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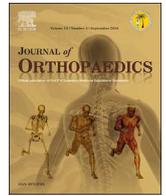
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## Orthopaedic Walk-In Clinics: A model to lessen the burden on Emergency Departments during the COVID-19 pandemic<sup>☆</sup>

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### ABSTRACT

**Objective:** Operating duties for orthopaedic surgeons decreased during the COVID-19 pandemic, while Emergency Department (ED) cases surged. Orthopaedic Walk-In Clinics (OWICs) were implemented to manage urgent musculoskeletal cases.

**Methods:** OWICs, organized in three days, were staffed by one orthopaedic surgeon, one triage person, three medical assistants, and a physician assistant/nurse practitioner.

**Results:** Musculoskeletal non-emergency ED referrals decreased by 40.6% ( $p < 0.001$ ) after initiation of the OWICs, allowing optimal use of resources to address the COVID-19 surge.

**Conclusion:** This paper describes the OWIC model and its preliminary impact. The OWICs could serve as a template for other orthopaedic departments during the pandemic.

### 1. Introduction

The novel coronavirus disease-19 (COVID-19), following a sentinel case in Wuhan, People's Republic of China, in December of 2019, spread rapidly throughout the world. A pandemic was declared by the World Health Organization (WHO) on March 11, 2020, with over 118,000 cases identified in 114 countries,<sup>1,2</sup> including the first case reported in the United States on January 20, 2020.<sup>3</sup> As of early May 2020, the coronavirus had infected over 3.5 million people worldwide, with the number continuing to grow. The pandemic led to nationally-recognized surgical care guidelines from the American College of Surgeons (ACS), the Center for Medicare and Medicaid Services (CMS), and the American Academy of Orthopaedic Surgeons (AAOS),<sup>4–6</sup> which implemented a tiered framework of recommendations to appropriately triage and plan for a surge of COVID-19 cases. Hospitals began prioritizing services and care to those with emergent cases and acute pain to optimize the use of essential medical supplies and equipment. As a result, normal clinic and operating duties for many orthopaedic surgeons were severely diminished.

While many orthopaedic practices had been seeing fewer patients, patient numbers presenting to the Emergency Department (ED) surged, as a large number of patients affected by COVID-19 presented for

urgent care.<sup>7,8</sup> EDs were disproportionately affected as additional patients continued to visit emergency rooms with traumatic injuries and urgent non-traumatic, non-COVID-19 related health problems. Orthopaedic complaints generated a large proportion of urgent hospital visits; between 17% and 26% of all cases presented to the ED were due to musculoskeletal complaints.<sup>9–11</sup> As the pandemic continued to evolve, the volume of ED presentations continued to rise, leading to an overburdened healthcare system. An early plan to lessen this burden and to ensure resource availability and capacity became critical.

To this end, our orthopaedic surgery department implemented a preliminary model of two temporary Orthopaedic Walk-In Clinics (OWICs) to manage cases that would have otherwise presented to the ED. Our hypothesis was that the initiation of the OWICs would decrease the number of orthopaedic non-emergency referrals from the ED, and free personnel and equipment to combat the COVID-19 surge. The preliminary success of the OWICs was determined by comparing the number of non-emergency orthopaedic referrals generated by the ED both before and after the implementation of the OWICs. This paper describes the OWIC model and its preliminary impact on ED orthopaedic referrals, potentially serving as a template for surgical specialty departments in response to the pandemic.

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## 2. Materials and methods

The study setting was a 192 bed, two-hospital system, Level 3 trauma center in a semi-rural area of central Maine, in the Northeast of the United States. The hospital system was staffed by a group of 10 orthopaedic surgeons, 3 podiatrists, 8 physician assistants (PA), one nurse practitioner (NP), one Registered Nurse (RN), and 5 non-surgical sports medicine physicians. The hospital normally offered regular orthopaedic surgery clinics at both locations (22 miles/35 km apart) but had never previously offered an OWIC. Staffing requirements at each of the two OWICs included: one triage person, one unit clerk, three medical assistants, one of whom was trained at applying casts, a PA or NP, a podiatrist, and an orthopaedic surgeon.

The first presumptive case of coronavirus in Maine was reported by Maine Center for Disease Control and Prevention (CDC) on March 12, 2020. The Governor of Maine declared a stop to all non-urgent elective surgery and outpatient appointments three days later on March 15. This was put into place to free inpatient beds and preserve personal protective equipment (PPE), making the supplies available for a potential surge of COVID-19 patients. We held an organizational meeting March 20, 2020 to initiate the OWICs; the clinics opened three days later on March 23, 2020. Prior to March 23, 2020, patients who presented to the ED with orthopaedic complaints either had emergency inpatient consultation performed by the on-call orthopaedic surgeon or were treated by the ED staff and discharged home with an outpatient non-emergency orthopaedic referral. A mandate was ordered by the state government on March 31, 2020, prohibiting all non-essential travel outside of the home.

With the goal of seeing patients that might otherwise have visited the ED for their orthopaedic care, and coinciding with the outpatient interim COVID-19 guidelines,<sup>12</sup> the OWIC patient inclusion criteria included patients with less than one month's history of new onset of musculoskeletal pain, infection, fall or injury, fracture, dislocation, or effusion. Exclusion criteria included patients both with injuries that were too severe for our clinic as well as those that were chronic. Patients with severe injuries sent directly to the ED included polytrauma, open fractures (except for Gustilo-Anderson Grade I open fractures of the upper extremity), and patients transported by Emergency Medical Services (EMS). Patients who were suffering from chronic complaints of greater than one month were also excluded from the OWICs, and instead were consulted via telemedicine at a later date. The orthopaedic surgeon overseeing the clinic made the final decision on whether a patient was acceptable to be seen in the OWIC or needed to be sent to the ED. Patients who had a proven diagnosis of COVID-19 were also excluded and sent directly to the ED.

Most of the supplies, equipment, and facilities needed to open the OWICs were already available on site, including on-site radiology, a minor procedure room, and supplies for essential procedures such as local anesthetics and hematoma blocks. Some additional supplies were deemed necessary for operation: a mini C-arm for fracture or dislocation reductions was reallocated from the outpatient surgery center; intramuscular ketorolac and oral opiate medications were stocked in in-clinic dispensary; and miscellaneous supplies such as suture kits were brought on-site.

The OWICs were advertised across the region using social media, the hospital website, posters, and print and radio broadcasting. Local and affiliated Primary Care Practices and Express Care locations were announced at organizational meetings, which became a major source of referrals. No patients were redirected to the OWICs after arriving at the ED, due to concern that this could violate the Emergency Medical Treatment and Labor Act (EMTALA).

Patients were initially triaged on arrival to the OWICs and asked a set of six COVID-19 symptom-related questions upon entering the building [Table 1]. Patients who answered negatively to all screening questions were seen with normal precautions. Patients who answered positively to any of the screening questions, or who exhibited signs or

**Table 1**  
COVID-19 screening criteria on arrival to OWICs.

Question 1	Low grade fever?
Question 2	Sore throat?
Question 3	Mild cough?
Question 4	Red itchy eyes?
Question 5	International or domestic travel in the last 30 days?
Question 6	Exposure to anyone known to be COVID-19 positive?

symptoms of COVID-19, were masked and seen by staff in gloves, mask, gown, and eye protection. Following initial screening, patients were brought to an examination room and seen by a RN, PA or NP triage staff, where their vitals were taken and they were assessed for urgency of orthopaedic complaints.

Once a patient was deemed appropriate for the OWIC, a brief history was obtained by the triage staff and then referred to the provider (PA, NP, or orthopaedic surgeon). The provider examined and treated the patient as necessary, with access to onsite radiology, splinting, and casting capabilities, and same-day physical therapy referrals. If the patient required admission for treatment, a clear plan was created to bring the patient to the hospital with minimal exposure and use of resources.

The preliminary outcome of our intervention was measured by studying the number of non-emergency outpatient orthopaedic surgery referrals that were created by the ED both before and after the initiation of the OWICs. Referral numbers from the 11 weeks prior to the initiation of the intervention were used as controls (January 6 to March 22, 2020). At the time of writing, data from 6 full weeks of clinic were available (March 23 to May 3, 2020). Statistical analysis of the number of referrals from the ED to the orthopaedic department was performed with Microsoft Excel software (Redmond, Washington) and Student t-tests were used to calculate significance of data.

## 3. Results

The clinic was initiated Monday, March 23, 2020. In the 11 weeks prior to the OWICs initiation, the orthopedic department was referred an average of 53 patients per week from the ED with non-emergency orthopaedic surgical complaints [Table 2].

Since March 23, 2020, an average of 55.5 patients per week sought urgent orthopaedic care, presenting both to the ED and the OWIC. This included an average of 34 patients per week who presented to the OWIC [Table 3], and an average of 21.5 patients per week who were referred from the ED [Table 3].

Referrals of non-emergency orthopaedic patients from the ED decreased from a historical average of 53 patients per week to 21.5 patients per week after initiation of the OWIC, a decrease to 40.6% of previous. This is a statistically significant difference ( $p < 0.001$ ).

The overall number of patients seeking urgent orthopaedic care

**Table 2**  
Number of patients referred from the ED prior to initiation of OWICs.

Week	ED Referrals
January 6, 2020	61
January 13, 2020	52
January 20, 2020	51
January 27, 2020	58
February 3, 2020	54
February 10, 2020	48
February 17, 2020	60
February 24, 2020	58
March 2, 2020	53
March 9, 2020	48
March 16, 2020	40
<b>Mean</b>	<b>53</b>

**Table 3**  
Number of patients referred from ED and number of patients seen in OWICs following initiation of OWICs.

Week	ED Referrals	OWICs Patients	Total
March 23, 2020	17	40	57
March 30, 2020	21	28	49
April 6, 2020	18	39	57
April 13, 2020	28	25	53
April 20, 2020	26	41	67
April 27, 2020	19	31	50
<b>Mean</b>	<b>21.5</b>	<b>34</b>	<b>55.5</b>

(both at the ED and the OWIC) remained stable from a historical average of 53 patients per week to an average of 55.5 patients per week after initiation of the OWIC, an increase to 105% of previous [Fig. 1]. This is a non-statistically significant difference ( $p = 0.463$ ).

#### 4. Discussion

With the goal of providing patients with high-quality orthopaedic care and minimizing patients’ risk of exposure to COVID-19, two OWICs were implemented to offload the burden from the ED to an outpatient clinic during the pandemic. In preliminary results, the OWICs provided for urgent orthopaedic patients to be seen safely and in a timely manner. The clinical management protocol included patient triaging, examining, treating, and scheduling follow-up all within the same visit. With a decreased number of scheduled surgeries in the department, the orthopaedic group at the hospital system was able to adapt quickly and rearrange staff schedules to operate two fully staffed OWICs.

While the number of referrals from the ED to the orthopaedic department has decreased during the COVID-19 pandemic, overall the weekly number of patients who sought orthopaedic emergency care at our hospital remained similar, both before and after the OWICs were established.

During the 6 weeks that the clinics have been open, the referral volume from the ED decreased, while a weekly average of 34 patients presented to the OWICs. These data showed a statistically significant decrease in the number of referrals, although our study did not show direct evidence that the patients who presented to the OWIC were patients who would have otherwise presented to the ED. The ban on non-essential travel outside the home may have contributed to lower orthopaedic presentations to the ED, and this may be a confounding factor in our study.

Through this preliminary work, we showed that the OWICs are

associated with a statistically significant decrease in the number of musculoskeletal referrals made from the ED, allowing redirection of staff and resources to better address the COVID-19 surge. Additionally, we demonstrated that it is possible to rapidly develop an OWIC using existing resources found at most orthopaedic surgery clinics. We also illustrated how a number of staff at an orthopaedic surgery clinic may be repurposed during a time of severely diminished elective patient care.

There were several limitations to our report. First, the preliminary sample size and length of the study were small. The study included 6 weeks of data from the OWICs, and 11 weeks of historical data from the ED, limiting the current work to a preliminary evaluation. However, given the timing and acute nature of this evolving situation, these preliminary data were useful for addressing current hospital response strategies and providing the basis for a long-term and larger study. Second, the OWICs were set up in semi-rural parts of Maine. Given Maine’s relatively low number of cases of coronavirus, this model may not be generalizable to hospitals in larger cities that have been more affected by COVID-19. However, the threat of overburdened healthcare systems and lack of medical resources are universal, and the OWICs demonstrated how EDs can allocate the supply of PPE and other scarce medical equipment for COVID-19 cases. Third, although the orthopaedic clinics developed at our hospital could potentially serve as models for other hospitals across specialties and regions, they are not the only systems to set up specialized emergency clinics during the COVID-19 pandemic; temporary surge clinics have been built across communities in response to the crisis.<sup>8,13</sup> Fourth, these clinics are associated with the need for additional resources that might not be available to other facilities.

Despite the limitations, we believe that the OWICs could continue to benefit the community beyond the duration of the COVID-19 pandemic. If additional specialty providers created their own clinics to relieve the pressure on the ED, the benefits could be augmented. When transitioning back to reopening the clinic and offices, our orthopaedic department has planned to continue the OWICs as a community resource, staffing it with a PA or NP and non-operative sports medicine physicians in consultation with orthopaedic surgeons during standard office times and after hours.

The OWICs, created in response to the pandemic, have become an integral component of our hospital’s strategy to lessen the burden of musculoskeletal cases on the ED and to better focus resources on those affected by the pandemic. The OWICs could potentially serve as a model for other orthopaedic, surgical, and medical subspecialty clinics both during and after the COVID-19 pandemic. The results of this study were preliminary but consistent with recently published work

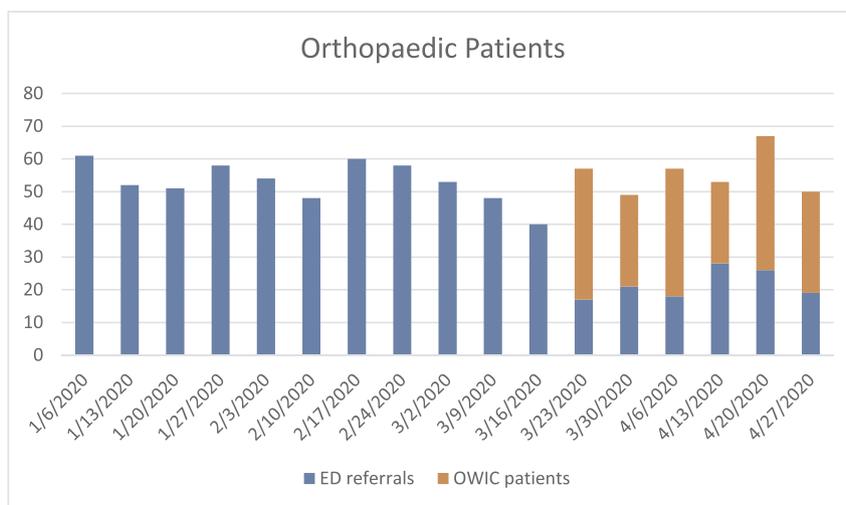


Fig. 1. Number of patients referred from ED and number of patients seen in OWICs.

evaluating the benefits of surge clinics during the pandemic. Further investigation with a larger cohort of patients over a longer period of time will determine the longitudinal efficacy of the clinics.

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### CRediT authorship contribution statement

**Madeline C. MacKechnie:** Conceptualization, Writing - original draft, Writing - review & editing, Visualization, Formal analysis. **Molly Nadeau:** Conceptualization, Data curation, Project administration, Writing - original draft, Writing - review & editing. **Ericka Deering:** Conceptualization, Data curation, Project administration, Writing - original draft, Writing - review & editing. **John Thaller:** Conceptualization, Investigation, Supervision. **Michael A. MacKechnie:** Conceptualization, Methodology, Investigation, Visualization, Writing - original draft, Writing - review & editing, Supervision, Formal analysis.

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