

SYSTEMATIC REVIEW

Virtual geriatric clinics and the COVID-19 catalyst: a rapid review

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Abstract

Background: During the current COVID-19 health crisis virtual geriatric clinics have become increasingly utilised to complete outpatient consultations, although concerns exist about feasibility of such virtual consultations for older people. The aim of this rapid review is to describe the satisfaction, clinic productivity, clinical benefit, and costs associated with the virtual geriatric clinic model of care.

Methods: A rapid review of PubMed, MEDLINE and CINAHL databases was conducted up to April 2020. Two independent reviewers extracted the information. Four subdomains were focused on: satisfaction with the virtual geriatric clinic, clinic productivity, clinical benefit to patients, costs and any challenges associated with the virtual clinic process.

Results: Nine studies with 975 patients met our inclusion criteria. All were observational studies. Seven studies reported patients were satisfied with the virtual geriatric clinic model of care. Productivity outcomes included reports of cost-effectiveness, savings on transport, and improved waiting list metrics. Clinical benefits included successful polypharmacy reviews, and reductions in acute hospitalisation rates. Varying challenges were reported for both clinicians and patients in eight of the nine studies. Hearing impairments and difficulty with technology added to anxieties experienced by patients. Physicians missed the added value of a thorough physical examination and had concerns about confidentiality.

Conclusion: Virtual geriatric clinics demonstrate evidence of productivity, benefit to patients, cost effectiveness and patient satisfaction with the treatment provided. In the current suboptimal pandemic climate, virtual geriatric clinics may allow Geriatricians to continue to provide an outpatient service, despite the encountered inherent challenges.

Keywords: Virtual geriatric clinics, telemedicine, telehealth, COVID-19, older people

Key points

- During the current COVID-19 health crisis virtual geriatric clinics have become increasingly utilised
- Our study highlights that the virtual geriatric clinic model demonstrates evidence of productivity, benefit to patients, cost effectiveness and patients are generally satisfied with the treatment provided.
- In the current suboptimal pandemic climate such virtual clinics may provide a means to provide continuity of care, if adopted with the above considerations in mind.

Introduction

Telemedicine is the exchange of medical information between locations through the use of electronic communication devices and it aims to function as a surrogate to

in-person consultations [1]. During the current COVID-19 pandemic recommendations have been made to try a “triage first” model of communication, and telemedicine has been purported as a solution for remote working [2], with

specific guidance having been developed on how to conduct online consultations in a general population [3]. Telehealth has demonstrated utility in a geriatric population, such as in supporting family caregivers [4], chronic management of frail older adults in the community [5], geriatric psychiatry care [6] and integrative geriatric telemedicine have been successfully incorporated into acute nursing home care [7]. However, telehealth has not been largely embraced in the initial outpatient assessment of this patient population, and the effectiveness of using telemedicine as a stand-alone method for outpatient consultations is uncertain.

This review aims to assess the utility of remote communication for geriatric outpatient clinic assessments with telecommunication (i.e. virtual geriatric clinics), replacing the traditional outpatient review. The current attraction of a virtual geriatric medicine clinic includes the provision of continued care, while incorporating the principles of “social distancing” during the current COVID-19 pandemic. Other proposed practical benefits include eliminating unnecessary travel which disproportionately affects older people attending outpatient clinics, reduced waiting times at the clinic itself, and reducing time spent on the waiting list before review, which is particularly important for patients with deteriorating health conditions. The challenges to providing a virtual geriatric clinic may include the suitability and versatility of this model for older adult populations, where challenges relating to cognition, perception, behaviour and need for support of a carer during the consultation are anticipated [8]. The geriatric patient cohort might experience additional challenges with using the technology needed to access telemedicine consultations [8], bringing the usability of telemedicine for older patients into question.

COVID-19 present a major risk to vulnerable older adults, but restricted access to ambulatory care also poses potential risks, necessitating institutions to consider use of virtual clinics to provide continuity of care for this population [9]. The primary aim of this rapid review is to describe the acceptability of a telehealth service as a model of care for geriatric outpatient consultations, with secondary aims of evaluating the productivity, clinical benefit, costs and challenges encountered with such services.

Patients and Methods

Search strategy and criteria

We performed a rapid review with a narrative synthesis which adhered to the “*Preferred Reporting Items for Systematic Reviews and Meta-Analyses*” (PRISMA) guidelines [10]. A review of the PubMed, MEDLINE and CINAHL databases was conducted from database inception up to April 8th 2020. The keywords “virtual” or “telemedicine” or “telehealth” or “remote” or “electronic” AND “geriatric” or “elderly” or “older” AND “clinic” or “consultation” or “visit” or “appointment” or outpatient’ were entered. There were no journal or language restrictions. Two independent reviewers independently collected information and screened all full

texts (RPM, KD), and resolved any inconsistencies by third party consensus (MC). Searches of reference lists from all included studies were completed. The PRISMA flow chart for data extraction is available as [Appendix A1](#).

Eligibility criteria

Our study population included all patients who were referred for a Geriatrician led outpatient assessment. The intervention was those who received an outpatient assessment via a virtual geriatric clinic consultation. The control group was defined as any within study comparator group which did not utilise a virtual clinic consultation. Studies of any design were eligible for inclusion. There were four main outcomes of interest; (i) patient and physician satisfaction with the virtual clinic process, (ii) clinic productivity, (iii) clinical benefit to patients, and (iv) any challenges associated with the virtual clinic process. Clinic productivity was defined as any outputs described by the studies that demonstrated efficacy of the service, including cost effectiveness, transport savings, or improvements in clinic waiting list metrics. Clinical benefits to patients included any outcomes which demonstrated a direct benefit to patient care from the virtual clinic, including evidence of successful medication rationalisation or a reduction in the hospitalisation rate.

Studies were excluded if the model of care was not an outpatient clinic setting and it did not involve specialist Geriatric physician consultation. This meant we excluded studies which reported on telemedicine from rural hospitals to tertiary assessments. Studies were excluded if they involved emergency assessments of patients by telemedicine, as this would be out of the remit of a standard geriatric outpatient visit.

Data extraction and synthesis

A data extraction form was piloted prior to full data extraction. Two reviewers (RM, KD) separately extracted the primary results, including the journal, year, authors, country of publication, study design, presence of an intervention/control group and numbers, members of the Geriatric clinic staff, study period, cost data, efficiency data, and any documented challenges from the VGC process.

Statistical analysis

There was considerable heterogeneity in data reporting with variability of methodology in the studies, so a formal meta-analysis could not be conducted. Risk of bias was assessed using the revised Cochrane ROBINS-I tool [11] (Risk Of Bias In Non-randomized Studies—of Interventions) and this is represented in graph format in the supplementary material ([Appendix A2](#)).

Results

The initial search yielded 1,028 articles. Twenty-five full texts were reviewed, of which sixteen articles were excluded as they

Table 1 . Baseline Study Characteristics

Authors & Year	Journal	Country	Population	Initial In Person Consultation	Patient Numbers	Mean Age (Years)	Male Gender %	Satisfaction Assessed	Cost Assessed	Clinical Benefit	Productivity & Efficiency	Challenges Reported	Risk of Bias Assessment
Azad et al. [13]	Canadian geriatrics journal: CGJ	Canada	Community	Yes	99	NR	40	Yes	-	-	Yes	Yes	Low
Catic et al. [18]	Journal of the American Medical Directors Association Geriatrics	USA	NH	No	47	82	25.6	-	-	Yes	-	Yes	Low
Chang et al. [14]		USA	Community	No	199	NR	100	-	-	Yes	-	-	Low
Hale et al. [19]	Geriatrics	USA	NH	No	37	NR	100	Yes	Yes	-	Yes	Yes	Low
Hui et al. [20]	Journal of telemedicine and telecare	Hong Kong	NH	No	200	82	33	Yes	Yes	Yes	Yes	Yes	Low
Lillicrap et al. [12]	Journal of telemedicine and telecare	Australia	Community	No	84	78.8	52.4	Yes	Yes	Yes	Yes	Yes	Moderate
Morgan et al. [15]	J Appl Gerontol	Canada	Community	Yes	169	72.5	39.6	Yes	-	-	Yes	Yes	Moderate
Powers & Buckner [17]	Geriatrics	USA	Community	No	45	NR	NR	Yes	Yes	Yes	Yes	Yes	Moderate
Powers et al. [16]	Journal of the American Geriatrics Society	USA	Community	No	95	77.8	100	Yes	-	Yes	Yes	Yes	Low

Abbreviations: NH: nursing home; NR: not reported; Risk of Bias Tool: Cochrane Risk Of Bias In Non-randomized Studies of Interventions Tool.

did not fulfill eligibility for outcome measure or population (i.e. not an outpatient population) or geriatric physician clinic. Nine full text studies were included, including 975 patients.

Study characteristics

Baseline characteristics of each study are summarised in Table 1. All studies were observational in nature and no randomized controlled trials were identified. Lillicrap et al [12] compared a virtual clinic outpatient consultation arm with an in person review arm, and the remainder were single arm studies. Six studies were in a cohort of community dwelling adults [12–17] and 3 studies were in a nursing home population [18–20]. Two studies [13, 15] offered patients initial in person consultations with ongoing follow up by telemedicine, while all others only telemedicine. The mean age of reported participants was 78.6 years. Three studies were conducted in an exclusive male veterans population [14, 16, 19]. The median study time for the interventions was 12 months (range 5–48 months). All studies had direct geriatrician input, with varying support from allied health professionals. Table 2 summarises the clinic design within each study. Two studies had input from an occupational therapist [15, 20] and a physiotherapist [12, 20]. No study included input from all allied health professionals.

Satisfaction

Seven studies reported on patient or physician satisfaction (Table 3) [12, 13, 15–17, 19, 20]. All studies reported that patients were satisfied with the virtual clinic model of care. Different methods were used to assess satisfaction. Three studies [13, 17, 20] reported the proportion of satisfied patients, ranging from 92% to 98% patient satisfaction. Two studies [15, 16] reported satisfaction on a Likert scale and reported a score out of five, with high satisfaction scores reported. Three studies asked patients if they would use virtual clinic again [13, 15, 16] and all reported they would. Physician satisfaction was reported in two studies [12, 13] and both of these studies reported high levels of physician satisfaction. Azad et al. [13] reported that 88% of physicians were satisfied, while Lillicrap et al. [12] did not report the proportion who were satisfied with the virtual clinic process but rather commenting that there was a high level of physician satisfaction.

Productivity and clinical benefit

Seven of the nine studies reported on productivity outcomes (Table 4) [12, 13, 15–17, 19, 20], with heterogenous outcomes. For clinic productivity, evidence of cost effectiveness was reported in four studies [12, 17, 19, 20], transport savings were reported in six studies [13, 15–17, 19, 20] and clinic scheduling benefits were reported in five studies [12, 13, 16, 19, 20], including three studies which reported a shortened waiting time for patients for their appointments. Hale et al. [19] and Hui & Wu [20] reported individual

cost analysis per patient visit, with savings of \$310 and 415 HK\$ (equating to approximately \$54) savings reported. Only one study [12] included a direct comparison with an in person service and found that in comparison with an in person services that virtual geriatric clinic was more effective at seeing a higher volume of patients, with superior waiting list management.

Seven of the nine studies reported on clinical benefit outcomes (Table 4) [12, 14, 16–18, 20]. Four studies reported successful medication rationalization [14, 16–18]. Three studies reported that there was a reduction in acute hospitalization events [12, 18, 20]. Catic et al. [18] reported half the rate of hospitalizations in the patient group who had the virtual clinic recommendations followed, Hui et al. [20] noted an 8.8% reduction in emergency department attendances and Lillicrap et al. [12] reported a lower odds ratio of hospitalization after introduction of the geriatric virtual clinic. Additional reported benefits in a nursing home population [18] was that increased awareness and education about medication side effects in the context of virtual consultation about one patient resulted in benefits to other patients not in the study in terms of improved sleep hygiene. Hui et al. [20] also reported that the virtual consultation platform was successfully used to implement a falls prevention programme.

Challenges

Eight of the nine studies reported challenges associated with the virtual clinic model (Table 5). There was no standardized approach to reporting the proportion of patients affected by problems across the studies, and they were reported in a qualitative manner. Four studies [13, 15, 16, 20] reported on problems physicians reported, including technical difficulties, issues with confidentiality (perceiving that patients or caregivers were unable to speak openly), communication issues (mainly hearing impairment) affecting the assessment and patient apprehension with regards to engaging in a virtual review (nervousness/hesitancy). Certain patient critiques echoed these themes—feeling apprehensive before the virtual clinic review, or finding that the consultation was impersonal, intimidating and anxiety inducing. Some patients experienced similar technical difficulties and one patient commented that they would have preferred a phone review over a video link review. Concerns about confidentiality were also reported by some patients.

Discussion

This review has demonstrated the potential benefits to patients with a virtual geriatric clinic model of care, including successful polypharmacy reviews, reductions in acute hospitalisation events, and shortened waiting times for patients for first review. The process appears to be largely satisfactory to patients and to physicians, with a suggestion that it may also be a cost-effective way to deliver care. However, challenges exist with such a model of care and the

Table 2. Members of the Clinic

Authors & Year	Population	Geriatrician	Psychiatrist	Psychologist	Nursing	Physiotherapist	Occupational Therapist	Social Worker
Azad et al. [13]	Community	Yes	-	-	-	-	-	-
Catic et al. [18]	NH	Yes	Yes	-	Yes	-	-	-
Chang et al. [14]	Community	Yes	Yes	Yes	Yes	-	-	Yes
Hale et al. [19]	NH	Yes	Yes	Yes	Yes	-	-	-
Hui et al. [20]	NH	Yes	Yes	-	Yes	Yes	Yes	-
Lillicrap et al. [12]	Community	Yes	-	-	-	-	Yes	-
Morgan et al. [15]	Community	Yes	-	Yes	Yes	Yes	-	-
Powers & Buckner [17]	Community	Yes	-	-	Yes	-	-	Yes
Powers et al. [16]	Community	Yes	Yes	Yes	Yes	-	-	Yes

Abbreviations: NH: nursing home.

Table 3. Satisfaction

Authors & Year	Population	Patient Numbers	Patient Satisfaction	Use Virtual Clinic Again?	Physician Satisfaction	Proportions
Azad et al. [13]	Community	99	Yes	Yes	Yes	92% patients satisfied, 88% of physicians
Catic et al. [18]	NH	47	-	-	-	NR
Chang et al. [14]	Community	199	-	-	-	NR
Hale et al. [19]	NH	37	Yes	-	-	83.3% technical success rate
Hui et al. [20]	NH	200	Yes	-	-	96% patients satisfied
Lillicrap et al. [12]	Community	84	Yes	-	Yes	High levels of patient/physician satisfaction (Numbers not reported)
Morgan et al. [15]	Community	169	Yes	Yes	-	Patient Satisfaction*: Mean = 4.66/5, SD = 0.11
Powers & Buckner [17]	Community	45	Yes	-	-	98% patients satisfied
Powers et al. [16]	Community	95	Yes	Yes	-	Patient Satisfaction*: Mean = 4.73/5

Abbreviations: NH: nursing home; NR: not reported; SD: standard deviation. *Both questionnaires were five point Likert scale questionnaires developed by the individual studies.

Table 4. Clinic Productivity & Clinical Benefit

Authors & Year	Cost Effective	Transport Savings Reported	Clinic Scheduling Benefits	Comment	Medication Rationalisation	Hospitalisation Reduction	Other Clinical Benefit
Azad et al. [13]	-	Yes	Yes	Reduction in clinic cancellation rate	-	-	-
Catic et al. [18]	-	-	-		Yes	Half the rate of hospitalizations when recommendations followed	Secondary benefit to other patients
Chang et al. [14]	-	-	-		Yes	-	-
Hale et al. [19]	Yes	Yes	Yes	Shorter waiting list	-	-	-
Hui et al. [20]	Yes	Yes	Yes	Shorter waiting list, increased review of patients	-	8.8% reduction in emergency department attendance. 10.6% reduction in bed days usage	Successful introduction of falls prevention
Lillicrap et al. [12]	Yes	-	Yes	Shorter waiting list	-	Lower Odds Ratio (0.4) of Hospitalisation after service introduction	Less hospital bed day usage
Morgan et al. [15]	-	Yes	-		-	-	-
Powers & Buckner [17]	Yes	Yes	-		Yes	-	-
Powers et al. [16]	-	Yes	Yes	Reduction in clinic no-show rate	Yes	-	-

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Table 5. Challenges Reported

Authors & Year	Challenges Reported	Physician Reported	Patient Reported	Other
Azad et al. [13]	Yes	Felt that communication with patient not as good	Anxiety before video consultation	Technical Difficulties (2/30)
Catic et al. [18]	Yes			Poor family engagement
Chang et al. [14]	-			
Hale et al. [19]	Yes	Hard to capture the physician workload	More difficult for patients with hearing impairment	Technical Difficulties
Hui et al. [20]	Yes	Felt missed out on physical exam		Occupational Therapy staff found format challenging
Lillicrap et al. [12]	Yes	Felt missed out on physical exam	More difficult for patients with sensory or behavioural issues	
Morgan et al. [15]	Yes		Those over 80 less likely to continue using virtual clinic Hearing impairment Some patients that found encounter impersonal	Technical Difficulties Relatives found it hard to provide collateral histories
Powers & Buckner [17]	Yes			The scheduling process was challenging
Powers et al. [16]	Yes	Felt missed out on physical exam	Hearing impairment Some would have preferred video over phone	

process can cause angst to some patients. Communication is perceived to be not as fluid as a face to face consultation, technical issues can arise, and physicians report that they feel completing a physical examination is a key component of a full patient assessment.

Virtual clinics have rapidly gained traction during the COVID-19 pandemic as an alternative means of delivering ambulatory care. It is now felt to be a necessity with calls from the American Geriatric society to expand telehealth services [21]. Universal masking of patients and physicians in a healthcare outpatient setting creates additional communication barriers [22], and virtual clinic consultations may be a way to partially overcome this barrier. Patients need not wear masks if they are in the safety of their own homes, and physicians may not have to wear face masks while being socially distant on video consultations. This could be a way of overcoming limitations of mask wearing and maintaining non-verbal communication while being socially distant [23].

Patients undergoing geriatric assessment in outpatient settings are most often not acutely unwell, but they may be “at risk” in the community. The complexity of their issues may be undervalued or identified late if not evaluated by specialist Geriatric assessment [9]. This has been magnified during COVID 19 crisis where people have been told to remain at home and often do not have access to services they usually attend like day centres, day hospital and community rehabilitation. Physicians should be targeting patients at high risk of hospitalisation and trying to engage them in ongoing review through a virtual clinic consultations, as such an approach has been shown to lead to improved outcomes in randomised controlled trials [24, 25]. In this review when a similar approach was adopted [12, 18] there were clear benefits in terms of reduction in hospitalisation rates.

The principles guiding a virtual geriatric clinic should be the same as a traditional geriatric clinic, that it is to be able to provide a comprehensive geriatric assessment to a high standard to patients. Cognitive impairment and polypharmacy were amenable to assessment with the virtual geriatric clinic model in the included studies, but other important geriatric syndromes such as frailty, sarcopenia [26] were not evaluated. Physicians who are embarking on virtual clinics during the COVID-19 pandemic should be cognizant of this and consider tailoring the focus of the clinic consultation to meet achievable goals.

Three of the included studies reported that physicians felt that not being able to do a physical examination was a downside of the virtual clinic process. A core importance of the traditional in person model is a thorough physical examination, which can help to strengthen the relationship between doctor and patient [27]. Clinicians who are skilled at bedside examination make better use of diagnostic tests and order less unnecessary tests [28] and incorporating such pragmatic approaches underpins the essence of geriatric care [29]. Two studies offered patients initial in person consultations, with virtual clinic follow up and this was acceptable to patients in both accounts. Utilising such a pragmatic approach during the COVID-19 pandemic would allow physicians to still undertake an initial thorough physical examination and use ongoing virtual clinic consultations for practical management of patients after this initial first step.

Virtual geriatric clinics appear to be cost effective. Exact cost per visit was provided in just two studies but it is interesting to note that there were significant discrepancies within the different costing models used, resulting in an almost six-fold difference in savings, depending on the cost model used. A clear breakdown of cost calculations is important to be able

to make valid comparisons between studies, with clarity over re-imbursement claims crucial in the expansion of virtual clinics [30].

Overall it is acknowledged that the patients were satisfied with the process, through various self-reported measures or Likert scales. Satisfaction rates did not differ between studies which had an initial in person consultation and those without an initial in person consultation, indicating both are acceptable. If virtual clinics are to be implemented on an ongoing basis, standardized patient-reported outcome measures should be used to audit satisfaction levels. This would also help to distinguish if satisfaction is related to the virtual clinic process itself or whether patients are satisfied with the treatment they received as a result of the consultation. Two studies [13, 15] reported that while patients were satisfied after the consultations they reported a degree of anxiety prior to the consultation, and being aware of and auditing this distinction should be a focus when trying to improve the virtual clinic experience for patients. Physicians should make use of validated telehealth satisfaction scales to help audit the process [18].

While there is evidence of productivity there is a need for solid collaboration from referring clinicians. A theme across the included studies was the need for strong partnership. Success was attributed to strong links between departments [19]. Crucial steps for stakeholders include planning robust pathways, good clinical governance, a clear documentation strategy with clear avenues of information for patients. Three of the included studies had patients who received telehealth consultations through the Veterans Health Administration, who have a track record in using telehealth in other circumstances. Of these Hale et al. [19] reported a high rate of technical success while Powers et al. [16] reported high patient satisfaction, indicating success when adapting technology that has already been successful in other environments. When setting up virtual clinics physicians should consider using supported technology where they can receive trained IT support to troubleshoot technical issues quickly and efficiently.

Certain limitations must be acknowledged. There was a limited number of studies that met our inclusion criteria and a lack of any randomized controlled trials. There was distinct heterogeneity in the setup of different virtual clinics models in our review and a limitation of the included studies in this systematic review was that only one study had a direct comparison of an in-person service. This was a rapid review undertaken during the COVID-19 pandemic and while we had broad search terms it is possible that some studies may have been overlooked. There was a limited number of countries included and the studies included were predominantly from North America which may limit the generalizability. While different challenges were reported by different studies they were rarely reported quantitatively making it hard to appreciate what problems are likely to affect clinicians who are setting up new virtual clinics during the current pandemic.

Conclusion

The current COVID-19 healthcare pandemic has created unique challenges in providing traditional in person care. The traditional practice of medicine is not easily reconfigured and adjusting to the inclusion of virtual geriatric clinics will take time. This is an opportunity for geriatric medicine to incorporate a new practice that may ultimately be beneficial to both patients and physicians. We would suggest that physicians target patients deemed at high risk of hospitalization, to consider focused consultations such as polypharmacy reviews, and to consider prioritizing ongoing review of patients who have previously been seen face to face which would mitigate the concerns of missing out on the key tenet of physical examination. There is the potential for significant actual and opportunistic cost savings. While outside of the current COVID-19 pandemic there is not a solid evidence base to support routine adoption of virtual clinics over the traditional standard of in person consultation, in the current suboptimal pandemic climate virtual geriatric clinics may provide a means to provide continuity of care to older people as long as inherent challenges particular to older people are incorporated into care pathways.

Supplementary Data: Supplementary data mentioned in the text are available to subscribers in *Age and Ageing* online.

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