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Exploring clinicians' experiences of how efficient virtual elective knee clinics are compared to traditional face-to-face clinics

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Abstract

Purpose – Efficient delivery of integrated healthcare requires solid alliances and collaboration with stakeholders on a regular basis. Due to coronavirus disease 2019 (COVID-19), it has become necessary to explore new ways of delivering integrated healthcare, and virtual clinics have offered one solution and are likely to continue due to the uncertainty with COVID-19. This study aims to explore clinicians' experiences of how efficient virtual elective knee clinics (VEKC) are in an orthopaedic setting in comparison to traditional face-to-face clinics.

Design/methodology/approach – The study utilised a mixed-methods study to obtain qualitative and quantitative data. This involved an anonymous online survey in addition to in-depth qualitative interviews conducted with a purposive sample of multidisciplinary colleagues who work with the VEKC in an acute hospital.

Findings – Three overarching themes and nine sub-themes emerged in the qualitative analysis. Overall, clinicians in both the quantitative and qualitative aspects of the study highlighted several ways that virtual clinics are efficient from both the patient and health service perspective. However, participants also highlighted barriers in relation to virtual clinics not being suitable for certain cohorts of patients and pathologies.

Originality/value – This is the first study in Ireland to provide valuable insights into the experiences of multidisciplinary clinicians using VEKC and their efficiency compared to traditional face-to-face clinics.

Keywords Efficient, Virtual clinics, Orthopaedics, Knee, Elective clinic, Face-to-Face, COVID-19

Paper type Research paper

1. Introduction

Since the outbreak of the coronavirus disease 2019 (COVID-19) pandemic at the start of 2020, healthcare providers have increasingly utilised telemedicine and virtual clinics to enable services to continue as efficiently as possible due to the changing circumstances in healthcare (Bokolo, 2020). Healthcare services remain under increasing pressure to manage both budgets and waiting lists, whilst continuing to deliver services safely and innovatively (Burke *et al.*, 2021).

Virtual clinics – also known as telemedicine or telehealth clinics – have been previously defined as a substitute for face-to-face appointments with a health clinician using technology (Kane and Gillis, 2018). Whilst clinicians are not able to apply a hands-on approach during telemedicine, virtual clinics have nonetheless been reported as cost-effective, providing high levels of patient satisfaction whilst ensuring patient safety is paramount (Ruelos *et al.*, 2021;

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Sangala *et al.*, 2021). Consequently, research has reported an exponential increase in the successful use of virtual clinics across many different specialities in healthcare settings since the onset of COVID-19 (Doraiswamy *et al.*, 2020; Quinn *et al.*, 2020; Moore *et al.*, 2021).

The creation of virtual clinics in an orthopaedic setting has also been reported to be safe and clinically effective (Garfan *et al.*, 2021). Additionally, the success of virtual clinics in reducing waiting lists and enabling shorter appointment times has led to the creation of other services in healthcare departments, e.g. additional injection clinics each week in an orthopaedics department (Kelly *et al.*, 2019).

Efficient delivery of integrated healthcare requires solid collaboration with stakeholders on a regular basis. Furthermore, with technology becoming more accessible in healthcare and household settings, the development of virtual clinics is likely to continue in the future (Baxter *et al.*, 2018).

Waiting lists in orthopaedics have significantly increased since the start of the COVID-19 pandemic due to the cancellation of elective procedures, consequently impacting both hospital and local primary care resources (Oussedik *et al.*, 2021). In Ireland alone, orthopaedics consistently exhibits one of the highest median patient waiting lists among all outpatient specialities (O'Reilly *et al.*, 2018).

Due to the aforementioned difficulties in healthcare provision – and the uncertainty of future COVID-19-related developments – virtual care is likely to play an important role for many healthcare services in the long term. Therefore, it is pertinent that departments have ready access to the appropriate equipment and processes in order to facilitate virtual clinics. In Ireland, this has been evidenced recently with the rollout of telehealth services utilised by physiotherapists to ensure patients can still have their physiotherapy appointments in a timely manner (Health Service Executive, 2021a, b).

The Whole System Demonstrator programme has previously reported how effective telehealth clinics can be, and this study was the largest randomised control trial of telehealth and telecare when published (Steventon *et al.*, 2012). The development of virtual clinics in orthopaedic settings was advocated for in The National Model of Care for Trauma and Orthopaedic Surgery, which sought to devise innovative and new ways of (1) improving the quality-of-care that patients receive, (2) reducing waiting lists and (3) ensuring patient-centred care is delivered safely and in a cost-effective manner (Health Service Executive, 2015). However, a previous study has highlighted there is a lack of research undertaken to date in virtual elective orthopaedic clinics (Barton *et al.*, 2021). Additionally, there was a dearth of both qualitative and quantitative studies regarding healthcare professionals' experiences and perceptions of virtual clinics in elective and trauma orthopaedics settings.

Therefore, this study aims to explore clinicians' experiences regarding the efficiency of virtual elective knee clinics (VEKC) in an orthopaedic setting, in comparison to traditional face-to-face clinics. Reviewing the efficiency of virtual elective orthopaedic clinics was also discussed by the author with work colleagues, who confirmed that no prior research had been undertaken with regards to virtual clinics at the author's workplace and as far as the author is aware, no similar study has been completed in the wider hospital group. The findings of this study have the potential to provide important information on the efficiency of VEKC in an orthopaedic setting.

2. Methods

2.1 Overview

This study adopted a mixed-methods approach, involving multidisciplinary colleagues who work with VEKC, utilising qualitative interviews and subsequent quantitative cross-sectional surveys. The study's qualitative component was conducted in accordance with the Standards for Reporting Qualitative Research checklist for qualitative studies (O'Brien *et al.*, 2014;

Equator Network, 2022). The study also aligned with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) checklist statement in relation to an observational cross-sectional survey of healthcare professionals (von Elm *et al.*, 2007).

2.2 Study design and setting

The study utilised a mixed-methods design that involved the following:

(1) An anonymous online survey with multidisciplinary colleagues who work with a VEKC.

(2) In-depth qualitative interviews conducted with a purposive sample of four multidisciplinary colleagues to elicit their views on the advantages and disadvantages of VEKC versus face-to-face clinics.

The study was carried out in the Department of Orthopaedics at Tallaght University Hospital, where the author works. Tallaght University Hospital has been operating a VEKC since 2020, which is currently managed and run by Professor of Trauma and Orthopaedics, Orthopaedic Consultants, Orthopaedic Registrars, Senior House Officers, Advanced Nurse Practitioners and Clinical Specialist Physiotherapists.

2.3 Sampling, recruitment and study population

All multidisciplinary colleagues who had experience undertaking the VEKC since its commencement at Tallaght University Hospital in 2020 were invited to take part in this study (Table 1). Ten participants were provided with information on the study and asked to return a consent form if they wished to participate.

From the ten participants who agreed to complete the survey, a purposeful sample of four clinicians was used for the semi-structured interviews to collate data; these were the four clinicians who undertook VEKC most frequently each week at Tallaght University Hospital (Figure 1).

2.4 Data collection

Data collection took place in April 2022 at Tallaght University Hospital, initially completing the semi-structured interviews using Skype. A topic guide for the interview was developed by completing a literature review on the topic (Appendix 1). The topic guide was also reviewed and adjusted by the author and university tutors following two pilot studies with work colleagues. Semi-structured interviews facilitate both structure and flexibility when exploring complex questions and are also participant centred (Jamshed, 2014).

The interviews were completed only by the author, audio recorded and transcribed verbatim, after which each transcript was reviewed by the interviewee for accuracy. Contemporaneous field notes were documented by the author to capture thoughts on the

Table 1.
Details of the ten health professionals who agreed to take part in the study

Number of recruited participants	Participants professions
6	Clinical Specialist Physiotherapists
2	Orthopaedic Specialists
1	Advanced Nurse Practitioner
1	Orthopaedic Registrar

Source(s): Author's own creation/work

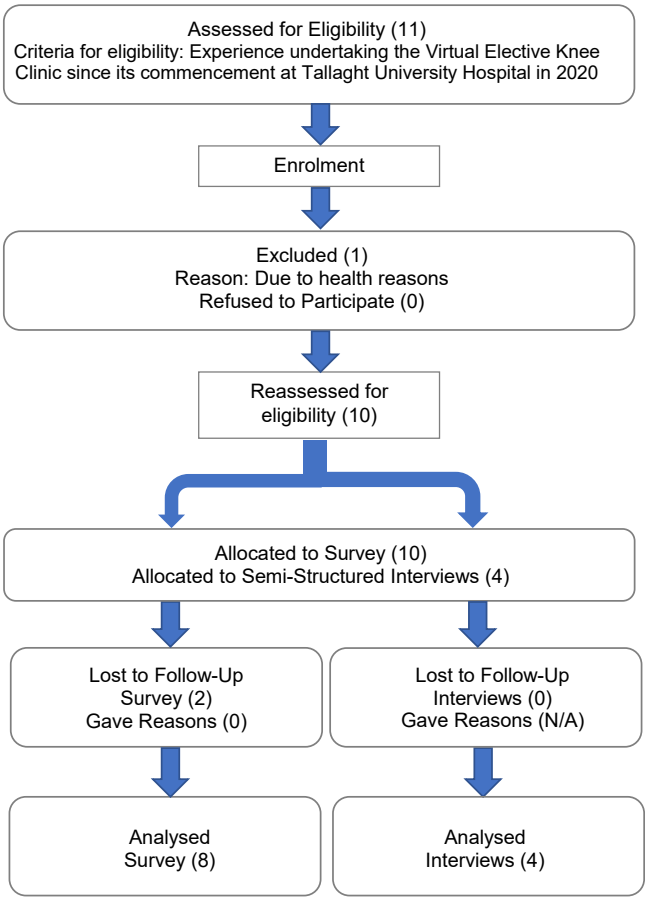

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Figure 1.
Flow chart outlining how the participants were allocated in this study

interview, in accordance with the previous research concept of reflexive thematic analysis (Braun and Clarke, 2019). No repeat interviews were required or completed.

Following the interviews, participants were asked to complete an electronic anonymous survey that was created on Google Forms (Appendix 2). The "collect email addresses" function was turned off to ensure that all responses were anonymised. To help improve data validity, the survey was initially piloted with colleagues – including Orthopaedics Specialists leading the VEKC – and edited based on advice and feedback from university tutors and work colleagues. Only the author distributed the survey and collected all of the data confidentially.

2.5 Analysis

Descriptive statistics were conducted using IBM SPSS version 27. The qualitative research software NVivo Version 12 was used to facilitate the coding of the semi-structured interviews and the data were analysed using thematic analysis (Braun and Clarke, 2006). The coded information was sorted into categories whilst themes were identified from these categories as

recommended from previous literature (Braun and Clarke, 2006, 2014). The thematic analysis steps outlined in the former paper include becoming familiar with the data, generating initial codes, searching for and reviewing themes, defining and naming themes and producing the report.

The data were also examined for similarities and differences within the identified themes in order to record the experiences of the respondents. Thematic analysis was conducted which can help deliver stringent framework for coding qualitative data from which patterns can be identified from collated data specific to the research question (Braun and Clarke, 2014).

Illustrative quotes in italics were used to emphasise points made by participants during the interviews. The coding, categories and thematic analysis was completed by the author only. Data collection, transcription and analysis continued until no new or relevant themes or issues were identified to indicate data saturation; analytic saturation is achieved when no new themes or commentary appear after interviews (Braun and Clarke, 2021).

For a mixed-methods study, using both measurable and explorative data to synthesise findings can provide added depth of understanding when addressing research aims and improve study validity (Fetters *et al.*, 2013; Tariq and Woodman, 2013).

2.6 Data management

Data collected via the electronic surveys were anonymous, and the interview recording transcripts were pseudonymised by allocating a participant number. The results were stored electronically at University College Dublin (UCD) using a secure, encrypted data management system (RedCap). The key code with the name and participant number was held at Tallaght University Hospital on a secure computer.

Audio recordings were destroyed once the interviews had been transcribed and any identifying information was removed from the transcripts prior to analysis. All soft copy data will be retained for two years (in the UCD password protected RedCap system) to facilitate data analysis and publication of scientific articles and will then be deleted by the Data Controller.

2.7 Ethical considerations

The study received full approval from St James Hospital/Tallaght University Hospital Joint Research Ethics Committee on 28 February 2022 and also on 14 April 2022 in relation to the amended survey used as the study instrument. The study had previously received full review exemption and approval from full ethical review on 17 November 2021 by the UCD School of Medicine Research Ethics Committee.

3. Findings

3.1 Quantitative phase

The response rate for the survey was 80% ($n = 8$) and there were no reasons collated as to why two people did not complete the survey. About 60% of the participants who agreed to complete the survey were females but due to the survey being completed anonymously, it is not possible to ascertain which health professionals and percentage of either gender completed the survey. Participants' ages were not gathered. Of the 12 questions in the survey, 9 questions were multiple choice and 3 questions consisted of short answer questions. Figures 2 and 3 highlight how the majority of respondents identified how virtual clinics are safe and efficient for VEKC.

Survey participants ($n = 6$) outlined that the efficiency of virtual clinics compared to face-to-face appointments for patients included considerations such as reduced travel, transport and parking costs in addition to not requiring as much time off work or school.

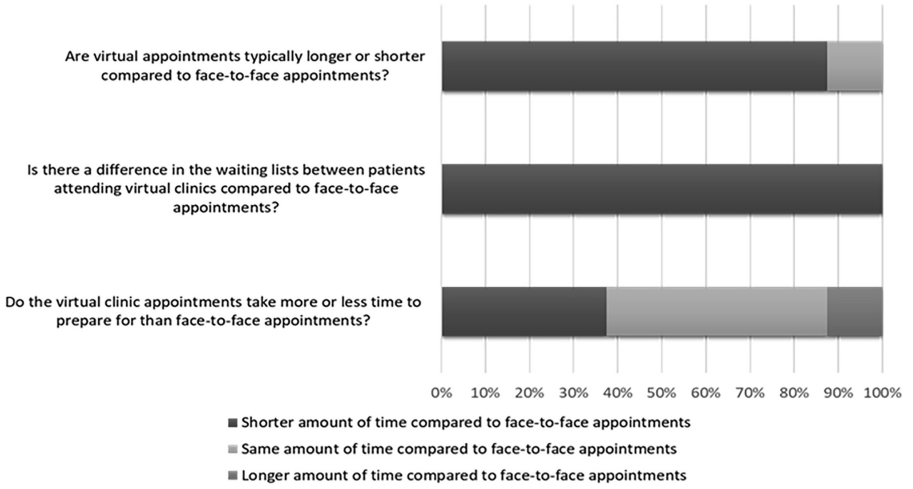

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Figure 2. Results from the participant survey using a Likert Scale

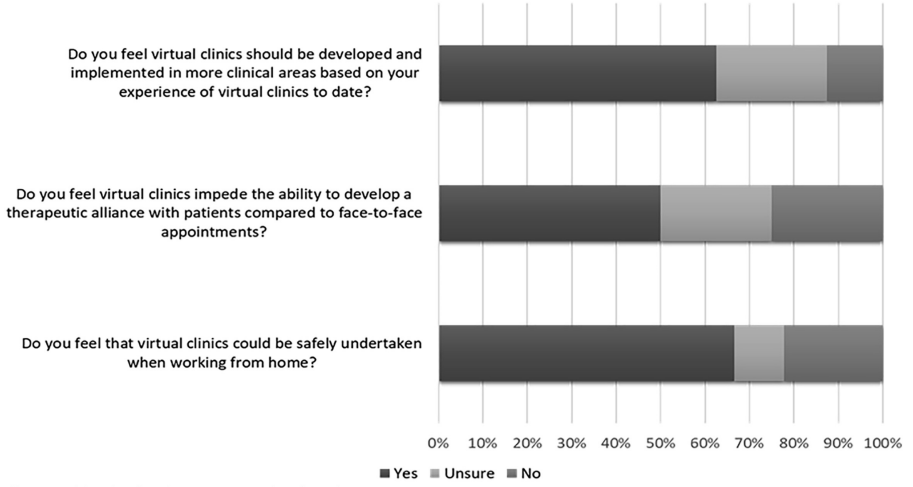

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Figure 3. Results from the participant survey using a Likert Scale

Similar barriers towards the role of virtual clinics identified by different participants ($n = 5$) included apprehension about discharging patients without performing a thorough hands-on examination and virtual clinics not being appropriate for certain pathologies, i.e. patients presenting with muscle weakness and balance issues.

Additionally, participants also highlighted other barriers with virtual clinics including operating them without the use of video software and information technology issues. Participants reported such barriers may restrict how virtual clinics operate successfully, whilst it is harder to build a rapport with the patient during a virtual appointment compared to face-to-face appointments.

3.2 Qualitative phase

Semi-structured interviews were conducted with four participants. Three participants were female and one participant was male. Three of the participants had two years' experience of undertaking virtual clinics and the fourth had two months' experience.

Three overarching themes were identified with nine sub-themes to further elaborate on each overarching theme (Table 2). Exemplar quotes have been provided in italics to illustrate each theme and all quotes have been coded using a participant number.

4. Theme 1: attending virtual clinics

4.1 Travel, work and parking

Participants reported patients would likely save money by attending virtual clinics rather than face-to-face. Potential cost-saving examples identified by the respondents included patients not having to take as much time off work in addition to reduced parking and associated travel costs of visiting the hospital.

> So the main advantages are that the patient doesn't travel to the hospital and you save a hospital visit for the patient. They can have it at home. It's easier, less costly for the patient (P1).

> They wouldn't have to take time off work. I suppose from an economic perspective also things like transport costs, things like parking costs (P3).

4.2 Active treatment time

Interview participants reported that attending face-to-face appointments tends to require more of a patient's time, when compared to attending virtual clinics. Respondents discussed how this may also allow patients carry out more tasks on the day of their medical appointment.

> Active treatment time for a face-to-face is at least two and a half hours. So that's the patient coming in, attending for the appointment and then by the time they get home. And we have data on us that the active treatment time for a virtual consultation is on average less than 20 minutes. So that's huge cost saving for the patient not coming in (P2).

Participants reported the duration of virtual appointments are shorter than face-to-face appointments facilitating more patients being booked into the virtual clinic sessions.

> Virtual appointments are shorter than face-to-face appointments so we could book more patients into a virtual half-day session than face-to-face half day session (P4).

Table 2.
Themes and sub-themes identified from the semi-structured interviews

	Theme	Sub-themes	
1	Attending virtual clinics	*1.1*	Travel, work and parking
		1.2	Active treatment time
		1.3	Room availability
2	Patient cohorts	*2.1*	Suitable pathologies
		2.2	Unsuitable pathologies
		2.3	Inclusion/Exclusion criteria
3	Tailored care and services	*3.1*	Patient feedback
		3.2	Attendance rates
		3.3	Follow-up appointments

Source(s): Author's own creation/work

4.3 Room availability

Participants believed that virtual clinics did not need to take place in a typical clinical room (where face-to-face appointments would usually take place) as the clinician does not need to use a hands-on approach with the patient. Participants also noted this could prove useful if there was any issue with room availability in the department.

> Virtual clinics might not require the same level of logistics, administrative cover or physical infrastructure, including clinic rooms, compared to face-to-face stuff (P3).

> And the reality is that we're not always going to have space to do face-to-face clinics. So it's a good option when you have more clinicians than you have space that you can run some virtual clinics (P4).

5. Theme 2: patient cohorts

5.1 Suitable pathologies

Participants highlighted that certain cohorts of patients are better suited to the VEKC, mainly those patients presenting with either mild or severe osteoarthritis, due to the likelihood of these patients requiring conservative management and surgical opinion, respectively.

> Virtual clinics are good for a certain cohort of patients, particularly those with the mild osteoarthritis. I think virtual clinics are very good for those moderate to severe osteoarthritis patients where we can direct them towards the surgical clinic (P1).

> I think virtual clinics really suits having an initial assessment with people presenting with mild osteoarthritis in either their hip or their knee (P2).

5.2 Unsuitable pathologies

Participants highlighted the difficulty with a certain cohort of patients attending virtual clinics, which might lead to these patients requiring more appointments as a result of not being assessed in person. Participants reported if these patients had been assessed in person initially, it may reduce the need for subsequent follow-up appointments.

> Patients whose pain severities are very high or their subjective doesn't marry up with their symptom severity on an objective outcome measure or have poor balance and muscle weakness, you would definitely make a better decision if you saw them physically (P1).

> Virtual clinics are not appropriate for patients with worrying neurological symptoms for example, new onset of reduced co-ordination or weakness in their limbs (P2).

> I would find that there is a bit of frustration with patients who have high levels of pain and are reviewed virtually as they likely require a face-to-face appointment for a thorough examination. I think, oh gosh, they're now having two appointments instead of one (P3).

Participants also felt the therapeutic alliance between clinicians and patients would be easier to ascertain with face-to-face initial assessment appointments rather than at virtual clinics.

> I do think if patients meet you, feel they've been listened to and they feel they've had someone look them in the eye in person it may be more helpful than patients thinking that it was just a quick phone call (P4).

5.3 Inclusion/exclusion criteria for virtual clinics

Participants recommended that improving the inclusion and exclusion referrals criteria for virtual clinics would lead to a more efficient process towards ensuring that the patient is seen

in an environment most suitable to their needs whilst also reducing the number of unnecessary appointments.

> I think we can make our inclusion criteria more efficient so there would be less chance of patients needing to come back for that second appointment and that would make the system a lot more efficient (P4).

6. Theme 3: tailored care and services

6.1 Patient feedback

Participants suggested that obtaining the patients' views and opinions regarding virtual clinics and how they operate, could help with development of virtual clinics and identify cost-saving ideas when planning service development.

> We need the patient's perspective, which we haven't got to date as I think their experience would matter too as they may have limited IT skills (P1).

> We could keep data on satisfaction or even look at patient satisfaction with this programme. So being able to have that data from the patient would make it a little bit slicker virtually (P2).

> We all need to be aware of the patient's perspective on the advantages and disadvantages of virtual clinics especially without using a videocall. We can't forget the patient's expectations and check if they would prefer the physical examination? (P3).

6.2 Attendance rates

Participants noted there was a reduced non-attendance rate during their virtual clinics compared to clinical appointments. Additionally, participants reported virtual clinics allowed more flexibility in contacting patients for their appointment if required, for example, if there were any late cancellations, participants could contact another patient by phone to fill that appointment slot.

> We tend to have less late cancellations and DNA (do not attend) rates with virtual clinics compared to face-to-face clinics (P1).

> It's been useful to have virtual clinics because we fit them in to maybe lunch time or at shorter notice and there hasn't been as many cancellations for those patients. When the patient is phoned the assessment takes a lot less time so we could probably book more patients into virtual than face-to-face sessions (P2).

> It is less common for us to have empty slots in our virtual clinics compared to our face-to-face appointments so more patients are seen on average in our virtual sessions (P4).

6.3 Follow-up appointments

Participants reported that virtual clinics could be very useful for follow-up appointments, in addition to contacting patients with results of investigations, more so than for undertaking initial assessments in most cases.

> So it could be used more in review appointments because the initial assessment gives you the wealth of knowledge and then you can make better decisions after that. I think it's very useful for return post investigations because again, it helps us then direct the patient to the right service (P1).

> It is likely that virtual clinics are better for follow up appointments as I would prefer patients initial assessment to be face-to-face (P3).

> Overall I feel an initial assessment is more thorough when completed in person but virtual clinics can be very useful for subsequent appointments (P4).

7. Discussion

7.1 Key findings

Several participants in this study reported multiple ways in which virtual appointments are more efficient for patients, compared to face-to-face appointments. This included not needing to pay for transport and parking fees nor arrange as much time off school or work, and not needing to leave their home for a prolonged period of time. Previous studies including a randomised control trial have previously also reported similar benefits for virtual clinics and highlighted a reduction in footfall in healthcare settings (Buvik *et al.*, 2019; Saeed *et al.*, 2020; Shenoy *et al.*, 2020).

Clinicians in this study reported that virtual clinics can take place in smaller non-clinical rooms as a hands-on objective assessment does not take place during a virtual appointment. This could make clinical rooms available for use by other clinicians to help manage their waiting lists. The majority of survey participants reported that virtual appointments are typically shorter in duration and have smaller waiting list times compared to face-to-face appointments. This correlates with prior research which reported that virtual clinics have significantly reduced consultation time and costs when compared to face-to-face appointments (O'Reilly *et al.*, 2019; Freiman *et al.*, 2021).

Study participants also noted a lower non-attendance rate for patients attending virtual clinics, which may make the virtual clinics more efficient regarding the numbers of patients assessed than face-to-face appointments. Additional financial benefits of implementing virtual elective orthopaedic clinics may also be inferred from the ability of other clinicians being able to undertake the VEKC, including physiotherapists and advanced nurse practitioners, who have robust clinical skills, but tend to command lower salaries than Orthopaedic Consultants (O'Reilly *et al.*, 2019).

However, feedback from both the interviews and survey did highlight some barriers to virtual clinics in relation to those patients who may prefer face-to-face appointments due to reduced information technology access or skills if a videocall had to be made. Additionally, some patients may also prefer an in-person assessment, which aligns with previous research involving clinicians and patients. This research highlighted how patients strongly value the presence of a healthcare clinician conducting a thorough objective examination in person (Marsh *et al.*, 2014; Barton *et al.*, 2021; Calner *et al.*, 2021).

There was a difference of opinion in the interview participants regarding the suitability of virtual clinics for different cohorts of patients. About 75% of the interview participants indicated that virtual clinics may be more useful for follow-up appointments rather than initial assessments. In contrast, one interview participant reported that virtual clinics would be suitable for initial assessments if the patient presented with mild hip or knee osteoarthritis. However, all of the interview participants also reported that face-to-face assessments would be more appropriate for certain cohorts of patients – for example, patients presenting with muscle weakness or loss of balance – to complete objective assessments in person.

Similarly to previous literature, participants in this study reported that the diagnostic accuracy of virtual clinics may be less accurate than face-to-face appointments due to the inability to complete a hands-on assessment; this may lead to patients being rebooked for further appointments after their virtual consultation (Glass and Bickler, 2021). In future, there may be scope for further development of the virtual clinics to incorporate hybrid models where the patient can be efficiently reviewed virtually and/or face-to-face according to their needs, as recommended in prior empirical studies and research (Vranceanu *et al.*, 2019; Gilbert *et al.*, 2022).

Research recently reported legal and safety issues relating to virtual clinics, arising from the brisk implementation of these clinics since the start of the COVID-19 pandemic (Gilbert *et al.*, 2021). However, it is noted that this study's questionnaire was based on anecdotal experience rather than being guided by a literature review or research. To help with the efficiency of virtual clinics, an agreed inclusion and exclusion list of pathologies suitable for virtual clinics should be determined to ensure that patients are assessed safely in the most appropriate environment in line with guidelines (Health Service Executive, 2021a, b).

Throughout all interviews, participants advocated that understanding the population's needs and tailoring services around the needs of the patient underlines the best way to efficiently use resources as part of integrated care, as outlined in previous guidelines (International Foundation for Integrated Care, 2020). The use of virtual clinics has been reported to help improve flexibility with how patient-centred integrated care can be delivered safely and effectively (Schuelke *et al.*, 2019; Sinn *et al.*, 2022; Katz *et al.*, 2017). The World Health Organisation (WHO) indicated that the implementation of integrated care will vital going forwards to help with the increasing cost and prevalence of long-term chronic conditions and preventable illnesses (WHO, 2015). Integrated care has also been shown to better facilitate use of resources within various healthcare departments, when stakeholders are aware of what matters to patients accessing healthcare services and how the system impacts people (Baxter *et al.*, 2018; Aufegger *et al.*, 2020).

7.2 Limitations

It is acknowledged there is a possibility of a response rate bias, where interested and enthusiastic clinicians known to the author may have been more likely to agree to take part in the study. Participants were known to the author and this study only reviewed the use of virtual elective orthopaedic clinics for knee pathologies. Future studies may focus on evaluating the effectiveness of virtual clinics for other trauma or elective orthopaedic clinics involving multidisciplinary teams (e.g. post hip and/or knee replacements, fracture clinics).

Convenience sampling was used for this study which took place in one hospital where a virtual knee elective clinic was operating, so it does not reflect experiences from other departments, hospitals or countries. There was a small sample size for this study due to the small number of clinicians who have operated the VEKC since their inception in 2020 at the site of study, which may reduce the generalisability and limit applicability of the results nationally and internationally. Clinicians in this study had varying levels of experience working with virtual clinics – ranging from two months to two years.

This study was unable to ascertain specific costs related to both virtual and face-to-face appointments at the place of study due to the data not being available to the author or participants; hence, future studies should quantify cost-saving figures.

8. Conclusion

Findings from this study highlights further research are required in relation to virtual elective orthopaedic clinics, particularly in an Irish setting. Clinicians in this study highlighted several ways that virtual clinics are efficient for both the patient and health service. This will be particularly pertinent going forward whilst the use of digital health and virtual clinics continue to be increasingly implemented in integrated healthcare settings (Shah *et al.*, 2022).

This study was undertaken to improve the understanding of clinicians' experiences of virtual clinics in an orthopaedics setting but further research in this topic would benefit from a larger sample size to improve generalisability. Additionally future research could seek service users' opinions to help elicit richer narratives regarding the role of virtual clinics to help improve integrated patient-centred care and multidisciplinary health teams as they may evolve in the future due to technology advances.

This study also highlighted barriers in the implementation of virtual clinics, particularly for certain cohorts of patients and pathologies. Research is needed to investigate the efficiency and safety of virtual clinics in other healthcare departments and hospitals nationwide. This would help identify to what degree the benefits of virtual care depend on the care setting and have meaningful comparisons with other clinical specialities to aid integrated care. Further research and training regarding virtual clinics have the potential to improve interest, knowledge and acceptability of their use among different medical professionals, whilst delivering safe and efficient patient-centred integrated care.

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Appendix 1

Table A1.
Semi-structured interview topic guide/ study instrument

Main questions

1. How have you adapted to using virtual clinics alongside face-to-face clinics?
2. How do you document the outcomes from each appointment for audit purposes?
3. How successful do you feel virtual clinics have been since they started at Tallaght University Hospital in 2020?
4. What options are available for patients who may not wish to take part in virtual clinics?
5. What do you feel is the cost-effectiveness, if any, of virtual clinics compared to face-to-face, from the *(A)* clinician's/health service and *(B)* service user point of view? If so, in what way(s)?
6. Has your opinion of working in virtual clinics changed over time?
7. How do you feel virtual clinics can be developed in other areas of orthopaedics and rheumatology?
8. Do you think that not being to assess patients' body language or complete objective examinations has an impact on the virtual clinic's effectiveness, compared to face-to-face appointments?
9. What are the main advantages and disadvantages of virtual clinics in comparison to face-to-face clinics?

Concluding question

Is there anything you would like to add that we have not talked about?

Follow-up questions

Please tell me more?
Please give an example?
What did you do?
In this situation, how do you handle it?
What do you do in practice?
Difficulties/opportunities?

Source(s): Author's own creation/work

Appendix 2

	Question	Response options
1	Are virtual appointments typically longer or shorter compared to face-to-face appointments?	Typically shorter than face-to-face appointments Approximately the same length of time as face-to-face appointments Typically longer than face-to-face appointments
2	How frequently do administrative issues arise from running virtual clinics compared to traditional face-to-face appointments?	Administrative issues occur less frequently with virtual clinics than face-to-face appointments Administrative issues occur at the same frequency with virtual clinics than face-to-face appointments Administrative issues occur more frequently with virtual clinics than face-to-face appointments
3	What would you say are the benefits of virtual clinics compared to face-to-face clinics? (please provide 2–3 examples)	Open text response
4	What do you feel are the main barriers when operating virtual clinics? (please provide 2–3 examples)	Open text response
5	How confident are you that your assessment techniques, when completed virtually, are as effective as your assessment techniques during face-to-face appointments? (1: Not confident, 5: Very confident)	1–5
6	Do you feel virtual clinics should be developed and implemented in more clinical areas of your department based on your experience of virtual/telehealth clinics to date?	Yes Unsure No
7	Do you feel virtual clinics impede the ability to develop a therapeutic alliance with patients compared to face-to-face appointments?	Yes Unsure No
8	What do patients report as the main benefits of attending a virtual appointment rather than a face-to-face appointment? (please provide 1–2 examples)	Open text response
9	Do you feel that virtual clinics could be safely undertaken when working from home?	Agree Unsure Disagree
10	Is there a difference in the waiting lists between patients attending virtual clinics compared to face-to-face appointments?	Shorter waiting list for virtual appointments No difference in waiting lists between virtual and face-to-face clinics Longer waiting list for virtual appointments
11	How often are patients rebooked for a face-to-face appointment following their virtual appointment due to the virtual clinics being deemed insufficient for assessing the patients?	Majority of the time Approximately 50% of the time Minority of the time
12	Do the virtual clinic appointments take more or less time to prepare for than face-to-face appointments, e.g. finding the patients contact details, logging on for a videocall, sending the patient information by post/email	Longer amount of time compared to face-to-face appointments Same amount of time compared to face-to-face appointments Shorter amount of time compared to face-to-face appointments

Source(s): Author's own creation/work

Table A2. Anonymous survey questions and response options/study instrument