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The benefit of introducing a virtual trauma assessment clinic during a global pandemic

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Sars-CoV2/COVID-19 pandemic created a national emergency in Ireland. Our institution implemented a virtual trauma assessment clinic to reduce attendance to our district hospital which was stimulated by the development of 'safe-distanced' care. The audit aimed to evaluate the impact of our trauma assessment clinic on care provision and presentation to hospital. All patients were managed according to the newly implemented virtual trauma assessment clinic protocol. Data was prospectively collected over a 6.5 week period from 23rd March 2020 to 7th May 2020. These referrals were reviewed twice weekly by a Consultant-led multidisciplinary team.

142 patients were referred to the virtual trauma assessment clinic. Mean age of referrals was 33.04 years. 43% (n=61) were male patients. Overall 32.4% (n=46) of new referrals were discharged directly to their family doctor. 30.3% (n=43) were discharged for physiotherapy follow up. 36.6% (n=52) required presentation to the hospital for further clinical review and 0.7% (n=1) was admitted for surgical intervention. Overall, this represents a reduction of 63% of patients attending the hospital.

A simple virtual trauma assessment clinic model resulted in significant reduction in unnecessary attendance at face-to-face fracture clinics enhancing patient and staff safety during a global pandemic. This virtual trauma assessment clinic model has allowed the mobilisation of staff to assist with other essential duties in other areas of our hospital without compromising care.

Keywords : Orthopaedic surgery, hospital outpatient clinic, quality improvement, virtual trauma assessment clinic, telemedicine, COVID-19.

INTRODUCTION

Sars-CoV2/COVID-19 pandemic created a national emergency in Ireland and across the globe[1]. The Irish Government announced a nationwide lockdown on the 27th of March 2020 with all non-essential travel or interactions banned and for any residents with medical comorbidities of aged over 70 required to remain within their home[2]. Healthcare services have seen delivery of care challenged. To ensure adequate patient care; hospital staff redeployment has occurred with staff being redeployed from less overloaded services to aid those overwhelmed[3]. To circumvent this and to reduce the risk of exposure to healthcare workers and the public, worldwide, novel formats of outpatient care have been introduced to reduce the volume of patients attending healthcare facilities[4,5]. The COVID-19 global pandemic has stimulated a change in outpatient hospital care being delivered[6,7] to patients with trauma related injuries requiring orthopaedic review at a distance. Telecommunication has enabled healthcare provision at a distance; involving virtual consultations including obtaining a patient's history, preforming a clinical examination, evaluating imaging and allowing open dialogue with the patient surrounding their care[8].

The introduction of virtual fracture clinics (VFC) in Glasgow in 2011 successfully changed the model of care for patients presenting to hospital with a subset of specific injuries[9]. VFCs theoretically reduce the number of unnecessary OPD visits, as seen with traditional fracture clinics (TFCs), whilst reducing OPD wait times and offering hospitals a cost effective alternative in the management of common, injuries[10,11]. Furthermore, high patient satisfaction levels have been reported as the Glasgow model of care proposed the availability of a patient help-line for advice and guidance whilst conservatively managing their injury[12]. With the introduction of this model of care, patients with specific injuries had their clinical details and radiographs reviewed by a consultant and the patient was subsequently contacted with a follow up plan[9,13].

Virtual fracture clinics are advocated by the British Orthopaedic Association using the successful Glasgow Fracture Clinic Protocol which has been introduced in hospitals across the U.K and Ireland1[4,15]. In district hospitals the introduction of this model of care has recorded reductions in new patient attendance to fracture clinics by up to 63%[16]. As 50% of trauma related injuries in the Republic of Ireland (ROI) were recorded as having occurred at home[17], important orthopaedic outpatient (OPD) follow up care is still essential for many of these patients[18]. However, providing follow up care for patients presenting with trauma related injuries has traditionally required patients to attend the hospital or clinic for traditional fracture clinic (TFC) appointments[19].

With a need to reduce patient attendance to acute hospitals and a need for urgent redeployment of medical personnel during the COVID-19 pandemic, we sought to introduce an alternative model of care for outpatient trauma case management in a district general hospital (DGH). Our institution is a level 3 hospital serving a population of 130,507 and the orthopaedic service cares for both paediatric and adult trauma patients[20].

The aim of this study was three-fold.

1. To evaluate our modified model of care in our virtual TAC specifically in relation to the reduction of patients successfully managed without requiring attendance to the hospital for follow-up care.
2. To examine which specific injury types required further physical attendances in the fracture clinic.
3. Assess if a reduction in volume of patients attending clinics allowed for staff redeployment to other clinical departments in the hospital during this period.

MATERIALS AND METHODS

A prospective clinical audit was completed in an orthopaedic unit in a district regional hospital, Mayo University Hospital. All patients were managed according to the newly implemented virtual trauma assessment clinic (TAC) protocol. Data was prospectively collected over a 6 week period from 23rd March 2020 to 7th May 2020.

Virtual TAC clinics were run twice weekly. All patients referred to the TAC were reviewed within 72 hours of ED presentation.

Patients who had been referred from the emergency department (ED) to the traditional fracture clinic were instead referred to a Consultant-led multidisciplinary team delivered virtual TAC. All injuries which would have otherwise been referred to a traditional fracture clinic were referred to the TAC, unlike the Glasgow model of care. There was no specified list of injuries. Removable splints were applied in the ED where appropriate and an information letter was provided to the patient about the TAC with a 24 hour telephone voice answering machine. The multidisciplinary team consisted of an orthopaedic consultant surgeon, an orthopaedic specialist registrar, non-consultant hospital doctors, a clinical physiotherapist and clinical nurses. Upon review of each patient's clinical records and radiographic imaging a plan of care was made with four possible outcomes: discharge to the patient's general practitioner; referral for physiotherapy follow up; review in the fracture clinic or; admission for surgery. The clinical physiotherapist contacted the patient after the clinic informing the patient of the plan of care and had open dialogue with the patient regarding their care. Information leaflets were sent out to the patient with a progress report. A clinical letter from the orthopaedic consultant was also sent to each patient's general practitioner (GP). Patients were encouraged to contact the TAC directly with any questions or issues at any time through the voicemail which was reviewed daily. Virtual TAC clinics were run twice weekly. All patients referred to the TAC were reviewed within 72 hours of ED presentation.

Inclusion criteria were all new patient referrals from the hospital's emergency department (ED) for orthopaedic trauma outpatient care. This differed from the Glasgow model of care, where only specified injuries were referred.

This study was a clinical audit for quality improvement purposes and no research ethical committee approval was required.

De-identified anonymised patient information was recorded after their case had been reviewed in the virtual TAC. A pro forma was developed for data collection which recorded patient data including: patient age; gender; injury sustained; injury location; management plan and if they had contacted the support line. Patients who returned unscheduled to the fracture clinic was also noted along with the reason for their return and subsequent management plan. Data was obtained from the internal hospital wide audit repository on data from the TFCs over the same period from 2019 and used as a comparative for analysis. This anonymised data was limited to gender, age and number of new attendances to the trauma fracture clinic. The trends will be examined with reference to the previous year's data over the same time period.

Our data was collected and recorded on a secure encrypted computer. The data was analysed using IBM SPSS version 26 Statistical software.

RESULTS

There were 142 new referrals from the ED to the TAC during the timeframe of this study in 2020. The previous year there had been 337 new referrals to the trauma fracture clinic from the ED which revealed a 137% reduction in new trauma referrals overall to the fracture clinic from the onset of the nationwide lockdown.

The mean age of patients referred to the TAC was 35.98 years, with median age of 32 years. The range of ages referred was 1-93 years. 56% of patients referred to the TAC were female (n= 80). 44% were male patients (n=61). In 2019, the mean age of all new referrals to the TFC was 31.9 years, median age was 20 years (range 1-90 years) with gender breakdown as 53% male and 47% female.

Of the patients referred to the TAC, there were 79 upper limb injuries recorded and 63 lower limb injuries recorded. The most common injuries reviewed were distal radius fractures with 15% (n=22) of all new referrals. 9.8% (n=14) soft tissue ankle injuries were referred. The breakdown of the location of all injuries is presented in Table I. Of interest examining gender and injury location, for patients referred to the TAC, the most common location of injury in males was the ankle 26% (n=16) and females was the wrist 20% (n=16).

Overall 32.4% (n=46) of new referrals to the TAC from ED were discharged directly to their GP. 30.3% (n=43) were discharged to physiotherapy follow up. 36.6% (n=52) were brought back to the hospital for clinical review representing a 6.5-fold reduction in face to face attendances of from 2019, and 0.7% (n=1) was admitted for surgical intervention for a paediatric lateral condyle fracture.

In total 3 patients, 2%, contacted the TAC requesting clinical review face-to-face. This was accommodated in each case. The first patient requested a clinical review as a result of persistent pain in their wrist post-trauma. They had been diagnosed with a soft tissue injury of the wrist and treated with a removable splint. After being reviewed in the TAC the patient was discharged to their GP for follow up. A follow up appointment was made for the patient to attend the fracture clinic and they were subsequently discharged from this, after symptoms resolved. The other 2 patients requested a review due to difficulties managing their temporary splints. These patients were accommodated and were also subsequently discharged from the clinic.

With the reduction in volume of patients attending our outpatient clinics, it was possible to redeploy seven of fourteen orthopaedic medical staff to other overwhelmed departments within our hospital. Redeployment of orthopaedic non-consultant hospital

Table I. — Location of Injury across gender.

Location of Injury	N=	%	Male n=	Female n=
Finger/Thumb	15	10.6	8	7
Hand	7	4.9	3	4
Wrist	24	16.9	8	16
Forearm	1	0.7	1	0
Elbow	12	8.3	2	10
Humerus	4	2.8	2	2
Shoulder	11	7.7	5	6
Clavicle	6	4.2	5	1
Hip	3	2.1	1	2
Femur	1	0.7	1	0
Knee	9	6.3	5	4
Tibia	3	2.1	2	1
Ankle	29	20.4	16	13
Foot	12	8.3	2	10
Toe	4	2.8	1	3
Thorax	1	0.7	0	1

doctors to assist in the ED and Respiratory and Medical departments has ensured patient care has not been compromised throughout the hospital. In addition to this, outpatient nurse redeployment was made possible.

DISCUSSION

Although the current COVID-19 pandemic has resulted in cancellations of elective and non-essential services, patients continue to sustain traumatic injuries requiring orthopaedic follow-up[21]. Albeit as expected during this pandemic and nationwide lockdown, a large decline in trauma cases being referred to the clinic was recorded. This is in keeping with international studies which note a significant reduction in trauma presentations to hospitals[22]. As face-to-face interaction increases the risk of virus transmission, reducing the volume of patients attending fracture clinics for appointments can limit the risk of exposure to both staff and patients. Despite a sizeable reduction in volume of trauma related injuries being referred to the orthopaedic department, our TAC has demonstrated successful implementation of this virtual service. This study demonstrates that an alternative model of trauma care in the midst of a pandemic produces effective results, reducing direct patient contact in hospital. It also ensures a consultant delivered individualised management plan for each patient within an accepted time period[23,24]. The benefits to the wider health care community are seen in the redeployment of orthopaedic staff who would usually be required to manage the volume of trauma at our fracture clinics, to assist in patient-care in other, more burdened services as a result of the COVID-19 pandemic.

Logishetty et al.[16] who introduced virtual clinics to their district hospital using the Glasgow model of care noted that of all the new cases referred in to their fracture clinic they reviewed up to 63% of cases in their virtual clinic. This differed to our model of care as every case was reviewed in our TAC. A similar model of care to our model was described by White and colleagues in Edinburgh[19]. Their study noted that 43.1% of referred patients required clinical review in trauma clinics. They also found that many patients referred to fracture clinics required reassurance and information for their minor injuries but did not necessarily need to attend a hospital. As demonstrated, our study concurs with this finding and also demonstrates a reduction in patients returning to hospital relative to their large study.

Other studies[25] have shown that during this pandemic alternative methods of risk reduction of COVID-19 infection have been used, including patient screening with temperature checks, provision of face-masks, use of electronic records and sanitization protocols. Whilst we agree that any patient who requires attendance for face-to-face consultation should be managed in accordance to local guidance including the measures mentioned, the continuous review of trauma patients face-to-face does not completely eliminate the risk of COVID-19 transmission. Overall, the safe discharging of 62.7% of our newly referred patients without having to physically attend the clinic demonstrates that our model of care is effective and increases the safety of staff and patients during this COVID-19 pandemic.

Our findings are consistent with multiple studies which document a significant reduction in new patient face-to-face meetings with the introduction of similar models of care[13,15,26]. With all newly referred patients not attending the hospital for their initial review, as they would have in the pre-pandemic era, and with a return to fracture clinic rate of 37.2% we identified a significant reduction in face-to-face meetings. An advantage of this new model of care has been the ability to redeploy orthopaedic doctors to assist in the management of patients in other departments including our Emergency Department and Medical Departments in the management patients during this pandemic. Direct discharges from virtual fracture clinics have been noted to be 26%[27]. Similarly, our study has noted a direct discharge from the fracture clinic as being 32.4%.

A strength of this study is that it is a prospective cohort study. In the midst of unprecedented crises, we have demonstrated that an alternative model of trauma outpatient care can provide effective and safe care with a reduction in face-to-face interaction.

Notwithstanding this a limitation of our study is that our numbers of patients included are low and that long term follow up has not been performed. It is also noted that our comparison group from 2019 did not include further breakdown of their management plans or injuries. However, we do see this model of care as an effective method of reducing risk to both the patient and staff of transmission of COVID-19 whilst still providing appropriate trauma care. Although there was a reduction in patients referred to the TAC relative to new referrals in 2019, this is likely due to the nationwide lockdown.

We recommend that further long term follow up of this patient cohort be performed to assess their

patient reported injury outcomes and satisfaction. We also propose that this model of care be used in district general hospitals as a safe and effective model for outpatient trauma care during this COVID-19 pandemic.

CONCLUSION

The implementation of the virtual TAC model of care has led to an overall reduction in patients attending the hospital for fracture clinic review whilst providing patient-centred, consultant-delivered care in a safe and effect manner during the COVID-19 pandemic. This new model has enabled redeployment of orthopaedic multidisciplinary staff to assist colleagues in other hospital departments which have experienced a surge in demand due to the ongoing COVID-19 pandemic.

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