

Title: eHealth Supported Decentralized Multi-Disciplinary Care for Gout Involving Rheumatology, Pharmacy, and Dietetics: Proof-of-concept Study

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ABSTRACT

Objective: To conduct quantitative and qualitative evaluation of an electronic health (eHealth)-supported decentralized multi-disciplinary care model for gout involving rheumatologists, pharmacist, and dietitian.

Methods: We conducted a 12-month proof-of-concept study. Gout patients with ≥ 1 flare in the past year and serum urate (SUA) ≥ 360 $\mu\text{mol/L}$ within the previous 2 months were followed by participating community rheumatologists on an as needed-basis, received monthly telephone consults with a pharmacist, and one telephone consult with a dietitian. Health care professionals were not co-located but had shared access to the rheumatologists' electronic medical records (EMR) for remote communication and collaboration. In quantitative evaluation, the primary outcome was the proportion of patients with SUA < 360 $\mu\text{mol/L}$ at 12 months. In qualitative evaluation, we conducted semi-structured interviews with a sub-set of patients and applied constructivist grounded theory to gather patients' perspectives.

Results: Overall, 35 gout patients (86% males, mean age 60.9 ± 14.9 years) participated. At 12 months, 72% of patients achieved target SUA < 360 $\mu\text{mol/L}$. Qualitative analysis of interviews with a subset of 12 patients resulted in two themes: 1) experiences with receiving care, including categories of improved knowledge about gout, receiving personalized support, and knowing someone cares; and 2) practical considerations, including categories of optimizing timing of care and coordination and accessibility.

Conclusion: Our multi-method study shows that a decentralized, multi-disciplinary care for gout involving rheumatology, pharmacy, and dietetics with shared EMR access led to gout patients achieving target SUA. It was well-received by patients who perceived better education about gout and personalized care.

Key Points

- We demonstrated the feasibility and impact of an eHealth-supported, decentralized collaborative care model for gout involving rheumatology, pharmacy, and dietetics
- Although prior multi-disciplinary models of care for gout have been reported, the novelty of our model is that health care providers are not co-located, lending to potential efficiencies and outreach to patients in rural areas

BACKGROUND

Gout, the most common form of inflammatory arthritis, is a growing problem with evidence of 1.5- and 2-fold increases in prevalence in the UK[1] and the US[2] over the past two decades. In British Columbia (BC), Canada, the prevalence of gout in 2012 was estimated at 3.8% and the incidence rate was 2.9 per 1000 person-years[3]. Contributing to the burden of gout is consistent reports of sub-optimal care and poor patient outcomes[4-7], motivating the efforts to improve care delivery[8].

In recent years, a number of programs or interventions for gout involving allied healthcare providers and rheumatologists have been evaluated in various jurisdictions. These include nurse-led care along with a rheumatologist for gout patients seen in a hospital rheumatology clinic in the UK[9,10] and pharmacist-led care along with a rheumatologist in health maintenance organization centres in the US[11-14]. A 2017 pilot study showed the feasibility of a program involving care from a rheumatologist, education from a nurse, and monitoring by a pharmacist for gout patients (n=45) seen at a hospital rheumatology setting in the US[15]. Indeed, supporting rheumatology care with allied care is an important step towards improving care for gout. Given differences in healthcare systems and delivery in various jurisdictions, ongoing development and evaluation of care models is important, as well as the roles of other allied healthcare providers. Furthermore, aforementioned models or programs have involved co-located healthcare providers and to our knowledge, the potential role of decentralized, multi-disciplinary care for gout has not been described. A decentralized model of care for gout can be established using electronic health technology (eHealth), which has various applications in rheumatology[16], by specifically using shared electronic medical records (EMRs) to facilitate communication and collaboration among healthcare providers. Our objective was to comprehensively evaluate a novel decentralized, multidisciplinary model of care for

gout involving community rheumatologists, a pharmacist, and a dietitian supported by shared eHealth using both quantitative and qualitative approaches.

METHODS

Model of Care

Our model of care is characterized by three features: 1) multi-disciplinary care involving rheumatologists, a pharmacist, and a dietitian; 2) decentralized in that healthcare providers were not co-located; and 3) supported by eHealth, through shared electronic medical record (EMR). With respect to healthcare providers involved, eight rheumatologists from four community rheumatology clinics in three cities representing both urban and rural settings in the province of BC participated as study sites, recruiting for the study, and seeing gout patients on an as-needed basis. The study pharmacist (NWT) provided an initial medication review via telephone at baseline and then followed a protocol involving monthly telephone calls to check and discuss laboratory results, medications (including changes, adherence, side effects), and assess lifestyle factors (**Supplementary Material 1**). This protocol was collaboratively developed by the pharmacist and rheumatologists (HC, AK, KS, and AA). Given the role of diet in the management of gout[17], our model of care included a dietitian (RF) who provided one hour-long telephone consult to discuss with patients their current dietary habits and/or concerns.

With respect to care delivery, it was decentralized in that healthcare providers were not co-located, with community rheumatologists seeing patients in their respective clinics. The study pharmacist was based at the study coordination centre in the Faculty of Pharmaceutical Sciences at the University of British Columbia and the study dietitian was based at their primary institution.

A third and unique feature of our model care is that it was supported by shared EMR. Specifically, healthcare providers had access to patients' EMRs in Plexia Electronic Medical Systems (www.plexia.ca). As we described in a prior study of the utility of EMRs for assessing quality of care indicators for gout, this EMR captures information on patient care episodes including medical problems, prescriptions ordered by the rheumatologists and filled by patients (via the BC PharmaNet System), laboratory tests ordered and results, reports (e.g., radiology), and notes, the narrative portion of the EMR[18]. Access to EMRs facilitated consults provided by allied healthcare providers – for example, the pharmacist can triangulate prescriptions from the rheumatologists to fills in pharmacies by patients as well as review laboratory results. Furthermore, shared EMR access facilitated collaborative care between all healthcare providers. The pharmacist and dietitian documented all consults as SOAP (subjective, objective, assessment, and plan) notes which were entered into the notes section of the EMR. Healthcare providers also utilized EMR functions such as memos to communicate directly. **Figure 1** illustrates the intervention as well as the follow-up and data collection schedule for the quantitative and qualitative evaluation.

Participants

Adults, 19 years or older, with gout seen by the participating rheumatologists were eligible if they: experienced ≥ 1 gout flare in the past year, have serum urate (SUA) ≥ 360 $\mu\text{mol/L}$ within the last 2 months, and able to provide informed consent and complete outcome assessments. Individuals were excluded if they had a previous diagnosis of a rheumatic disease, not including osteoarthritis.

Study Design, Follow-up, and Data Collection

We evaluated our model of care within a 12-month, observational proof-of-concept, multi-method study. Eligible gout patients were evaluated from baseline to 12 months. Quantitative

outcome data were collected at baseline, 6, and 12 months using the EMR and patient reported outcome measures (PROMs) administered over the Internet or telephone. The primary outcome is the proportion of patients achieving SUA target ($<360 \mu\text{mol/L}$) at 12 months. Based on a prior proof-of-concept study of nurse-led care with a rheumatologist for gout[9], we defined success as having 70% of patients achieving target SUA at 12 months. Secondary outcomes include PROMs for: medication adherence (5-item Compliance Questionnaire Rheumatology ([CQR-5])[19,20], work productivity (Work Productivity and Activity Impairment Questionnaire [WPAI])[21], functional status (Health Assessment Questionnaire [HAQ])[22,23], and quality of life (EQ-5D)[24-26].

Patients were also invited for one-on-one semi-structured interviews to understand their experiences and perspectives from receiving care for their gout in this care model. We purposively invited patients for interviews based on SUA and medication adherence (CQR-5). Participation was voluntary and interviews were conducted over the telephone (by AH). Interviews were digitally recorded using an Olympus Digital Voice Recorder WS-853, and professionally transcribed.

Statistical Analysis

We calculated descriptive statistics, including medians and proportions, to characterize patients and study outcomes over baseline, 6 month, and 12 month follow-up. We tested for significance of trends with the Cochran-Armitage trend test for categorical variables and by fitting linear generalized estimating equation models with exchangeable working correlations for continuous variables. We used SAS Version 9.4.

Qualitative Analysis

Transcribed interviews were imported to NVivo 11 (QSR International) to organize and support the analysis. As described in previous work, this descriptive qualitative study applied the

constructivist grounded theory approach and followed the coding steps of: 1) initial coding; and 2) focused coding and categorization [27,28]. Interviews were conducted with patients until topic saturation was reached, defined as a point when there are no novel insights about the constructed categories. One study author (AH) completed the initial analysis and a consensus on the final themes and categories was achieved after discussion with a second study author (MDV).

Patient and Public Involvement

This study was supported by the Arthritis Patient Advisory Board (APAB) of Arthritis Research Canada (ARC), a national consumer group of individuals living with arthritis, who regularly collaborates in arthritis research[29]. APAB provided input in study design, patient recruitment, and knowledge translation.

RESULTS

Quantitative Results

Forty-six individuals with gout receiving care from participating community rheumatologists were invited to participate. Of those, 39 consented to participate and four withdrew consent. Altogether, 35 patients providing informed consent received care and follow-up within the model of care. **Table 1** summarizes baseline patient characteristics, including mean age of 60.9 ± 14.9 years and 86% being men. Over a third (66%) of patients' body mass index was categorized as overweight or obese. Tophi at baseline were present in 54% of patients. At baseline, 22 patients were on urate-lowering therapy (ULT) with 21 on allopurinol at mean dose of 221 ± 125 milligrams and 1 patient on 80 mg of febuxostat.

We assessed encounters with healthcare providers over the 12 months of follow-up within the model of care. Including the baseline visit, patients saw their respective rheumatologists, a mean 2.8 ± 1.1 times. With respect to consults with the pharmacist, patients had a mean of 3.6 ± 2.7 telephone consults over the 12 month follow-up. Despite multiple attempts, 33 of 35 patients received their one hour telephone consult from the dietitian. With respect to rheumatologist-interventions, we noted 13 new ULT prescriptions after baseline such that by 3 months, all 35 patients were receiving ULT, with 32 on allopurinol (mean dose 272 ± 146 mg) and 3 on febuxostat (80 mg). At 12 months, 31 patients were receiving allopurinol (mean dose 290 ± 147 mg) and 3 on febuxostat (80 mg). Collaborative interventions initiated by the pharmacist and/or rheumatologist included up-titration of ULT doses for 15 patients, discontinuation of unnecessary medications for 12 patients, and restarting of ULT for 3 patients where non-adherence was identified during telephone consults. In addition, the pharmacist renewed ULT prescriptions for 4 patients using the EMR.

With respect to our primary quantitative outcome, the proportion of patients with SUA <360 $\mu\text{mol/L}$ at 12 months was 72.4%, greater than our aforementioned target of 70% and representing an increase from baseline (24.2%) and 6 months (65.5%) (p-value for trend = 0.0001). Correspondingly, patients' SUA declined over the follow-up from a median of 443 $\mu\text{mol/L}$ (interquartile range [IQR] 181 $\mu\text{mol/L}$) at baseline, to 333 $\mu\text{mol/L}$ (IQR 82 $\mu\text{mol/L}$) at 6 months, and to 322 $\mu\text{mol/L}$ (IQR 93 $\mu\text{mol/L}$) at 12 months (p-value for trend <0.0001). With respect to PROMs completed over the follow-up, we did not observe any significant trends (**Table 2**).

Qualitative Results

Semi-structured interviews were completed with 12 patients (83% male; 66.5 ± 13.3 years). Near the time of the interview, six patients had SUA above target ($360 \mu\text{mol/L}$) and/or were considered non-adherent according to the CQR5. Two main themes resulted from the analysis: 1) experience with decentralized multidisciplinary care model; and 2) practical considerations (**Table 3**).

Three categories comprised the first theme: 1) learning about gout and its' management; 2) receiving personalized support; and 3) knowing someone cares. The first category, learning about gout and its' management, included gaining knowledge on diet, medications, meaning of SUA, and knowledge about gout. Many patients described learning about dietary triggers that can cause gout symptoms to flare. A number of patients also described learning about SUA, which helped patients to understand their SUA levels and connect the impact of diet and medications on their disease. Second, receiving personalized support included reviewing lab test results and receiving direct advice and instructions. Importantly, some patients expressed having their own experiences with gout, such as personal dietary triggers, validated when speaking with a health professional. Support also included direct instructions about how to properly take medications. The third category, knowing someone cares, referred to patients sensing that the health professionals cared for them and that a concerted effort was being made to improve their health. The described sense of caring included having someone listen, establishing a genuine connection, and feeling emotionally supported.

The second theme, practical considerations, describes opportunities to improve care delivery and contains two categories: 1) optimizing timing of the care model; and 2) coordination and accessibility. To optimize timing, a number of patients shared that it would be better to begin the model of care when gout is active (i.e., causing flares and pain) or when ULT is being taken inappropriately. The second category, coordination and accessibility, highlighted the benefits and difficulties with utilizing telehealth. While some patients expressed telehealth offered convenience,

especially for those living a distance from their rheumatologist, others noted the difficulty in coordinating phone calls with the pharmacist and dietitian.

DISCUSSION

Our objective was to apply a multi-method approach to evaluate a decentralized, multi-disciplinary model of care for gout involving community rheumatologists, a pharmacist, and dietitian that is uniquely supported by shared EMRs between care providers. Assessment of patient outcomes showed 72% achieving target SUA $<360 \mu\text{mol/L}$ after 12 months of follow-up within this model of care. Furthermore, qualitative analyses of semi-structured interviews with a subset of 12 patients resulted in two themes – experiences with receiving care and practical considerations – which capture patients' perspectives of this model, which may inform further research or future implementation of this model. Given sub-optimal care and poor patient outcomes in gout[4-7], developing new ways of delivering care is important as well as comprehensive evaluation approaches that take into consideration clinical and patient reported outcomes as well as patient perspectives.

Previously described programs and interventions for gout involving rheumatologists working with allied healthcare providers, including nurses[9,10] and pharmacists[11,12,14,13], in centralized (co-located) settings represent promising approaches to improve gout care. Specifically, a 2-year randomized controlled trial (RCT) in the UK showed 95% of patients receiving nurse-led care in a hospital rheumatology clinic achieved SUA target less than $360 \mu\text{mol/L}$ as compared to 30% of patients receiving general practitioner (GP)-led usual care[10]. Among interventions involving pharmacy, a 26-week RCT in the US showed that 35% of gout patients receiving rheumatologist and clinical pharmacist-delivered intervention achieved target SUA levels as compared to 13% of gout patients in the control group[12]. Also in the US, a 1-year cluster RCT showed that more gout patients receiving pharmacist-led care with a rheumatologist had achieved target SUA (31.3% vs

20.6%, $p < 0.0001$) and better adherence compared to those receiving usual care[14]. A similarity across these interventions is an emphasis on provision of education to patients by allied healthcare providers. Incorporating an educational component is important, as a 2018 systematic review and thematic synthesis of 20 qualitative studies on gout management identified limited knowledge on gout as a major theme among patients[30].

Adding to these prior works, we describe a model of care that incorporates a similar multi-disciplinary approach involving allied healthcare providers supporting rheumatology care but introducing a decentralized approach and the role of eHealth to support care delivery. While multi-disciplinary approaches have been described not only in gout[10,9,11,12] but as well as in other rheumatic diseases[31], to our knowledge, this is the first description of a model whereby healthcare providers are not co-located. With a decentralized approach, efficiencies are introduced whereby the pharmacist and dietitian had capacity to support eight rheumatologists. Furthermore, with 2 of 8 participating rheumatologist practising in a smaller city (pop: 90,000) outside of the metropolitan Vancouver area, we also demonstrated potential improved access to care for patients living in rural or remote areas. Efficiencies are further introduced by having eHealth support care delivery in the form of shared EMR. Evidence on the promising role of digital technologies, including smartphone apps, sensors, and wearables in rheumatology care is emerging[32]. Adding to this evidence, this is the first description of how EMRs can be further leveraged to support patient care in a multi-disciplinary setting.

Given the novelty of our model of care, we applied a multi-method approach to its evaluation. The quantitative evaluation, facilitated by utilizing patient data captured in the EMR, demonstrated the potential impact of the model of care on clinical outcomes, particularly in achieving SUA target as well as PROMs. Complementing the quantitative evaluation is our qualitative assessment which offered valuable insight from patients into aspects of this care model

that optimize care. Prior research has identified that insufficient knowledge about gout is a common barrier to optimal management[33-35]. Results from our qualitative evaluation show that patients learned important aspects about gout through this care model, including: the meaning of SUA and its relationship to gout severity; medication information; and dietary and lifestyle recommendations. Similar to our study, a qualitative exploration of patients' experiences with a nurse-led intervention for gout identified that a multidisciplinary care model can support learning about gout and offer personalized support[36]. In the context of our study, receiving personalized support included receiving guided feedback of lab tests and ongoing medication management, all of which can contribute to improving treatment adherence. A unique finding of our study is that a decentralized collaborative care model has the ability for patients to also receive emotional support as evidenced by patients' sensing that their health providers cared for them. This finding is potentially explained by the inclusion of allied healthcare providers as well as the utilization of telehealth to increase both the frequency and opportunities for patient contact.

Nonetheless, limitations of our study deserve comment. Given that it was a proof-of-concept study, the study sample size is small and we did not conduct any comparative analysis with patients that did not experience the model of care. However, establishing the infrastructure to deliver and evaluate this model, lends to the feasibility of future evaluations, including implementing clustered randomized controlled designs as patient-level randomization would not be appropriate. While use of data captured in the EMR, particularly on SUA levels, facilitated outcome evaluation, there may still be instances of missing data, particularly if patients did not go the laboratory despite instructions from their rheumatologists, which is not captured in the EMR. Records of gout flares were also unavailable in the EMR and few validated questionnaires are available to assess gout flares[37]. Although we assessed PROMs over follow-up, we did not observe any significant trends. Along with a small study sample size to begin with, because PROMs were collected on a voluntary

research basis, not all patients provided responses and few consistently completed PROMs across all follow-up points. The 1-year follow-up may also not be sufficient to observe impacts of the care model on constructs such as quality of life and work productivity. Nonetheless, we cautiously interpreted findings of a lower proportion of patients self-reporting as adherent to their medications at 12 months. This may reflect the fact that patients who completed the PROMs at 12 months are those who remain engaged in the model of care and the research because of problems – such as adherence – that require continued support. Finally, with respect to the qualitative assessment, patient recall may be a potential limitation. As well, because they did not interact with the EMR, patients could only share their experiences about two aspects of the model, that is, the multi-disciplinary and decentralized aspects and not the incorporation of eHealth.

CONCLUSIONS

Altogether, we showed in a proof-of-concept study that a decentralized, multi-disciplinary care model for gout involving rheumatology, pharmacy, and dietetics with shared EMR access led to gout patients achieving target SUA. It was well-received by patients who perceived better education about gout and personalized care.

Table 1. Patient characteristics at baseline

Characteristic	Value
Age (years), mean (SD)	60.9 ± 14.9
Sex, N (%)	
Women	5 (14)
Men	30 (86)
Race, N (%) ^a	
Asian	8 (24)
Caucasian	25 (76)
Highest level of education, N (%) ^a	
High school or equivalent	8 (24)
Some college/university	6 (18)
Vocational/technical school	4 (12)
Undergraduate college/university	8 (24)
Graduate or professional degree	7 (21)
Annual household income, N (%) ^a	
Under \$10,000	1 (3)
\$10,000-\$19,999	1 (3)
\$20,000-\$29,999	2 (6)
\$30,000-\$49,999	5 (15)
\$50,000-\$74,999	10 (30)
\$75,000-\$99,999	5 (15)
\$100,000-\$150,000	3 (9)
Over \$150,000	4 (12)
Prefer not to answer	2 (6)
Body mass index, N (%)	
Normal (18.5-24.9)	4 (11)
Overweight (25.0-29.9)	8 (23)
Obese (≥30.0)	15 (43)
Not assessed	8 (23)
Blood pressure, N (%)	
Normal	11 (31)
Normal - High	5 (14)
Hypertension	16 (46)
Hypotension	2 (6)
Not assessed	1 (3)
Comorbidities, N (%)	
Diabetes mellitus	9 (26)

Moderate to severe chronic kidney disease	6 (17)
Congestive heart failure	6 (17)
Myocardial infarction	5 (14)
Peripheral vascular disease	1 (3)
Cerebrovascular disease	1 (3)
Dementia	1 (3)
Chronic obstructive pulmonary disease	3 (9)
Peptic ulcer disease	3 (9)
Tophi, N (%)	
Present	19 (54)
None	4 (11)
Not assessed	12 (34)
Urate lowering therapy, N (%)	
Allopurinol ^b	21 (95)
Dose (milligrams), mean (SD)	221 ±125
Febuxostat ^b	1 (5)
Dose (milligrams), mean	80

^aDenominator based on data available.

^bDenominator based on patients prescribed urate lowering therapy.

Table 2. Patient-reported outcome measures (PROMs) assessed at baseline, 6 month, and 12 month follow-up

Outcome	Baseline (n=33)	6 months (n=20)	12 months (n=20)	Trend- test p-value^a
Compliance Questionnaire Rheumatology-5 Item				
Adherent, N (%)	20 (60.6)	14 (70.0)	8 (40.0)	0.31
Health Assessment Questionnaire				
median (IQR)	0.5 (1.3)	0.3 (0.6)	0.4 (1.2)	0.56
EQ-5D^b				
Mobility, N (% with problems ^c)	16 (48.5)	10 (52.6)	8 (40.0)	0.68
Self-care, N (% with problems ^c)	5 (15.2)	1 (5.3)	3 (15.0)	0.73
Usual activities, N (% with problems ^c)	15 (45.5)	7 (36.8)	6 (33.3)	0.37
Pain/discomfort, N (% with problems ^c)	20 (64.5)	11 (57.9)	9 (50.0)	0.33
Anxiety/depression, N (% with problems ^c)	6 (18.2)	1 (10.5)	2 (25.0)	0.76
Visual Analog Scale, median (IQR)	60.0 (72.0)	70.0 (77.0)	67.5 (71.5)	0.79
Work Productivity and Activity Impairment Questionnaire				
Current employed, N (%)	12 (36.4)	7 (35.0)	7 (35.0)	
percent of work time missed due to gout, median (IQR)	0.0 (4.6)	0.0 (21.1)	0.0 (0.0)	0.25
percent of impairment while working due to gout, median (IQR)	10.0 (20.0)	30.0 (70.0)	20.0 (35.0)	0.31
percent of overall work impairment due to gout, median (IQR)	10.0 (20.0)	30.0 (80.0)	10.0 (20.0)	0.82
percent of activity impairment due to gout, median (IQR)	50.0 (65.0)	40.0 (50.0)	30.0 (60.0)	0.16

^aCategorical variables were assessed using the Cochran-Armitage trend test and continuous variables were fitted with linear generalized estimating equation models with exchangeable working correlations.

^bDenominators based on data available.

^cPatients with problems were those indicating any problem within each of the EQ-5D categories.

Abbreviations: IQR – interquartile range

Table 3. Qualitative description of patients’ experience with the eHealth-supported decentralized collaborative care model for gout (theme 1) and practical considerations for model implementation (theme 2)

Conceptual Category	Example Quotes
Theme 1: Experience with decentralized collaborative care model	
Learning about gout and its’ management	<p><i>“I was delighted to hear that I could drink wine again. So that’s a big factor.”</i> (Patient 1, male)</p> <p><i>“we went over... you know things to avoid eating”</i> (Patient 7, female)</p> <p><i>“the CT scan that, that she ordered that displayed exactly where the crystals in my feet and my hands was pretty dramatic”</i> (Patient 9, male)</p> <p><i>“If I just went onto allopurinol on its own, that in itself might trigger a gout attack”</i> (Patient 12, male)</p> <p><i>“the blood tests, that kind of showed whether it was working or not”</i> (Patient 4, male)</p>
Receiving personalized support	<p><i>“seeing what the results and the confidence [the health providers] have instilled in me of taking it [medication], has changed my opinion of taking it on a regular daily basis”</i> (Patient 2, male)</p> <p><i>“it was nice having her [pharmacist] check on the blood tests.. and interpreting them, and I remember one in particular where it looked like stuff was going the wrong way, so it was nice having that kind of feedback”</i> (Patient 8, male)</p>
Knowing someone cares	<p><i>“I felt that somebody really cared who wanted to know how I’m doing”</i> (Patient 3, female)</p> <p><i>“even though I’m far [...], they also care for my health. I feel so happy, happy because they care, that’s the point.”</i> (Patient 5, male)</p> <p><i>“it’s just that you feel you know that somebody cares. The information is useful but just to have somebody you know suddenly to have all this attention around something that you’re experiencing is, you know it feels good.”</i> (Patient 4, male)</p>
Theme 2: Practical considerations	
Optimizing timing of the care model	<p><i>“but certainly the consults would be very useful if the medications weren’t as effective as they were for me”</i> (Patient 9, male)</p> <p><i>“a year ahead when my gout was so extreme before I got referred to a rheumatologist, it would have been a lot more helpful”</i> (Patient 7, female)</p>
Coordination and accessibility	<p><i>“I don’t think the gout right now is an issue”</i> (Patient 6, male)</p> <p><i>“I already told the dietitian, the pharmacist, [the rheumatologist], I told them that I always.. work out of town, but they insisted that we will give you a call”</i> (Patient 5, male)</p> <p><i>“I think she called me, he or she called me and I was not home. But then I called and left a message, but then I don’t think she called me back”</i> (Patient 3, female)</p>

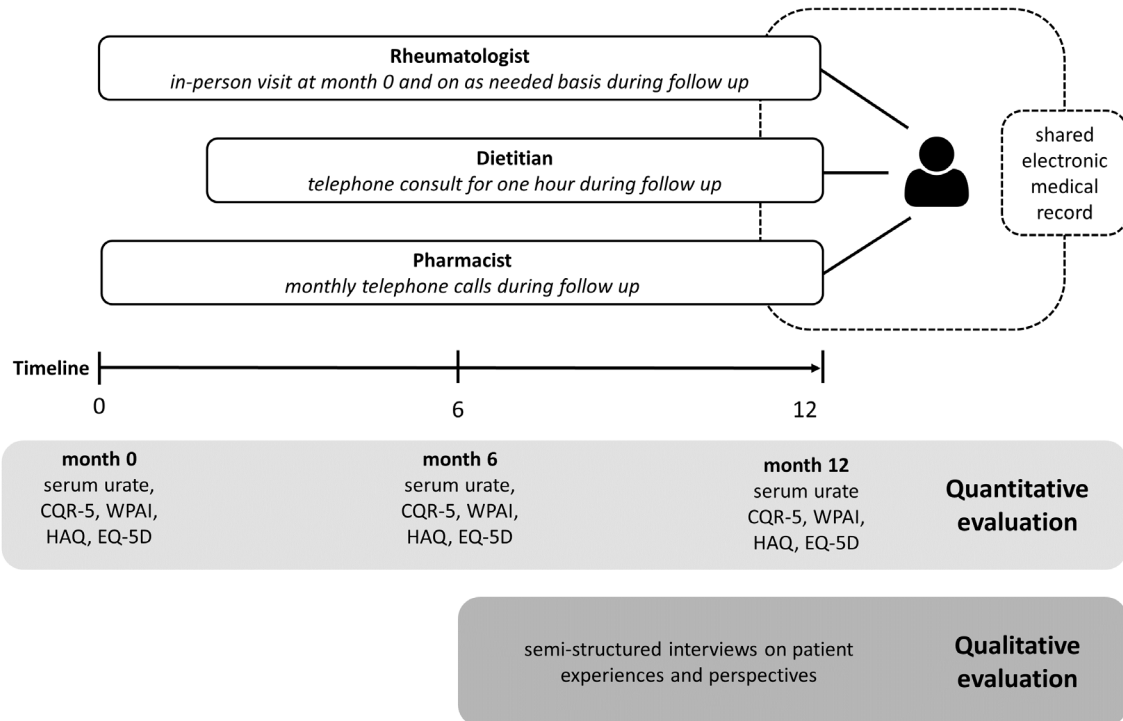
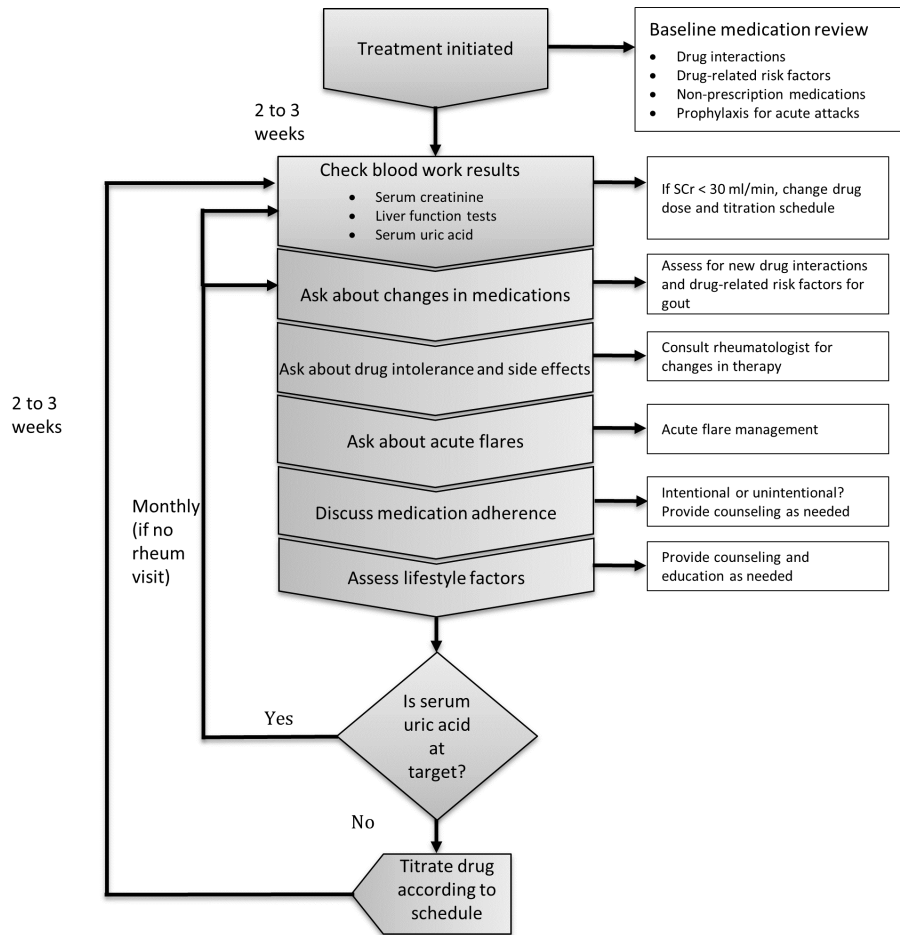


Figure 1. Overview of eHealth-supported multi-disciplinary model of care for gout and study flow

Abbreviations: CQR-5 – 5-item Compliance Questionnaire Rheumatology; WPAI – Work Productivity and Activity Impairment Questionnaire; HAQ – Health Assessment Questionnaire



Supplementary Material 1. Overview of pharmacist protocol

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DECLARATIONS

Ethics approval and consent to participate

This study was reviewed and approved by the University of British Columbia Clinical Research Ethics Board (H14-01465) and Behavioural Research Ethics Board (H16-02061). Written consent was received from all study participants.

Consent for publication

Not applicable.

Availability of data and material

The datasets generated and/or analyzed during the current study are not publicly available due to the personal information of study participants but are available from the corresponding author on reasonable request.

Competing interests

HKC reports grants from AstraZeneca and consulting fees from Takeda, Selecta, and Horizon outside of the submitted work.

The other authors have disclosed no conflicts of interest.

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