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# Virtual clinics versus face-to-face review: Is the benefit the same for new orthopaedic patients?

Sarah Shammout<sup>a</sup>, Rosemary Wall<sup>b,\*</sup>, Philip N. Murphy<sup>c</sup>, Kowshik Jain<sup>d</sup>

<sup>a</sup> Walsall Manor Hospital, Walsall Healthcare NHS trust

<sup>b</sup> University Hospitals Coventry and Warwickshire

<sup>c</sup> Edge Hill University, UK

<sup>d</sup> Dudley Group of Hospitals NHS Trust

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## ABSTRACT

**Background:** COVID-19 shocked global healthcare systems, particularly the surgical services, resulting in a significant backlog of patients with waiting times not expected to return to pre-pandemic levels until 2025. The Royal College of Surgeons has recommended a wider use of virtual clinics to meet the increased demand. The efficacy of virtual follow up is well documented in the literature; however, there is very little evidence of the role of virtual clinics in the assessment of new elective patients.

**Methods:** Observational study comparing clinical outcomes of new patients electively referred to orthopaedic virtual clinics between January and February 2021 with face-to-face clinics in January and February 2020.

**Results:** Over the equivalent time frame, more patients were reviewed in virtual clinics compared to traditional face-to-face (821 vs 499). However, virtual clinics lead to significantly more patients being brought back for follow up (78.3% vs 37.3%) and fewer patients received outcomes that progressed their journey towards a definitive intervention or discharge.

**Conclusion:** The overall benefit of virtual clinic appointments in the context of reviewing new patients remains to be proven. Despite increasing use of virtual clinics in the National Health Service, we have shown a potential delay to patients' clinical progression, ultimately delaying healthcare delivery. Potential methods to improve the benefit of virtual clinics are proposed.

## 1. Introduction

The COVID-19 pandemic posed a crisis to the healthcare services worldwide. Healthcare utilisation has reduced by a third, with many services providing only emergency and urgent care, which has resulted in cancellations of most elective clinical work [1]. The impact this has had on waiting times for review and surgery has been profound [2]. A survey conducted during the first peak of the pandemic across the United Kingdom suggested that 91% of all elective orthopaedic operations were cancelled, with trauma services continuing normally in only 24% of cases. Elective clinic capacity was significantly reduced with 55% of clinics completely cancelled and 35% running at reduced volume [3].

Most elective orthopaedic referrals are from primary care general practitioners or physiotherapists and fall under the 18-week-wait

'referral to treatment' National Health Service (NHS) pathway [4]. The role of specialist secondary care is to 'stop the clock' by either commencing treatment or deciding that treatment is not required [4]. This encompasses arranging further investigations, making diagnoses, and providing specialist advice and reassurance. Ultimately, the goal is the discharge of patients back to the care of general practitioners after having received any treatment that is required. The challenge arises in secondary care when too many patients remain under specialists but without a clear plan of action or need for ongoing specialist review. These 'static' patients are neither discharged, nor awaiting specialist intervention and are booked into valuable appointments that could be used more judiciously.

The Royal college of Surgeons of England proposed the use of virtual clinics to help meet the increasing demand, due to the pandemic, on outpatient services. [5]. Virtual clinics have been proposed as a widely

\* Corresponding author, University Hospitals Coventry and Warwickshire, Trauma and Orthopaedics Department (5th Floor), Clifford Bridge Road, Coventry, CV2 2DX.

E-mail address: [Rosemary.wall@nhs.net](mailto:Rosemary.wall@nhs.net) (R. Wall).

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accepted sustainable means to meet the increasing needs of the NHS, whilst also reducing costs to patients and losses in productivity compared to conventional outpatient clinics [5–7]. Virtual clinics are conducted remotely, usually over the telephone, or videoconferencing, with or without the use of online tools to improve accessibility [7].

The efficacy of such clinics in the acute trauma setting, so called ‘virtual fracture clinics’, is now well established as a safe, cost effective and efficient method in which to review selected patients [8]. Similarly, virtual appointments used in the context of follow up patients are increasing in popularity [9,10].

However, very few studies have explored the efficacy of virtual clinics in managing new elective orthopaedic patients. In this paper we aim to investigate the efficacy of virtual clinics for new elective orthopaedic referrals, specifically regarding how virtual appointments progress the patient journey in secondary care, as compared to the current standard of face-to-face consultations. This concept of the ‘flow’ of a patient is something more typically applied to inpatient care of NHS patients, however, it can be adapted to similarly reflect the flow of patients through the outpatient service [11].

## 2. Method

This retrospective observational study comprised all patients assessed in any orthopaedic clinic at a new patient appointment in a single NHS Hospital Trust over two consecutive months at the beginning of 2021 (January and February 2021). The Trust comprised two separate sites in which orthopaedic elective clinics were conducted, in an urban area of the United Kingdom and had twelve orthopaedic consultants at the time of this study. The dates were selected because, at this time, all new appointments were being conducted in a virtual manner due to the COVID-19 pandemic. Patients were identified using the hospital appointment booking IT system and anonymised outcome data were collected. Our comparator group was the equivalent patient population from one year prior when all consultations were performed face to face (January and February 2020).

All new elective referrals to spinal, lower limb, upper limb and foot & ankle clinics in the NHS trust were included if they had been allocated a new patient, consultant-supervised consultation. Excluded from the study were: all ‘Did Not Attend’ (DNA); ‘uncontactable’-in the virtual setting; follow-up clinics and allied health professional-led clinic appointments.

Anonymised data were collected on each appointment as follows: anonymised identification number, age at time of appointment, subspecialty of appointment (hip, knee, hand etc.), appointment date, 18-week-wait patient outcome.

The 18-week-wait outcomes were categorised by two of the authors (RW and SS). These categories were: added to waiting list for surgery; direct admission for intervention; awaiting results from additional investigations/opinions; discharged back to primary care; future follow up in orthopaedic clinic. These were then grouped according to their influence of the patient’s progress towards specialist intervention or discharge back to primary care in-keeping with the principles of patient ‘flow’; ‘addition to the waiting list’, ‘request of investigations’ or ‘discharge from the clinic’ were considered as progress to the patient’s clinical journey. The outcome of patients planned for future follow up (i.e. another appointment for face to face review in clinic) was classed as a ‘static’ outcome by which we mean ‘remaining in secondary care with no clinical progress towards intervention or discharge’.

Chi squared analysis was performed comparing our data to the null hypothesis that there is no relationship between the format of appointment (i.e. face to face or virtual) and patient’s outcome. This was undertaken by our statistician (PM) using SPSS version 24 using a conventional alpha level of  $\alpha = 0.05$  for a small effect size of  $w = 0.1$  [12].

## 3. Results

In January and February 2020, 499 patients were reviewed in new elective orthopaedic clinics in the NHS Trust, all of which were from face-to-face appointments. This compares to 821 in the first two months of 2021, 100% of which were undertaken virtually (the vast majority via telephone consultation). This is a 64% increase in the number of new patient consultations in the same time frame. The mean age of patients seen was similar for the two groups: 56.8 years and 55.7 years respectively.

Distribution of subspecialty clinics was similar across the two time periods with the majority being lower limb clinics, followed by upper limb clinics (see Table 1).

### 3.1. Outcomes

The majority of patients (78.3%) reviewed via a virtual clinic appointment were booked for a future face to face or virtual review appointment. Fewer patients were added to a surgical waiting list or discharged from the service compared to equivalent patients reviewed in a face-to-face clinic. Further details of the comparative outcomes provided as shown in Table 2.

### 3.2. Progressing the patient journey

Clinical progression was considered to have occurred if patients were added to a theatre waiting list, discharged, or were awaiting investigation results. Patients brought back for further follow up (face to face follow up) were considered not to have progressed on their patient journey (i.e. a “static outcome”). Table 3 shows the observed outcomes for face to face and virtual appointments, as well as the expected outcomes under the null hypothesis of no association between appointment type and outcome category (E).

The results in Table 3 yielded a highly significant chi-square value with  $\chi^2 [1, N = 1319] = 224.8738, P < 0.001$ . A *post-hoc* power analysis demonstrated power slightly greater than 0.95 for this result with the alpha level of  $\alpha = 0.05$  for a small effect size ( $w = 0.1$ ) [16].

## 4. Discussion

We have demonstrated that a higher volume of patients can be reviewed in equivalent time frames using virtual clinics as compared to face-to-face consultations. This has been demonstrated previously and has been attributed to reduced running time and layover between patients as well as reduced time spent on late or non-attendances [13]. The potential benefits for the patient are also well documented with increasing evidence from virtual fracture clinics and elective follow-up clinics that suggests improved patient satisfaction due to reduced travel times and reduced waiting time [10, 14]. Virtual appointments also provide a safer option for seeking healthcare without the added exposure to COVID-19, of particular significance to older and high-risk patients [13].

However, this ostensibly desirable finding of higher volume clinics must be interpreted with caution. The highly significant Chi-squared value demonstrated here is consistent with the view that virtual clinics are associated with a greater likelihood of further follow up (in a

**Table 1**  
Distribution of sub-speciality clinics undertaken.

Clinic Subspecialty	Face to Face Clinics (2020)		Virtual Clinics (2021)	
	No. patients	%	No. patients	%
Foot & Ankle	100	20.0%	119	14.5%
Lower limb	175	35.0%	282	34.3%
Upper Limb	145	29.0%	255	27.4%
Spines	79	15.8%	165	20.0%

**Table 2**

Outcomes for patients reviewed in face to face as compared to virtual new orthopaedic clinics.

Outcomes	Face to Face (2020)		Virtual (2021)	
	Number	%	Number	%
Added to waiting list	171	34.3%	61	7.4%
Awaiting results	68	13.6%	65	7.9%
Discharged	74	14.8%	51	6.2%
Follow up	186	37.2%	643	78.3%
Direct admission	0	0%	1	0.1%
Total	499	100%	821	100%

**Table 3**

Observed and expected outcomes (E: in parentheses) for the patient journey\*.

Outcomes	Face to Face	Virtual
Progressive outcomes	313 (185.38)	177 (304.63)
Static outcomes (Follow up)	186 (313.63)	643 (515.38)
<b>TOTALS</b>	<b>499</b>	<b>820<sup>1</sup></b>

\* The direct admission has been omitted from this analysis.

face-to-face format) being required when compared to initial face-to-face clinics for new elective orthopaedic patients. This suggests that virtual elective clinics are less effective at progressing the patient journey towards a specialist intervention or discharge back to primary care when compared to face-to-face clinics. This leaves a significant burden of patients in secondary care who may otherwise have been discharged back to the care of their general practitioner.

There are several factors that could contribute to the lack of progression of patients seen in virtual clinics compared to the traditional face to face clinics in the orthopaedic elective setting; these are outlined below.

#### 4.1. Technology

Not specific to the clinical subspeciality, technical difficulties including connectivity and user confidence in the technology are likely to play a role [15–17]. It is possible that these technical aspects will improve with time and increased familiarity with virtual frameworks, for both the clinician and patient. However, virtual clinics, especially those conducted via telephone with no visual element, present additional challenges specifically for patients with certain communication needs. For example, a hearing-impaired patient may not hear their telephone ringing to undertake their appointment or be unable to sufficiently hear or understand the clinician. Furthermore, for patients in whom their first language is not the language of the clinician (in this study, English), adequate advanced organisation of a 3-way telephone call with an interpreter must be undertaken [17]. In the context of the COVID-19 pandemic, much of the virtual consultation organisation was rapid and last-minute, potentially excusing the failure of some of these appointments to be of optimal benefit for all patients and hence the decision to arrange further face to face follow up [14]. However, moving forwards, to optimise the utility of virtual consultations for everyone, additional consideration would need to be applied to such circumstances to ensure fair and optimal use of each appointment.

#### 4.2. Training

In addition to the technological elements of the virtual clinics, there comes familiarity and preference on the side of the clinician [17]. Traditional training has been in the form of face-to-face clinic appointments, with clinical assessment comprising history and examination followed by investigations that help formulate a diagnosis and treatment plan. The lack of examination and inability to pick on non-verbal cues in a telephone consultation is at odds with the method in which most

clinicians will have trained and practised for many years. This understandably introduces apprehension when making definitive decisions [18]. This is in-keeping with the findings of Barsom et al. who demonstrated a better experience for both patients and clinicians where there was a visual aspect to the consultation by using video compared to telephone only consultation [19]. In our study, the virtual appointments were almost entirely telephone, meaning further analysis of video conferencing is not appropriate. However, the delay in progression to intervention seen in our virtual appointments could partly be due to this lack of visual feedback.

A further consideration is the role of so-called ‘junior’, or specialist training, doctors in virtual consultations. Traditionally in the NHS, in face-to-face consultant-led clinics, trainees have immediate access to an experienced senior doctor, typically a consultant, to advise on definitive decision making (such as the addition of the patient to a surgical waiting list). In one study in a different surgical speciality, this was the norm for 39% of consultants with 85% expecting any decisions regarding patient care to be discussed with them [20]. This ‘consultant-next-door’ policy provides immediate input, if required, from a senior clinician to those patients being reviewed by more junior members of the team, crucially at the same appointment. This is not always possible in a virtual setting, especially if the consultations are being undertaken simultaneously by multiple members of the team but from remote physical locations. A less experienced clinician may decide to arrange further review for the patient to permit senior input, hence comparatively delaying that patient’s progress towards intervention or discharge.

#### 4.3. Triage

The ease of decision making is likely to be influenced by the degree of complexity of diagnosis and the intervention planned in an orthopaedic clinic. In the virtual setting, physical examination or investigation is limited, and will usually require a face-to-face appointment to ensure a comprehensive clinical assessment. Rutherford et al. demonstrated that 88.8% of patients felt that clinical examination was an important part of their consultation with clinicians similarly expressing the importance of this aspect of the consultation previously [15, 21]. Moreover, particularly in orthopaedics, but common across other medical specialities, is the need for baseline investigations necessary to reach a diagnosis. In orthopaedic clinics, this frequently includes imaging (radiographs) of the relevant joint or bone and this would need to be organised and undertaken prior to the virtual consultation for optimal utilisation of the appointment. As demonstrated by Buvik et al, remote telemedicine consultations and face to face consultations were comparably effective in their patient population when 88% of the virtual patients had attended for specific radiographs prior to their consultation [22]. Finally, in surgical settings, clinicians may have concerns regarding their ability to counsel patients fully prior to major surgery when the non-verbal cues are deficient in a virtual consultation [15, 19]. Triaging such patients appropriately (for example, those who have already had required imaging or who are presenting with less complex conditions) is more likely to lead to benefits from a virtual first attendance thus optimising the utility of this resource and reducing the need for ‘duplicate’ appointment face to face [23].

#### 4.4. Covid-19

One must also consider the influence the pandemic has had on clinician decision making to retain patients in secondary care without a plan for intervention or discharge. One aspect which we did not explore in our data collection was the specific reasons for return. Whilst this may be due to a clinical aspect as discussed above, the impact of the COVID-19 virus is also likely to have played a role in decision making. One example might be the decision to delay surgical intervention due to the known increased risks of surgery if the patient is COVID positive peri-operatively [24]. Moreover, the reduced availability of staff along, along

with inaccessibility to or reduced theatre capacity, is likely to have influenced some decision making, either consciously or subconsciously. Similarly, we have not explored here the potential influence of the COVID pandemic on health seeking behaviours of patients therefore being referred from primary care. The similar age and sub-speciality distribution of patients in our findings goes some-way to suggest a similar cohort of patients being referred across the two time frames, however, disease severity and other potential influential factors may also have differed.

We acknowledge additional limitations of this study. Retrospective review of data introduces the risk of confounding variables not considered in our analysis. Similarly, by grouping data into categories according to progressive and static outcomes, we have inevitably oversimplified the nuanced nature with which real patients are managed. Whilst we are not aware of this categorisation of the outcomes being published previously, this decision for grouping was based on the ever-expanding principles of managing patient ‘flow’ [11]. This is a concept typically considered of inpatient management however is an area of increasing interest within which further work is needed to explore the capacity mismatch that similarly exists in the NHS in the outpatient clinic setting. However, in our careful analysis of the outcomes, together with cautious interpretation of our results, we feel these limitations are minimised.

Due to the increased volume of patients reviewed via virtual clinics, it is likely they will play a continued role in the future management of elective patients in reducing the volume of outstanding work generated by the pandemic. Nevertheless, an overreliance on virtual clinics to help manage the increasing workload may present issues. As we have demonstrated, with the delayed progression to a definitive patient outcome from a virtual clinical consultation, there is a risk of further overwhelming face to face clinics with subsequently more people “entering the system”. Consequently, lengthening waiting times for those aspects of patient care (listing and consenting for surgery) which cannot be addressed virtually, simply ‘kicking the can down the road’.

On balance we suggest the targeted use of virtual clinics in the context of elective new patients. Through the employment of the considerations discussed here, with pre-review triage to determine whether patients are reviewed virtually or face-to-face, as opposed to a “one size fit all” where all patients are consulted virtually and, potentially, inappropriately. This, along with adequate timing to allow consultant input where required in ‘junior’ held clinics, along with improving familiarity with the technologies in use, is likely to maximise the efficacy of virtual consultations.

## 5. Conclusion

The overall benefit of virtual clinic appointments in the context of reviewing new orthopaedic patients remains to be proven. Whilst it initially increases the volume of patient consultations, with important potential experiential benefits for patients, the actual benefit to progressing their clinical care appears to be limited for many patients, creating further potential problems for secondary care. Key to further enhancing the use of virtual appointments is the improvement and inclusion of video technology and, most importantly, clinician and patient familiarity with such technology. This, along with appropriate triaging of referrals from a clinical and organisational perspective, will optimise their use and therefore benefit both the patients and the healthcare system.

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## Conflict of Interest

Nil to declare.

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