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A theoretical model for comparing UK costs of contact lens replacement modalities

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ABSTRACT

Purpose: To develop a theoretical 'cost-per-wear' model of contact lens wear, as tool for UK practitioners to assist patients in determining the most cost-effective lens replacement and wearing frequency protocols. **Methods:** The annual cost of professional fees, contact lenses and solutions when wearing daily, two weekly and monthly replacement contact lenses was determined for spherical, toric and multifocal prescription types. This annual cost was divided by the number times lenses are worn per year, resulting in a cost-per-wear. **Results:** The cost-per-wear for two weekly and monthly replacement contact lenses is similar, both decreasing with increasing frequency of wear. The cost-per-wear of daily replacement lenses is lower than for reusable lenses when worn 1–2 days per week (DPW), but higher when worn 4–7 DPW. The 'cross-over point' for spherical lenses at which the cost-per-wear is virtually the same for the three replacement frequencies, approximately £2.06, occurs at 3 DPW. The cross-over point for toric lenses is at 4 DPW with daily compared to two weekly replacement lenses (£2.06) and between 2–3 DPW with daily compared to monthly replacement contact lenses (£2.39). The crossover point for multifocal lenses of all replacement frequencies is between 4 and 5 DPW (£1.79). **Conclusions:** In general, daily replacement contact lenses are more cost-effective when worn on a part-time basis (1–3 DPW) and reusable lenses are more cost-effective when worn full-time (4–7 DPW). This cost-per-wear model will assist practitioners in making an informed decision when offering advice to patients relating to the most suitable replacement modality.

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1. Introduction

When faced with a prospective contact lens wearer, the clinician must take into account many factors to determine the most appropriate contact lens type. Consideration may be given to the choice between soft or rigid lenses; however, in 2010 only 2% of new contact lens fits in the UK were with rigid lenses [1]. With practitioners overwhelmingly favouring soft lenses, their choice is hardly narrowed, as soft lenses are available in a wide range of materials and modalities. Characteristics such as polymer type, oxygen transmissibility, water content, material modulus of elasticity, surface wettability and lubricity, and optical performance have to be considered [2]. A decision must also be made in respect of the most appropriate lens replacement frequency, such as daily [3], two weekly or monthly [4] replacement. The parameters in

which a given lens type is available [5] will dictate whether such a lens can be prescribed for a particular patient.

Clinical decision-making will encompass many of the above factors. However, on top of these considerations the critical issue of cost and affordability must be assessed. Although recommendations may be made to a prospective lens wearer based upon clinical considerations, the ultimate choice of lens type will be affected by the willingness and/or ability of the patient to pay. There are three key components of a contact lens wear regimen: the professional fee, the cost of lenses and the cost of lens care solutions. The patient must be aware of all the costs likely to be incurred when choosing one lens type over another.

The impact of various contact lens types on the ocular response to lenses wear has been researched extensively and widely published [6]. In contrast, little information is available to assist practitioners and lens wearers balance these considerations against the financial burden of lens wear. Lens brands of a given category (e.g. spherical lenses) will show some variation in price, but the factor that perhaps has the greatest impact on the cost of lenses is the frequency of lens replacement. In the United Kingdom, virtually all

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soft lenses prescribed in 2010 fell into two lens replacement categories: daily (47% of all soft lenses prescribed) and monthly (50%) replacement. The remainder being largely made up of two weekly replacement lenses (2%) and unplanned replacement (1%) [7].

Intuitively, the most desirable lens replacement frequency is daily disposability, because of the excellent clinical performance and convenience of this modality [3]. Indeed, if all contact lenses replacement modalities were the same price, it is difficult to think of a reason for prescribing anything other than daily disposable lenses. It is perhaps surprising that two weekly replacement lenses do not figure more highly. In this regard, UK figures are in stark contrast to other markets, such as Australia and the USA, where daily, two weekly and monthly replacement lenses were fitted in 2010 in proportions of 28:29:41% and 17:33:49%, respectively [7].

Daily disposable lenses are generally perceived as being more expensive than reusable (two weekly or monthly replacement) lenses, leading many practitioners to prescribe, and many patients to request, the latter. However, the notion that 'daily replacement lenses are more expensive' is over-simplistic because the true cost of lens wear will be impacted significantly by the frequency of use of lenses.

Efron et al. [8] put forward a cost-per-wear model for the Australian market and proposed that it is sufficiently robust to be used in other markets. The basis for this model is that direct comparison between different lens replacement modalities can be made by considering the total cost incurred each time the lens is worn, i.e. the 'cost-per-wear'. The cost-per-wear model is adapted here for differing conditions in the United Kingdom.

2. Methods

For any given lens type, cost-per-wear is calculated by determining the total cost incurred by a patient over a 12-month period, taking into account professional fees and costs of lenses and solutions, and dividing this total amount by the number of times the lenses are worn in that 12-month period. All monetary values reported in this paper are in Pounds Sterling (£).

2.1. Professional fees

To obtain a representative figure for the professional fees element, a number of UK optometrists were contacted through an email forum requesting them to confidentially disclose the fees they would charge a new lens wearer for lens fitting and for after-care during the first 12 months of wear. Responses were received from 13 independent optometrists. The median value of their fees was £150.00 per year, which is the professional fee used in this model.

2.2. Contact lenses

To illustrate the construct of this model, the price of one arbitrarily chosen representative daily, two weekly and monthly replacement lens brand was selected from the online retailer Postoptics [9] on April 4, 2011. By utilizing this website, a full range of contact lens prices was available for comparison. Had prices been obtained from one of the major multiple groups, preferred provider arrangements with specific lens manufacturers would most likely have applied, thus distorting the relative prices of lenses across different categories where lenses from different manufacturers are used.

A version of the cost-per-wear model is constructed for each of the three forms of contact lens optical correction: spherical, toric and multifocal lenses. Nine lenses were selected arbitrarily, to be representative in these models (three forms of optical correction in

each of three replacement frequencies). These lenses are detailed in Table 1.

2.3. Lens care solutions

In the United Kingdom, 89% of lens wearers who required a lens care solution were prescribed a multipurpose product in 2010 [1]. Lens care solutions are, of course, not required for patients prescribed single use (daily replacement) lenses. COMPLETE® Multi-Purpose Solution Easy Rub® Formula (Abbott Medical Optics United Kingdom Ltd., High Wycombe) is used as an example in our model. On the Postoptics website [9], this solution is available in individual 60 ml travel packs, or in twin-packs of 2 × 360 ml bottles. The annual cost of purchasing this solution for use with lenses worn from one to seven days per week, consistent with assumptions 3–5 below, is shown in Table 2.

2.4. Assumptions

In constructing this model, the following assumptions are made with respect to the characteristics and purchasing patterns of an individual patient:

1. The patient requires a different optical prescription for each eye.
2. The patient is fully compliant with all aspects of lens wear. Thus, lenses are discarded in accordance with the manufacturer-recommended replacement frequency irrespective of the frequency of lens wear.
3. The patient is fully compliant with all aspects of lens care. In particular, contact lens solution bottles are discarded after the recommended expiry time since opening, which is 90 days for COMPLETE® Multi-Purpose Solution Easy Rub® Formula [10].
4. The patient makes the most cost-effective purchase of lenses for six months use at a time. Thus, for example, when faced with a choice of purchasing daily replacement lenses in boxes of 90 or 180 lenses, the patient anticipating wearing lenses one to three times per week would purchase one box of 90 lenses for each eye, whereas a patient anticipating wearing lenses between four and seven times per week would purchase one box of 180 lenses for each eye.
5. The patient uses 8 ml of contact lens multipurpose solution each day, and makes the most cost-efficient purchase of solution to last six months at a time.
6. No postage costs are incurred, as these are waived for all orders over £30.00.

2.5. Sample calculation

A sample calculation of the cost-per-wear for daily, two weekly and monthly replacement spherical lenses, worn from one to seven days per week is given in the Appendix.

3. Results

3.1. Total annual costs

The relative contributions of professional fees, lenses and solutions to the total annual cost of spherical contact lenses, when worn every day, is shown for daily, two weekly and monthly replacement modalities in Fig. 1. In this example, daily replacement, two weekly and monthly replacement contact lenses represent 72%, 39% and 31% of the total annual cost of lens wear, respectively. This proportionality is very similar for toric and multifocal lenses.

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