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Mobile applications to enhance self-management of gout

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ABSTRACT

Background: Gout is an arthritic condition that is characterised by extremely painful, debilitating acute attacks and eventual joint and organ damage if not controlled. Despite the availability of very effective therapies that, if adhered to, will prevent acute attacks and long-term damage, the disorder is increasingly prevalent. There is an urgent need to improve self-management of gout.
Objectives: Mobile health (mHealth) applications ('apps'), designed to facilitate management of chronic conditions, present novel opportunities for supporting patient self-management of gout. The aim of this review was to assess features of available gout management apps designed to assist consumers in managing their gout and their consistency with guidelines for gout management.
Methods: English-language, smart-device apps designed to assist self-management of gout were identified using search term "gout" and downloaded from Apple and Google Play app stores. To be included in the review, apps had to allow users to monitor their gout disease (e.g. serum uric acid (sUA) tracking, record acute attacks) and/or educate patients about gout. Investigators derived patient-focused recommendations for gout management from contemporary guidelines. Features of reviewed apps were independently assessed by two reviewers for their facilitation of these recommendations.
Results: The search identified 57 apps possibly relevant to gout management, of which six met the inclusion criteria. One app incorporated all recommendations for patient-focused gout management from guidelines including monitoring sUA, recording attacks and lifestyle advice. However, the majority of these elements were not functional within the app, and instead required users to manually complete printouts.
Conclusions: Currently, only one app exists that includes all recommendations to facilitate patient self-management of gout, however some features can only be actioned manually. Given the lack of progress in achieving better patient outcomes and the promise of mHealth interventions to deliver significant gains, new or updated gout management apps are required to promote successful self-management of this chronic disease.

1. Introduction

Despite the availability of very effective urate-lowering therapies (ULT), the prevalence of gout is increasing (3% of adults in the United States in 2007) and its incidence is also rising rapidly [1,2]. Authoritative guidelines for the effective management of chronic gout are available [3–6]. The core advice of these guidelines is to lower and maintain serum uric acid (sUA) to ≤6 mg/dL (0.36 mmol/L; British Guidelines recommend ≤5 mg/dL (0.30 mmol/L)) [3], and to increase the dose of allopurinol, the predominantly used ULT, slowly until this is achieved. Remarkably, if these guidelines are followed, and ULT is commenced carefully, acute gout attacks will ultimately cease and the damaging effects of monosodium-urate deposits in joints and tissues will be avoided or minimised [7].

Abbreviations: sUA, serum uric acid; ULT, urate-lowering therapy; GP, general practitioner; mHealth, mobile health; App, application.

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A study has shown that negative experiences and mistaken beliefs of patients with gout were major barriers to patients seeking information and advice about gout, and also impacted on their adherence to therapy [8]. Patients were unaware that the condition could be treated effectively, and general practitioners (GPs) were reluctant to commence ULT due to unfamiliarity with gout management guidelines and concerns regarding the risk for serious hypersensitivity to ULT drugs [9,10]. Innovative methods are required to facilitate better gout management and overcome these barriers. A study in the United Kingdom, involving 106 gout patients, showed that a nurse-delivered combination of intensive, personalised education and lifestyle advice with appropriate ULT dosing advice was successful in achieving target sUA concentrations in 9 out of 10 gout patients, thus providing evidence that self-management can be effective [11].

A systematic review of factors associated with successful chronic disease management showed evidence supporting the effectiveness of interventions to support self-management by patients [12]. These factors included educational sessions and motivational counselling with health professionals, and decision-support tools for GPs [12]. The number of adults in the United States using the internet, especially on portable devices, such as cell phones or tablets, has increased, with two-thirds of cell phone owners using the device to go online [13], and the trend continues to rise [13–15]. Over half of smartphone owners use their mobile devices to go online to find health information [16,17], with those suffering from chronic conditions more likely to do so [18]. Further, one in five smartphone owners have some form of health application (app) installed on their smartphone [19]. Electronic tools have been shown to be effective in supporting self-management, changing health behaviours such as improving medication adherence, and increasing compliance to guidelines for chronic diseases such as asthma, diabetes and juvenile idiopathic arthritis [20–23]. Additionally, a meta-analysis demonstrated the effectiveness of providing individualised feedback to patients about their progress during interventions to support behaviour change [24]. Collectively, this evidence suggests that there is a sound argument for the development of electronic health tools such as mobile health (mHealth) apps, to enhance self-management of gout and other chronic health conditions, particularly if applications can be accessed on mobile devices such as smartphones.

Gout is a chronic disease in which patients have long-term challenges to maintain good control of their gout. Taking medication regularly, often for life, and having regular sUA tests are critical behaviours required. The change in behaviour of many gout patients needed to meet this standard is extremely challenging as evidenced by the low medication adherence rates and poor control of gout revealed in many studies [25–27]. Hence, the development of an mHealth app to support the required behaviour changes would be a significant advance in gout management. Gout is a strong candidate condition for self-management given the presence of an indicator, sUA, which correlates closely with the risk of gout attacks and can be monitored by patients. With an improved understanding of their condition, along with reminders and individual feedback, it is anticipated that gout sufferers will more likely reach and maintain target sUA concentrations through better treatment adherence. This review assessed mobile apps currently available to patients for the management of gout. To do so, a thorough examination of the apps was conducted which included comparison of the apps' content and features against internationally accepted gout management guidelines, important for successful outcomes in individual patients.

2. Methods

2.1. Search strategy for mobile apps for gout patients

A search was performed in the Apple App Store℠ for iPhone and iPad compatible mobile apps for gout management. The search in the Apple App Store using the term "gout" (in May 2015) retrieved 57 apps. The inclusion criteria for the apps to be included in the review were that the app had to be in English, primarily related to the disease gout, designed for patient use and incorporate elements of disease monitoring and/or patient education. The App Store description of each app was then read and assessed against these inclusion criteria. Following this, 51 apps were excluded (Table 1), with only six apps (11%) meeting the above conditions. The Android™ mobile app store, Google Play™, was also searched for gout management apps designed to assist consumers to better manage their gout using Android devices, and no additional apps were found.

2.2. Identification of self-management recommendations from existing gout management guidelines

Of the available gout guidelines, four were selected for this review. These four guidelines [3–6] were selected because they are the most recently developed and under the auspices of the leading, international associations in the field of rheumatology. These guidelines [3–6] are directed primarily towards healthcare providers to manage their patients, and hence, not all recommendations are applicable to patient self-management. Two investigators (AN, DK) independently reviewed the gout management guidelines and reached a consensus on the recommendations that were relevant to individual patient self-management (Table 2) i.e. those recommendations that could be actionable by a patient.

2.3. Presence of patient-focused recommendations for management of chronic gout in gout apps

Two investigators (AN, DK) independently assessed the six apps that met the inclusion criteria, separately, against each of the recommendations from Table 2. For a recommendation to be considered present, the app needed to include a function or educational material (e.g. an informational statement or section) for that specific recommendation. Once again, the investigators met to compare results and came to a consensus after discussion.

Table 1
Reasons for apps being excluded from further study.

Exclusion criteria	# of mobile applications
Not related to gout (e.g. many were French where goût refers to taste of food)	28
Related to gout (disease), but only provided information on purine content of foods that might contribute to gout	12
Related to gout (disease), but only provided homeopathic advice	2
Related to gout (disease), but not for patient use (targeted to healthcare providers)	7
Overall health management app not primarily focused on gout e.g. provided tracking facility for several blood concentration pathology results, one of which was urate, but included no other information about gout	2
Not in English	18

Note: Categories not mutually exclusive.