Use of telemedicine for rheumatology practice in Queensland, Australia: Experiences before and during the COVID-19 pandemic

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Abstract

Background: In Australia there is a shortage of rheumatologists potentially translating to poorer outcomes. A possible solution in this setting is telemedicine (TM).

Aim: The aim of this study was to examine the utilisation and provider perceptions of TM in rheumatology in Queensland and explore the challenges faced when using TM before and during COVID-19.

Methods: A sequential mixed-methods study design was used. Rheumatologists completed a questionnaire on demographics, clinical practice, TM uptake, models of care and clinician perceptions of TM. The qualitative phase utilised purposeful sampling of active users of TM through in-depth semi-structured interviews.

Results: Thirty rheumatologists participated with 76.7% identifying as active TM users. Use of TM was limited prior to COVID-19 with 80.9% seeing less than 5 patients per week. Patient populations served by TM included capital city (53.3%), regional (63.3%) and rural/remote (23.3%). Most rheumatologists prescribed conventional or biologic disease modifying agents (90% and 55%) through TM consultations. Barriers to TM use included low confidence in joint assessments, limited distribution of technology, access to administrative and peripheral clinical staff and lack of financial incentives. During the COVID-19 pandemic, a significant expansion of TM via telephone calls occurred and rheumatologists reported low confidence and satisfaction with this model.

Conclusions: Familiarity with TM exists in this rheumatologist cohort, however its use in routine practise is limited due to multiple barriers. The COVID 19 pandemic highlighted low confidence in telephone calls as a form of TM underlining the need for appropriate TM models of care for rheumatology practice.

Key Words: Telemedicine, telerheumatology, telehealth.

INTRODUCTION

The rapid expansion of information and communication technology (ICT) has paved the way for telemedicine (TM) to emerge as a promising adjunct in healthcare provision, potentially improving access to specialist medical care for all patients but particularly for those living in rural and remote communities[1,2]. In Queensland, many patients referred to public rheumatology outpatient services are not seen within clinically triaged timeframes[3]. This is reflective of a larger nationwide workforce issue within the specialty of rheumatology[1].

For inflammatory conditions such as rheumatoid arthritis, 'time is joint'.[4] Delays in early initiation of disease-modifying anti-rheumatic drugs (DMARDs) and failure to facilitate 'treat to target' goals, within the recognised window of opportunity may result in the accrual of erosive, irreversible joint damage and associated morbidity[4,5]. Early specialist-led initiation of therapy for inflammatory arthritis leads to higher rates of drug-free remission, less radiographic damage and decreased requirement for orthopaedic surgery[4,5]. Data indicates that patients referred with suspected inflammatory arthritis in Australia are not always seen within the optimal therapeutic window[6,7].

Given the workforce shortage within the Australian rheumatology sector, there is a need to streamline services to optimise access. Queensland Health has one of the largest video-conferencing telehealth capabilities within Australia (involving over 200 hospitals and community facilities within the state) and a number of publications indicate TM use within rheumatology in Queensland[8,9,10]. However, a greater TM capacity would improve access further, and understanding provider perceptions and barriers to using TM may assist in further TM development within rheumatology.

The aim of this study was to examine the utilisation and provider perceptions of TM in rheumatology in Queensland and to explore the challenges and barriers faced when using TM for rheumatology specialist care. As this study was in part undertaken during the COVID-19 pandemic, the scope was expanded to investigate the changing landscape of TM for rheumatology care during this time.

METHODS

The study invited Queensland based rheumatologists currently listed on the Australian Rheumatology Association registry to participate. Written consent was obtained from all participants. Ethics approval was obtained from the Townsville Hospital and Health Service Human Research Ethics Committee (HREC LNR/2019/QTHS/52885).

A sequential mixed-methods study design was adopted to gain insight into the current TM landscape within rheumatology in Queensland. Rheumatologists completed a questionnaire including demographics, TM uptake, models of care applied, clinical practice and clinician perceptions of TM (Supplementary A). The questionnaire and participant information sheets were disseminated by email followed by two reminders at one-month intervals. Questionnaires were completed prior to the COVID-19 pandemic (February 2020)

The qualitative phase of the study adopted purposeful sampling and invited active users of TM identified from questionnaire data for in-depth interviews. This approach was adopted from the techniques described by Benoot et al.[11] to identify appropriate contacts for in-depth discussion of TM in rheumatology. Telephone interviews were conducted by the primary investigator (DJ) using a semi-structured interview guide. Given this phase of the study took place during the COVID-19 pandemic, the impact of the COVID 19 pandemic on TM use

was also explored, assessing the change in TM use and clinical practice (Supplementary B). The interviews were digitally recorded, de-identified and transcribed verbatim for coding. The data collection concluded in July 2020. Transcribed qualitative data was manually coded by 2 authors independently (DJ, FA). Thematic analysis was applied in the coding process.

De-identified quantitative data analysis was performed using STATA (StataCorp. 2019. Stata Statistical Software: Release 16.1 College Station, TX: StataCorp LLC). Descriptive summaries for continuous variables were computed as means and standard deviation (SD) and counts and percentages for categorical variables. The Chi-square test and the independent samples t-test were used to compare participants' demographics and their use of TM. The associations between practice and the use of telemedicine was also assessed. Inference was based on 5% level of significance.

RESULTS

30 rheumatologists from Queensland responded from an estimated pool of 50 (response rate 60%). Demographic details are outlined in Table 1. There was a balance in gender (female n=13, 43.3%) and a mix of recently qualified and experienced rheumatologists and those involved in public and private practice (Table 1). 83% of rheumatologists had utilised TM in the past, with 76.7% using TM at the time of responding to the questionnaire. The patient population that the rheumatologists were serving at the time of questionnaire included capital city (n=16, 53.3%), regional (n=19, 63.3%) and rural or remote (n=7, 23.3 %) (Table 1).

Table 1: Demographics of rheumatologists n=30

Female, n (%)	**13 (43.3)**
Years as a rheumatologist, n (%)	

<10 years	13 (43.3)
10-19 years	5 (16.7)
20-29 years	8 (26.7)
30-39 years	3 (10.0)
>40 years	1 (3.3)
Healthcare sector, n (%)	
Public practice	10 (33.3)
Private practice	4 (13.3)
Both	16 (53.3)
Primary medical qualification obtained in Australia, n (%)	16 (53.3)
Location of patient population servicing*, n (%)	
Major Cities Australia	16 (53.3)
Inner and outer regional Australia	19 (63.3)
Remote Australia	4 (13.3)
Very remote Australia	3 (10)
Ever practiced in a rural or remote setting^, n (%)	19 (63.3)
Current users of telemedicine, n (%)	23 (76.7)
Use of telemedicine technology anytime in the past, n (%)	25 (83.3)
Formal training or education in telemedicine services, n (%)	5 (16.7)

**can be more than one patient population serviced, ^n =29 survey answer; Australian Statistical Geography Standard (ASGS) remoteness classification*

Analysis revealed a significant association between rheumatologists having ever practised in a rural/remote setting (n=19, 65.5%) and use of TM within the last 24 months (n=17, 58.62%), p=0.030 by Pearson chi2 analysis. There was no association demonstrated with

formal training in TM or the number of years as a rheumatologist and TM use within the last 24 months.

Rheumatologists were asked about their interactions with TM including their models of usage, clinical practice and their perceptions of TM (Table 2). 76.7% of the responding rheumatologists were currently using TM . The majority of rheumatologists (80%) indicated that they utilised another healthcare professional during the TM consult and the majority of rheumatologists did not see new patient consults by TM (80%). Use of TM in this cohort of QLD rheumatologists occurred in both private and public practice settings (Table 2).

Table 2: Rheumatologists (active TM users) interaction with TM n=23 (Completed before the COVID – 19 pandemic)

Model of TM usage	
Frequency of review of TM patients in person #, n (%)	
Annual	5 (23.8)
Bi-annual	5 (23.8)
As needed	5 (23.8)
Every 2nd visit	3 (14.3)
Exclusive TM after initial Face to Face review	2 (9.5)
Average number of patients reviewed using TM per week *, n (%)	
Nil	5 (23.8)
1-5 patients	12 (57.1)
6-10 patients	2 (9.5)
>10 patients	2 (9.5)

Health care provider at peripheral site for TM consult #, n (%)	16 (80)
TM used for education or supervision of remote healthcare providers? # , n (%)	3 (15)
Clinical practise within TM	
New patient consultations performed via TM #, n (%)	4 (20)
Commencement of conventional DMARDS through TM #, n (%)	18 (90)
Commencement of biologic DMARDs through TM # , n (%)	11 (55)
Supervision of joint injections #, n (%)	0 (0)
Physician perceptions of TM	
Confidence with performing joint assessments via TM ^, n (%)	
Low	5 (26.3)
Medium	10 (52.6)
High	4 (21.0)
Quality of technology used^, n (%)	
Excellent	3 (15.8)
Good	9 (47.4)
Adequate	6 (31.6)
Poor	1 (5.3)

*^n=19 # = 20 * =21 survey answers (incomplete survey responses), TM= telemedicine, FTF=face to face, DMARD= Disease modifying anti-rheumatic drugs*

Models of TM care with a peripheral health care practitioner (HCP) varied, with 50% utilising a peripheral GP and 50% utilising practice nurses, with variable training in detailed rheumatological joint examination. 80.9% of the active users reviewed less than 5 patients per week by TM. None of the rheumatologists surveyed utilised TM in conjunction with any Aboriginal and Torres Strait Islander services.

Most practitioners saw their TM consults within existing clinics, with 15% having TM specific clinics. Billing of the private telemedicine consults was variable with 78.6% of practitioners bulk-billing and 21.4% charging a gap fee. The technology utilised for TM before the pandemic in all public hospitals and clinics was Cisco Jabber. In private settings, the platforms varied, and included Skype and Facetime. During the surge of COVID – 19 in early 2020, various telehealth portals were replaced and substituted with telephone consults in almost all public hospitals, whereas private remained mixed however still largely consulting on the phone. (Table 4)

Practitioners' personal satisfaction using TM was self-rated at 6.9 ± 2.33 (mean ± SD) out of 10 (1 extremely dissatisfied and 10 extremely satisfied). 23% (7/30) of the rheumatologists surveyed were not current users of TM in their practise. The stated reasons for not using TM included unfamiliarity with TM practice and lack of training in setting up. Four rheumatologists in full time public practice raised issues pertaining to lack of resources including funding, secure IT software to facilitate videoconferencing (VC) and time to set up the infrastructure.

Twelve rheumatologists further participated in phone interviews and one was interviewed via email. The domains explored in the interviews included formal training in TM, new patient reviews via TM, use of healthcare professionals (HCP) at peripheral sites, barriers and challenges in implementation, confidence and satisfaction and how these issues may have evolved during the COVID-19 pandemic (Table 3 and 4).

Table 3: Themes and supporting quotes of rheumatologists before COVID 19 n=12

Theme 1: Limitations of the current model of care preventing wider use of TM in rheumatology clinics and directly impacting physician confidence and satisfaction
Lack of formal training *No, I did not have any formal training and didn't know anybody who had.* *No, but I had training in how to use the software but that was not like medicine specific, it was more technology based, if that's what you mean.*

New patient reviews

No new cases and we have criteria that you can only enter into telehealth follow up if you had met two board criteria, one is you had a confirmed diagnosis, so we weren't using that for follow up of outstanding investigations with diagnostic uncertainty. And the second criteria were, post your acute treatment phase.

You cannot tell whether that person suffers from a pain syndrome of fibromyalgia or whether they have inflammatory arthritis. I really would say to you it is very difficult to make that assessment.

No, I never did. I wasn't convinced that I would be able to do a proper assessment that way.

Variability in peripheral site medical support

I would say I see 60-70% of patients on their own and 30-40% with a GP.

About 50/50. 50% would be doing Skype at their GP surgery and 50% do it at home on their own.

Administrative support

It costs us money, we lose money, we lose time and costs us admin. So, there is absolutely no incentive to do this other than a desire to provide care to those who otherwise can't.

I think you got to have someone, a clinic nurse that looks at it and coordinates it and contacts the various people. That is why you never end up doing a lot of telehealth consultations because of the logistics involved.

Technology

See I can work the phones, I can get through a heap of reviews by just ringing people up, but if I have got

to dial up a telehealth system on Cisco Jabber every time, that is going to be slow. *Queensland Health IT is not built for purpose, so the Cisco Jabber system relies on both ends connecting, have to have this high level of data security and very few GPs are prepared to pay* *Oh, all the time. Skype drops out all the time*
Physician perceptions *I do not think your ability to examine, as in assess people, is adequate. It is poor quality assessment.* *My practise now is largely telehealth, and I would say to you it is not a substitute for face to face.* *There is a spectrum. In that if the alternative is the patient does not get seen and does not get any care, then it's a good solution. But I don't think it substitutes for having a patient sitting in the room with you, taking the history and examining them with your own hands and then having that discussion with a piece of paper that you draw on. That's the gold standard, to me.*

Table 4: Themes and supporting quotes of rheumatologists during COVID 19 n=12

Theme 1: New models of TM care created quickly with significant limitations *As of two weeks ago, 100% patient seen via telehealth.* *We are doing telephone for all follow ups. I am still doing face to face for new patients.* *We are doing phone reviews directly to patients and previously we had a GP who could assess joints,*

so if the patient is not doing well now it is very sub-optimal. *Review waiting list is expanding as some phone reviews are inadequate and those patients need to be re-booked face to face again.* *Limited video-conferencing options and hence resorting to telephone reviews.*
Theme 2: Physician confidence in TM derived from the perceived safety of the model *I think it definitely has the potential to be unsafe. I only agreed to do this because for now, I think people are unhappy to come in here so I decided I would offer it for a 6-week period.* *I think as I said it is a good model if people are stable and well. But if people have problems, you can't always solve it over the phone.* *So, I have seen my first two new patients today on Skype and it is very unsatisfactory.* *We are trying to make it work so satisfaction is moderate to low.* *It has worked well for patients who are well controlled because if they have got no active joints and their blood tests are good, then I do feel quite confident in being reassured.*
Theme 3: Challenges with new adoption of widespread TM during COVID *We are bulk billing people, so our income has fallen by 50%.* *So there is a degree of risk in what we do as we rely on history, we rely on patients being capable of*

telling us what is wrong and then modify how we potentially investigate them depending on the fact that we can't see them, all the time.

The before COVID interview analysis revealed a major theme of perceived limitations of the current TM models of care preventing wider use of TM in rheumatology clinics and directly impacting physician confidence and satisfaction in the use of TM (Table 3). Rheumatologists indicated issues around lack of formal training, clinical limitations to treating new or initial patients, variability in peripheral site health professional assistance, lack of administrative support, technology limitations and physician perceptions of TM care (Table 3).

Interviews during the COVID-19 pandemic demonstrated themes pertaining to difficulties with the required rapid adoption of telehealth and particularly the challenges and limitations with telephone calls as a form of TM, indicated low confidence in this form of TM (Table 4). Respondents felt the telephone consults had a potential to be unsafe and risky due to heavy reliance on patient history but was suitable if the patient was a review and stable.

DISCUSSION

Multiple studies support the use of TM as an acceptable adjunct to traditional face-to-face consultations in many clinical circumstances [2,12,13]. However uptake of TM within

rheumatology as demonstrated in this study remains low. This finding is similar to those from a survey of German rheumatologists that shows low levels of knowledge about TM and less than 40% current usage[14]. Likewise, a physician survey in the US in 2018 suggested less than 10% of rheumatologists were actively utilising TM [15].

As seen within the QLD rheumatology cohort, studies found barriers to TM uptake include limited knowledge, inadequate reimbursement, technology costs and administration issues[14,15]. A high proportion of the surveyed rheumatologists in Germany showed interest in adopting TM for review of stable follow-up and tele-counselling to improve care of rheumatic diseases[14]. This is very consistent with the Queensland study results.

Two Queensland based studies of tele-rheumatology service provision, demonstrate high levels of patient satisfaction[8,9]. However, physician satisfaction is closely related to their confidence in the diagnosis and this can be improved with greater peripheral medical support e.g., nurses or local medical officer lead assessment of joints [2,16] . This issue was evident in the qualitative results in this study as was the idea that rheumatologists felt more confident in the review of stable, ongoing patients. Several other studies have shown that rheumatologists support TM follow up of stable review patients when the diagnosis is already secure[17,18].

With the COVID-19 pandemic, a worldwide transition in rheumatology clinics occurred with rheumatologists endeavouring to reduce FTF clinics with TM including Videoconferencing (VC) or telephone clinics [19]. The uptake of telephone consultations grew exponentially highlighting newer technical and clinical issues of limitations in access to VC. Bos et al reported that in the Netherlands the majority of rheumatologists converted to telephone calls with only 9% utilising VC to review patients during the pandemic: also highlighting

difficulties with physical examination being a major barrier [20]. Costa et al. shared the experience of an Italian Psoriatic Arthritis clinic during COVID-19 Pandemic converting to a mix of TM including VC and telephone consultations that effectively allowed continuation of treatment in the majority including the prescription of both conventional and biologic DMARDs[21]. The QLD cohort showed that most rheumatologists if using TM prescribed conventional or biologic disease modifying agents (90% and 55%) through a TM platform.

Limitations of this study include a low capture rate with only 60% of the currently practising rheumatologists in QLD participating. Data saturation was also reached early in the qualitative study. Selection bias is likely within the qualitative data given the small number and within the setting of the COVID-19 pandemic.

In conclusion this study demonstrates familiarity with TM within a rheumatology cohort in Queensland but minimal use in routine practise due to multiple barriers. The COVID 19 pandemic highlighted low confidence in telephone calls as a form of TM underlining the need for appropriate TM models of care for rheumatology practice to be further developed and analysed.

REFERENCES

1. Roberts LJ, Lamont EG, Lim I, Sabesan S, Barrett C. Telerheumatology: an idea whose time has come. Intern Med J. 2012 Oct; 42(10):1072-8.

2. McDougall JA, Ferucci ED, Glover J, Fraenkel L. Telerheumatology: a systematic review. Arthritis Care Res (Hoboken) 2017 Oct; 69(10):1546-57.

3. Queensland Health. Queensland reporting hospitals: quarterly information for specialist outpatient at 01 January 2020 [Internet]. 2020 [updated 2020; cited 2020 May 28]. Available from: http://www.performance.health.qld.gov.au/Hospital/SpecialistOutpatient/99999

4. Combe B, Landewe R, Daien CI, Hua C, Aletaha D, Álvaro-Gracia et al. 2016 update of the EULAR recommendations for the management of early arthritis. Ann Rheum Dis 2017 ; 76:948-59.

5. Smolden JS, Aletaha D, McInnes IB. Rheumatoid Arthritis. Lancet 2016; 388:2023-38.

6. Ison, M, Duggan, E, Mehdi, A, Thomas, R and Benham, H. Treatment delays for patients with new onset rheumatoid arthritis presenting to an Australian early arthritis clinic. Internal Medicine Journal 2018; 48(12):1498-1504.

7. Van Doornum S, Tropea J, Tacey M, et al. Time to institution of disease modifying anti-rheumatic drugs in Australian patients with early rheumatoid arthritis. Arthritis & Rheumatism 2013; 65:S565.

8. Devadula S, Langbecker D, Vecchio P, Tesiram J, Meiklejohn J and Benham H. Tele-rheumatology to regional hospital outpatient clinics: patient perspectives on a new model of care. Telemedicine and E-Health 2019; 26 (7) tmj.2019.0111, 912-919.

9. Poulsen KA, Millen CM, Lakshman UI, Buttner PG, Roberts LJ. Satisfaction with rural rheumatology telemedicine service. Int J Rheum Dis 2015 Mar;18(3):304-14.

10. Novel Telehealth Outreach Model: Why travel to see the rheumatologist? Clinical Excellence Queensland, Eugene Ma and Ashleigh Hennessey. Feb 2020. Available at https://clinicalexcellence.qld.gov.au/improvement-exchange/novel-telehealth-outreach-model-why-travel-see-rheumatologist

11. Benoot C, Hannes K, Bilsen J. The use of purposeful sampling in a qualitative evidence synthesis: a worked example on sexual adjustment to a cancer trajectory. BMC Med Res Methodol 2016;16(21).

12. Piga M, Cangemi I, Mathieu A, Cauli A. Telemedicine for patients with rheumatic diseases: systematic review and proposal for research agenda. Semin Arthritis Rheum. 2017 Aug; 47(1):121-8.

13. Martin-Khan M, Wootton R, Whited J, Gray LC. A systematic review of studies concerning observer agreement during medical specialist diagnosis using videoconferencing. J Telemed Telecare 2011; 17(7):350-7.

14. Muehlensiepen F, Knitza J, Marquardt W, Engler J, Hueber A, Welcker M. Acceptance of Telerheumatology by Rheumatologists and General Practitioners in Germany: Nationwide Cross-sectional Survey Study. J Med Internet Res 2021;23(3): e23742

15. Kane CK, Gillis K. The use of telemedicine by physicians: Still the exception rather than the rule. Health Aff (Millwood) 2018 Dec; 37(12):1923-1930

16. Leggett P, Graham L, Steele K, Gilliland A, Stevenson M, O'Reilly D et al. Telerheumatology – diagnostic accuracy and acceptability to patient, specialist and general practitioner. Br J Gen Pract. 2001 Sep;51(470):746-8.

17. Kernder A, Morf H, Klemm P, et al. Digital rheumatology in the era of COVID-19: results of a national patient and physician survey. RMD Open 2021;7:e001548.

18. Matsumoto RA, England BR, Mastarone G, Richards JS, Chang E, Wood PR, Barton JL. Rheumatology Clinicians' Perceptions of Telerheumatology Within the Veterans Health Administration: A National Survey Study. Mil Med. 2020 Dec 30;185(11-12)

19. Bonfá, E, Gossec, L, Isenberg, D.A. et al. How COVID-19 is changing rheumatology clinical practice. Nat Rev Rheumatol 2021; 17, 11–15.

20. Bos, W.H., van Tubergen, A. & Vonkeman, H.E. Telemedicine for patients with rheumatic and musculoskeletal diseases during the COVID-19 pandemic; a positive experience in the Netherlands. Rheumatol Int 2021; 41, 565–573.

21. Costa, L., Tasso, M., Scotti, N., Mostacciuolo, E., Girolimetto, N., Foglia, F., Del Puente, A., Scarpa, R., & Caso, F. Telerheumatology in COVID-19 era: A study from a psoriatic arthritis cohort. Annals of the Rheumatic Diseases. 2021; *80*(4).