthritis of joints etc. Previous studies have shown that medical imagery giving a vivid representation of the consequences of unhealthy behaviour can enhance risk communication, although these have used generalised, not personal images, which provide less tailored information about risk status [14–16].

Quantitative Light-Induced fluorescence (QLF) is a recent technological development in the dental field. A QLF camera produces images of teeth, which allows visualisation of tooth mineral loss at a stage before it is visible with the naked eye. It also highlights plaque which has been present in the mouth for more than 48 h [17]. By imaging previously unseen consequences of poor dental self-care, QLF has considerable potential as a risk communication tool, but is, as yet untested.

This study aims to investigate the benefits of two alternative means of communicating risk information to patients: a colour-coded RAG graphic, and a QLF image of their teeth and gums, in support of the usual verbal communication between dentist and patient - comparing these to usual care. Of particular interest, is the value which patients attach to different information forms tested, as measured by Willingness-to-Pay (WTP) – a measure which is widely used in health economics for measuring patients' preferences and determining the economic value of various services [18].

2. Methods

2.1. Study design

Using a randomised controlled trial design, we will compare patients' valuation and responses to information given 1) verbally (usual care), [V]; 2) verbally accompanied by a traffic light graphic, [TL]; and 3) verbally accompanied by a QLF image, [QLF]. We expect patients to prefer risk information presented in traffic light and/or QLF groups more than usual verbal communication. We also expect to see a greater improvement in oral health behaviours in the traffic light and/or QLF group compared to the usual care group.

2.2. Theoretical model

Imagery and numeric risk estimates are thought to influence people's reaction to risk messages by increasing patients' perception of the said threat to their health and well-being, thus heightening fear regarding any negative consequences of inaction [19]. The Extended Parallel Process Model (EPPM) describes how two appraisals determine whether a risk communication will prompt patients to adopt healthier behaviour (Fig. 1) [20]. Firstly, threat appraisals, (encompassing
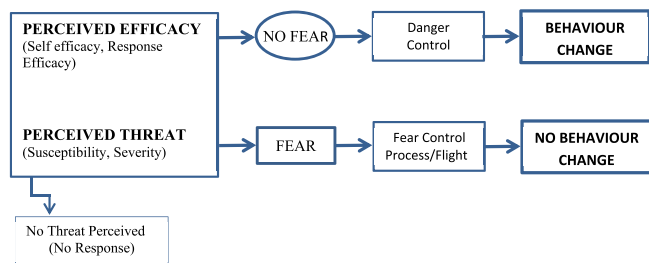

Fig. 1. Extended parallel process model.

perceptions that negative health outcomes are likely and severe); are postulated to lead to protective behaviour provided that the coping appraisal is also high. Coping appraisal refers to patients' perceptions that they can change unhealthy behaviour (self-efficacy) [21], and that these changes will reduce risk (outcome efficacy). If coping appraisals are high, generating perceptions of threat and fear are thought to promote behavioural change. On the other hand, if coping appraisals are low, this is thought to lead to defensive behaviours (such as denial of the message), even where individuals perceive themselves to be at risk of a threat [20,22]. Imagery, in particular has been associated with defensiveness [23]. The EPPM points to the possibility that certain risk communications can have negative as well as positive effects on individuals [22]. We will therefore use the EPPM as a framework to help understand why traffic light or QLF supplements to usual verbal risk communication at dental check-ups are or are not effective, and how effectiveness of risk communication may be improved.

2.3. Study objectives

- To measure individuals' preferences for three different risk communication forms using Willingness-to-Pay methods.
- To identify any differences in preference for information form between differing demographic, behavioural and psychographic groups.
- To use variables derived from the EPPM model to predict the likelihood that different information leads to behaviour change; and to measure any actual behaviour change, exploring links between behaviour and patients' valuations.
- To conduct a cost-benefit framework analysis of the three different methods and to explore the financial implications for NHS dentistry.

2.4. Setting

Patients will be recruited from four NHS dental practices in two areas of the North of England, which are not involved in piloting of the new NHS dental contract using a RAG categorisation for all patients [24]. Practices will be invited to participate by working down a list of randomly numbered NHS dental practices, until two practices in each geographical area are recruited (excluding single-handed practices in view of these being unlikely to generate sufficient patient throughput to meet recruitment targets). Practices expressing an interest in participation will be provided with an information sheet and will consent to take part in the study by the practice owner/s signing a dental practice consent form.

2.5. Participants

Participants will be recruited by trained staff at each dental practice. Patients will be approached to take part when making a dental check-up appointment.

2.5.1. Inclusion criteria

NHS adult patients (aged 18 years or older) deemed to be high/medium risk for poor oral health identified using a nationally developed algorithm, applied by the dental practice [25]. These may be either new patients or regular attenders at that practice. Patients will be screened for eligibility when making the appointment (for example: patient reported symptoms, medical history such as poorly controlled diabetes, and/or health behaviours such as smoking), although eligibility will be fully determined after a clinical examination by a dentist during the dental check-up. This follows the model currently being tested in NHS dental practices where patients are stratified into high/medium risk groups based on a combination of social history/medical history (patient factors) and clinical assessment criteria [26]. For simplicity, clinical criteria for risk assessment are limited to the most common/serious clinical criteria of dental caries and periodontal (gum)