Systematic review of smartphone apps to treat vertigo: is there room for improvement?

**Review team members and affiliations**

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**Anticipated start date**

21/6/2021

**Anticipated completion date**

21/10/2021

**Review question**

The review aims to answer the following questions:

1. Which smartphone apps are commercially available on the iOS App and Android Google Store to treat vertigo in adult patients?
2. What is the quality of these smartphone apps to manage vertigo?
3. How effective are these apps in treating vertigo?
4. Is there any clinician or healthcare professional involvement in app development?
5. How do users rate these smartphone apps?

**Searches**

UK smartphone application store: iOS App Store, Android Google Store. A core list of key-words pertaining to vertigo will be used to form the basis of the searches in the smartphone application stores.

In addition, the following electronic databases will be searched: Cochrane Ear, Nose and Throat Disorders Group Trials Register; the Cochrane Library, including the Cochrane Database of Systematic Reviews, DARE, and Cochrane Central Register of Controlled Trials; Medline, EMBASE; CINAHL; Web of Science, from 2007 (the year smartphones were introduced) to June 2021. The search will be limited to English language and peer-reviewed studies. Forward, backward searching and hand-searching will also be conducted to ensure all relevant publications are identified.

A core list of key words pertaining to vertigo will be used to form the basis of the individual domain searches. Information obtained from personal communication, App/Google Play store searches and from research experience of the authors is also included.

**Types of study to be included**

Randomised controlled trials, cohort studies, case-control studies and case series (minimum number of patients >30).

**Condition or domain being studied**

Review all apps aiming to help adult patients manage or treat their vertigo

**Participants/population**

Inclusion criteria:

* English language smartphone apps
* Apps available on Google play or App Store in the UK
* Apps for 18 or over
* Free or paid apps
* Apps aimed to help patients manage vertigo

Exclusion criteria:

* Non-English language apps
* Apps aimed at children
* Website based interventions for patients with dizziness or vertigo
* Apps aimed at patients with orthostatic hypotension, poor strength, stroke and other non-ENT issues related to dizziness

**Intervention(s), exposure(s)**

The study will assess the use of mobile Applications in the management of vertigo at any point in the patient’s pathway. These Apps will be identified both from the literature and those currently available on the iOS App or Google Play store.

**Comparator(s)/control**

N/A

**Context**

Adult patients with vertigo using smartphone apps to manage their symptoms.

**Main outcome(s)**

**App review:**

To review and assess commercially available Apps for patients with vertigo in terms of:

* Content and aim of each App: assess what services Apps currently offer to patients with vertigo. These may include, but are not limited to, diagnosis, symptom diary, rehabilitation exercises
* Price of each App
* Quality: using the Mobile Application Rating Scale
* Healthcare professional involvement in development

**Review of studies assessing the effectiveness of vertigo apps**

* Patient reported outcome measures (e.g. severity, frequency, quality of life)
* Clinician reported outcome measures (e.g. nystagmus, positional manoeuvres)
* Objective measures (e.g. vestibulo-occular reflexes, posturography)

**Additional outcome(s)**

User experience will be assessed by qualitative content analysis of published app reviews.

**Data extraction (selection and coding)**

The apps in keeping with the inclusion criteria will be selected from two popular sources ‘Google Play Store’ and ‘Apple App Store’. Two reviewers will independently review the quality of each app with MARS scoring and input data into a standardized structured form. Significant differences in scoring (+/- 10% of the maximal possible score) will be discussed between reviewers and any remaining discrepancies will be settled by a third reviewer. The extracted data will be stored in an Excel spreadsheet.

Extracted information will include:

* App software (iOS and android), search term, App name, App type, description, ratings, reviews, healthcare professional involvement, price
* Version, date of first release, date of latest update
* Publisher, description of the app, main function of the app, target user, special features incorporated, number of downloads in the Android store, number in the chart in the Apple store.
* Missing data will be requested from the author/publisher or the app or Apple/Android store.

**Risk of bias (quality) assessment**

Quality will be assessed for the Apps as described above using the Mobile Application Rating Scale.

Identified articles will be assessed using the appropriate risk of bias tool. For randomised controlled trials, the Cochrane risk of bias tool will be used. Non-randomised trials will be assessed using the Newcastle-Ottawa Scale. The assessment will be performed independently by two reviewers.

**Strategy for data synthesis**

The apps identified from the Apple store and Google play store which meet the inclusion criteria will be analysed using the descriptive analysis, MARS scoring and content analysis of app reviews. Themes will be formulated from content analysis to determine what makes an App for vertigo effective or not. Inter-observer differences will be analysed using Pearson Correlation coefficient.

Basic descriptive statistics will be calculated*.* Apps found in both the Apple store and Google Play store will be analysed using iOS. Apps that do not have customer ratings available will still be included in the descriptive analysis. Review ratings will be compared to price and quality ratings using Spearman correlation coefficient.

It is expected that there will be limited randomised controlled trials identified in the systematic review part of this review. Thus, meta-analysis is unlikely to be achievable. Therefore, a descriptive assessment will be undertaken to report the primary and secondary aims.

**Analysis of subgroups or subsets**

No subgroup analysis is planned for this review.

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