

# Evaluating musculoskeletal urgent care center triage and transfer of emergency conditions for emergency surgical assessment and intervention

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## Abstract

Musculoskeletal urgent care centers (MUCCs) are an alternative to emergency departments (EDs) for patients to seek care for low acuity orthopedic injuries such as ankle sprains or joint pain, but are not equipped to manage orthopedic emergencies that require a higher level of care provided in the ED. This study aims to evaluate telephone and online triage practices as well as ED transfer procedures for MUCCs for patients presenting with an orthopedic condition requiring urgent surgical intervention. We called 595 MUCCs using a standardized script presenting as a critical patient with symptoms of lower extremity compartment syndrome. We compared direct ED referral frequency and triage frequency for MUCCs for patients insured by either Medicaid or by private insurance. We found that patients presenting with an apparent compartment syndrome were directly referred to the ED by < 1 in 5 MUCCs. Additionally, < 5% of patients were asked additional triage questions that would increase clinician suspicion for compartment syndrome and allow MUCCs to appropriately direct patients to the ED. MUCCs provide limited telephone and online triage for patients, which may result in delays of care for life or limb threatening injuries that require ED resources such as sedation, reductions, and emergency surgery. However, when MUCCs did conduct triage, it significantly increased the likelihood that patients were appropriately referred to the ED. *Level of Evidence:* Level II, prognostic study.

**Abbreviations:** ED = emergency department, LECS = lower extremity compartment syndrome, MUCC = musculoskeletal urgent care center, UCC = urgent care center.

**Keywords:** triage; musculoskeletal urgent care; compartment syndrome; orthopaedic emergencies; online resources

## 1. Introduction

Musculoskeletal urgent care centers (MUCCs) have become more prevalent in recent years as they have demonstrated reduced waiting times and cost of care when compared to the emergency department (ED).<sup>[1]</sup> MUCCs also increase access to specialty providers, as many MUCCs are owned and operated privately by orthopedic surgeons.<sup>[2]</sup> Accessing orthopedic specialists in the ED setting can be challenging and approximately 25% of visits to the ED are due to diseases of the musculoskeletal system or musculoskeletal injuries.<sup>[3,4]</sup> However, many MUCCs restrict access to patients based on insurance type which may limit care options for patients.<sup>[2,5]</sup>

Prior research has demonstrated that urgent care centers (UCCs) may delay care for patients presenting with emergent surgical conditions.<sup>[6]</sup> Limited research has explored how MUCCs affect treatment for emergent orthopedic conditions, and how they institute triage protocols. Our group aims to explore care pathways and investigate the effects of triage and patient insurance type by using a secret shopper scenario for a patient presenting with signs and symptoms of lower extremity compartment syndrome (LECS) to a MUCC. This builds on the study by Hsiang et al<sup>[6]</sup> by our research

group and seeks to compare treatment principles between UCCs and MUCCs. Compartment syndrome is an orthopedic emergency that requires immediate surgical evaluation given the high risk for patient morbidity and mortality.<sup>[7,8]</sup> While many orthopedic surgeons consider compartment syndrome a clinical condition that requires emergency surgery, it is often missed as a diagnosis.<sup>[9]</sup> LECS can be caused by a variety of injuries including fractures (especially of the tibia), soft tissue injuries such as blunt trauma and crush injuries, and vascular injuries.<sup>[10]</sup> As LECS requires an urgent fasciotomy to improve patient outcomes, MUCCs do not provide the necessary level of care to treat LECS.<sup>[7,11]</sup> This study aims to evaluate telephone and online triage practices as well as ED transfer procedures for MUCCs for patients presenting with an orthopedic condition requiring urgent surgical intervention.

## 2. Methods

### 2.1. Study design and setting

We used a cross-sectional secret shopper methodology for our study that has been previously described in the literature.<sup>[2,5,6]</sup>

The authors have no funding and conflicts of interest to disclose.

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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to investigate MUCC access. In June 2021, our study population was determined and included MUCCs in the United States located using Google Search and Google Maps (Mountain View, CA). We used the phrases “XX musculoskeletal urgent care,” “XX orthopedic urgent care,” and “XX MSK urgent care,” where XX was replaced with the 2-letter state postal abbreviation. We utilized this approach as we believe it most closely replicates what a patient seeking urgent musculoskeletal care may search in order to find nearby providers.

**2.2. Participants/study subjects**

The classification of a MUCC was a clinic that had same-day appointments or walk-in appointments. Orthopedic surgical centers that offered to schedule appointments the next day or the day after were excluded. We excluded general UCCs and orthopedic clinic offices. We found a total of 624 MUCCs in 49 states, excluding Delaware which had no MUCCs. We then removed clinics that were determined not to be MUCCs during our initial phone call, with 595 MUCCs remaining in 48 different states (Vermont did not have any open MUCCs).

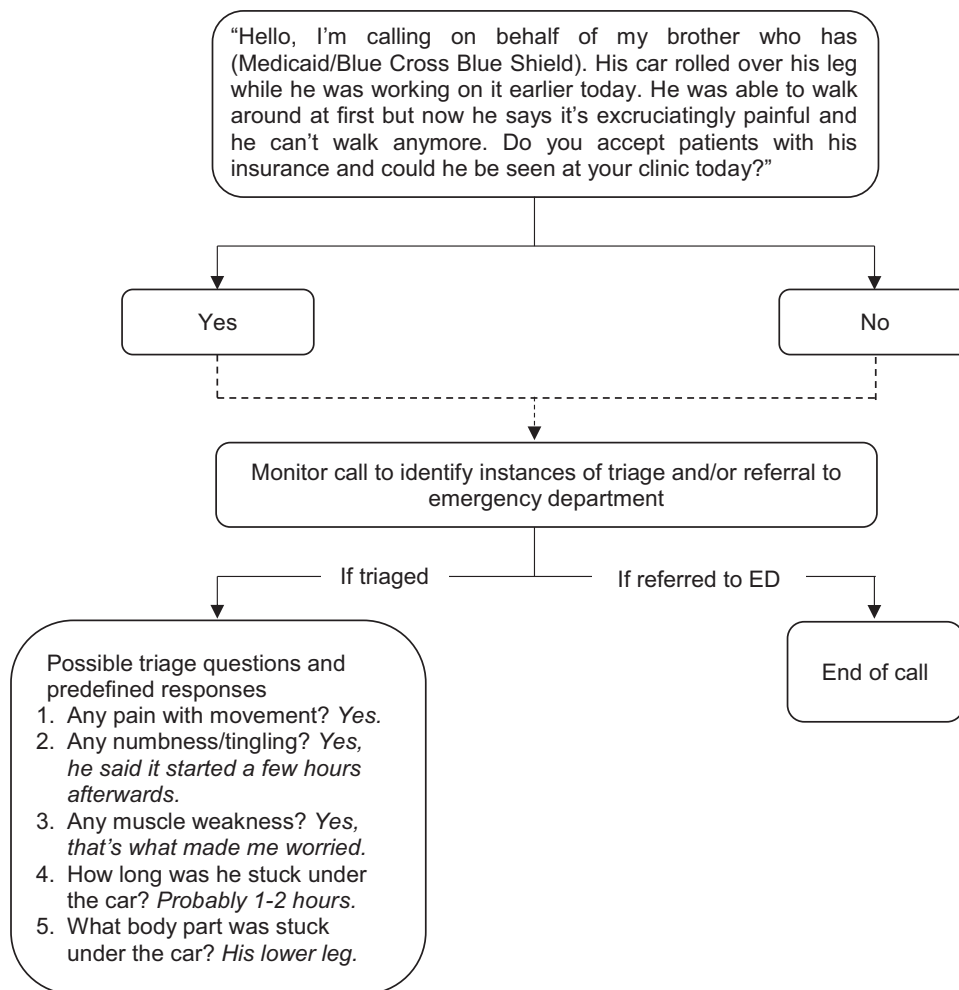
**2.3. Description of experiment, treatment, or surgery**

Trained investigators used a standardized script to call MUCCs posing as a family member of a fictitious patient who presented following an injury with symptoms of LECS (Fig. 1). All calls were made from a caller-ID blocked phone number and initial calls were

observed to ensure that the script was followed. Several practicing orthopedic surgeons with significant experience caring for patients at MUCCs and EDs designed and validated the scenario to be similar to realistic encounters they have observed. The scenario was designed to raise suspicion for compartment syndrome as it was a lower extremity crush injury. The secret shopper design was chosen as we believed that patients may be resistant to call 911 given the perceived high cost of using an ambulance. In addition, underinsured or uninsured patients may be hesitant to seek care at the ED if they are concerned about long wait times or future medical bills. Compartment syndrome was chosen as the injury pathology as it has certain symptom clusters that are pathognomonic of its presentation, and it is an injury that we believed would be easily recognizable if triage questions were asked. Each MUCC was called twice, once with the fictional patient insured by a private company (Blue Cross Blue Shield) and once with the patient insured by Medicaid or Medicaid Managed Care. Investigators were instructed to initially say Medicaid but clarify with the region’s most common Medicaid Managed Care plan if asked. The same scenario was used for each call and each call was made at least 2 weeks apart to reduce potential bias from inter- and intra-office variation. At the end of each call, it was made clear to each MUCC operative that the fictional patient would not be coming in for an appointment.

**2.4. Variables, outcome measures, data sources, and bias**

For each call, the investigator collected if the MUCC accepted the patient’s insurance type, if the MUCC operator conducted



**Figure 1.** Standardized call script for secret shopper calls to musculoskeletal urgent care centers.

triage, and if the patient was referred to the ED. Triage was classified as any time when a nonclinician staff member (e.g., receptionist) consulted any type of clinician, including nurse, physician assistant, advanced practice registered nurse, or physician, regarding the patient’s symptoms. Triage also included any time that the investigator spoke directly to a clinician (nurse, physician assistant, advanced practice registered nurse, or physician) regarding the patient’s symptoms. Common triage questions were given predefined responses (Fig. 1) and for any other questions the investigator replied “I’m not sure.” ED referral was classified as any time a staff member told the patient to go to the ED without coming to the MUCC. In our study, patients could be asked additional triage questions without being referred to the ED or patients could be referred to the ED without being asked additional triage questions (Fig. 2). If a MUCC said they accepted Medicaid only with a referral from a primary care provider, this response was classified as not accepting Medicaid given that the scenario presented was an emergency that would not allow time to coordinate a referral from a primary care office. Investigators never mentioned triage or referral to the ED during the calls. We obtained responses from 595 MUCCs.

Individual MUCCs were classified according to their affiliation as either nonaffiliated (without a connection to a hospital or practice), extension (a MUCC associated with a private practice or nonacademic hospital), or academic (associated with a teaching hospital). They were also classified according to their region (Northeast, South, Midwest, West) to determine if these factors were associated with MUCC ED referral frequency.

To determine data on online resources for triage at MUCCs, we searched for resources in all pages and subsections of each MUCC website. For each website we collected the following yes/no variables: presence of a Chat Bot, walk-in wait time, ability to schedule appointments through the website, presence of a triage checklist, and list of treated injuries/services. A triage checklist was defined as the presence of detailed instructions explaining when a patient should go to the emergency room versus a MUCC. As some MUCC websites had multiple locations listed and patients would be able to access the MUCC website through different location-specific search terms, we included all MUCC locations in our analyses. Any MUCCs for which we were unable to collect data were excluded from this portion of the study.

**2.5. Primary and secondary study outcomes**

Our primary goal was to determine what proportion of MUCCs referred patients to the ED presenting with symptoms of LECS requiring urgent surgical intervention. To achieve this, we calculated the proportion of MUCCs that appropriately referred patients to the ED during the secret shopper call. To further

investigate what factors were associated with ED referral, we investigated the affiliation, geographic region, and cash payment price of each MUCC as well as the insurance coverage provider of the secret shopper patient.

Our secondary study goals were to determine the proportion of MUCCs that asked patients additional triage questions, independent of the patient being referred to the ED, and if asking additional triage questions was associated with patient referral to the ED. This was assessed through the secret shopper phone calls that were made by our team. An additional secondary study goal was to assess the availability of triage resources on MUCC websites.

**2.6. Ethical approval**

Our study design was reviewed by our institution’s Institutional Review Board and received an exemption waiver as our results may have been biased if providers were aware that they were involved in a study.

**2.7. Statistical analysis**

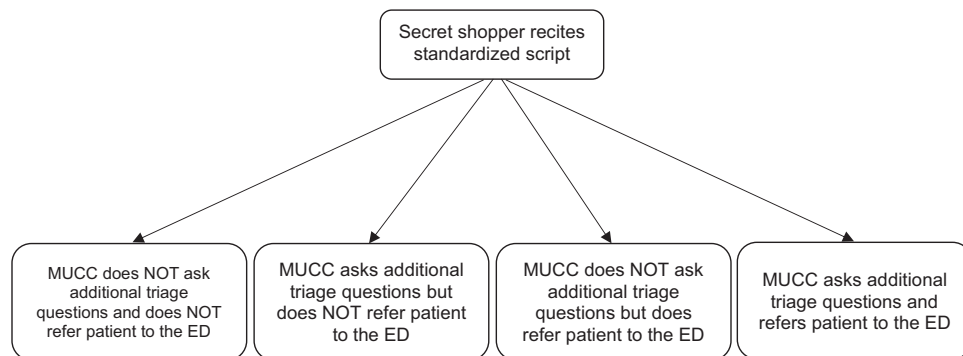
Statistical analyses were performed using JMP Pro Version 13 (Cary, NC). Chi-square tests were used to examine ED referral frequency and triage frequency for patients with Medicaid and patients with private insurance. Univariate logistic regression was used to investigate factors associated with ED referrals at MUCCs that accepted both Medicaid and private insurance.

**3. Results**

The majority of MUCCs in our sample were affiliated with private practices or nonacademic hospitals (86%, 514/595), located in the South (36%, 217/595), accepted Medicaid (69%, 412/595), and accepted private insurance (99%, 588/595) (Table 1). We found no open MUCCs in Vermont and Delaware and included 595 total MUCCs in 48 states.

At the 595 MUCCs included in our study, 18% (107/595) directly referred patients with Medicaid to the ED and 10% (57/595) directly referred patients with private insurance to the ED who presented with symptoms of LECS requiring urgent surgical intervention (Table 2). At the 407 (68%, 407/595) MUCCs that accepted both Medicaid and private insurance, 7% (27/407) of patients with Medicaid and 11% (45/407) of patients with private insurance were referred directly to the ED (Table 2). Patients with Medicaid were less likely to be referred to the ED than patients with private insurance at MUCCs that accepted both Medicaid and private insurance (OR = 0.57, 95% CI 0.35–0.94, P = .03).

At the 595 MUCCs included in our study, 5% (28/595) of patients with Medicaid and 3% (17/595) of patients with



**Figure 2.** Possible outcomes for secret shopper calls to musculoskeletal urgent care centers.

**Table 1**  
**Characteristics of all musculoskeletal urgent care centers (n = 595).**

		N (%)
Classification n (%)	Not affiliated	36 (6%)
	Academic hospital	45 (8%)
	Private practice	514 (86%)
Region n (%)	Northeast	140 (24%)
	Midwest	149 (25%)
	South	217 (36%)
	West	89 (15%)
Medicaid acceptance n (%)	Yes	412 (69%)
	No	183 (31%)
Private insurance acceptance, n (%)	Yes	588 (99%)
	No	7 (1%)

**Table 2**  
**Emergency department referral frequency at musculoskeletal urgent care centers.**

		Medicaid	Private
		n (%)	n (%)
<b>All musculoskeletal urgent care centers</b>			
Direct ED referral n = 595	Yes	107 (18%)	57 (10%)
	No	488 (82%)	538 (90%)
ED referral after triagea	Yes	6 (21%)	8 (47%)
	No	22 (79%)	9 (53%)
<b>Musculoskeletal urgent care centers that accept both Medicaid and private insurance</b>			
Direct ED referral n = 407	Yes	27 (7%)	45 (11%)
	No	380 (93%)	362 (89%)
ED referral after triageb	Yes	6 (23%)	4 (36%)
	No	20 (77%)	7 (64%)

ED = emergency department.

<sup>a</sup>n = 28 for Medicaid ED Referral After Triage and n = 17 for Private ED Referral After Triage.

<sup>b</sup>n = 26 for Medicaid ED Referral After Triage, n = 11 for Private ED Referral after Triage.

private insurance were triaged (Table 3). When considering MUCCs that accepted both Medicaid and private insurance, 6% (26/407) of patients with Medicaid and 3% (11/407) of patients with private insurance were triaged by a clinician provider (Table 3). Patients with Medicaid were over twice as likely to be triaged than patients with private insurance (OR = 2.46, 95% CI 1.20–5.04, *P* = .01).

ED referral frequency was compared before and after triage at the MUCCs that accepted both Medicaid and private insurance. After triage, the ED referral frequency for patients with Medicaid was 23% (6/26) and the frequency for patients with private insurance was 36% (4/11) (Table 2). Patients with Medicaid were over 4 times more likely to be referred to the ED after triage compared to before triage (OR = 4.22, 95% CI 1.57–11.39, *P* = .002). Patients with private insurance were also over 4 times more likely to be referred to the ED after triage compared to before triage (OR = 4.60, 95% CI 1.29–16.32, *P* = .01). ED referral frequency after triage was not significantly difference between patients with Medicaid and patients with private insurance (OR = 0.53, 95% CI 0.11–2.42, *P* = .41).

We found that neither the classification of the MUCC (*P* = .51) nor the region of the MUCC (*P* = .27) was associated with the frequency of ED referral for patients with Medicaid at MUCCs that accepted both Medicaid and private insurance (Table 4). For patients with private insurance at MUCCs that accepted both Medicaid and private insurance, region was associated with the frequency of ED referral (*P* = .0002) with MUCCs in the Midwest, South, and West being less likely to refer patients to the ED compared with MUCCs in the Northeast (Table 5).

MUCC classification was not associated with the frequency of ED referrals (*P* = .44) (Table 5).

Almost all MUCC websites provided a list of treated injuries/services (99%, 586/592) and most allowed patients to schedule an appointment on the website directly (81%, 480/592) (Table 6). Very few MUCCs provided patients with resources to help with triage such as a checklist that informed patients when they should go to the emergency department (12%, 73/592). Some offered a chat bot to aid in triage and patient questions (10%, 56/592). Three percent (19/592) of MUCC websites provided a walk-in wait time estimate (Table 6).

#### 4. Discussion

MUCCs are an important part of the care landscape for orthopedic injuries as they offer patients reduced wait times and decreased cost of care as opposed to the ED.<sup>[1]</sup> Limited research has been done on patient care practices for MUCCs. Our study investigates how MUCCs manage patients presenting with symptoms of apparent LECS, which requires emergency surgical intervention. We found that patients presenting with an apparent compartment syndrome were directly referred to the ED by < 1 in 5 MUCCs. Additionally, < 5% of patients were asked additional triage questions that would increase clinician suspicion for compartment syndrome and allow MUCCs to appropriately direct patients to the ED. However, when triage was performed, it substantially increased the likelihood that a patient was referred to the ED for both patients with Medicaid and patients with private insurance.

Less than 20% of MUCCs appropriately directed patients to the ED when they presented with symptoms of LECS which requires surgical intervention. Similar findings with UCCs were described by Hsiang et al demonstrating that UCCs and MUCCs may have limited telephone triage practices in place to determine where patients should seek care.<sup>[6]</sup> The study by Hsiang et al<sup>[6]</sup> employed a secret shopper design and called UCCs posing as a patient with an emergent surgical complaint, an incarcerated hernia causing a small bowel obstruction. As with our study, a patient presenting with an emergent surgical condition was often told to come directly to a UCC as opposed to the ED and patients were only referred to the ED a third of the time. We hypothesize that these delays in care may be catastrophic for patients and lead to worse outcomes, especially as early fasciotomy leads to improved outcomes for compartment syndrome.<sup>[11]</sup> Additionally, delayed diagnosis of compartment syndrome may lead to complex medical-legal liability that may cause an increased financial burden for orthopedic practices.<sup>[12]</sup>

We found that < 5% of MUCCs triaged patients in our secret shopper scenario. Triage questions can reveal clinical details that patients may not find important or may not initially mention. Hsiang et al found that patients who were triaged were more likely to be referred to the ED when presenting with a surgical emergency, demonstrating that triage questions can help highlight the clinical urgency of a situation.<sup>[6]</sup> Our results demonstrate the importance of MUCCs implementing a standardized triage protocol to ensure that patients who require immediate medical attention are not encouraged to first present to a MUCC, which may have insufficient resources to allow care for their condition. Triage questions that would reveal musculoskeletal emergency scenarios such as numbness and tingling, muscle weakness, and loss of bladder or bowel control should be routinely asked prior to advising patients where to seek care.

We found that triage did substantially improve the likelihood of referral to the ED. This replicates the findings of Hsiang et al.<sup>[6]</sup> As triage has been found to increase ED referral likelihood, a short set of triage questions should be implemented by MUCCs to ensure that patients seek care at the appropriate care setting. Strudwick et al<sup>[13–18]</sup> published a series of papers recommending history questions and red flags for a variety of orthopedic conditions, however no simple set of triage questions

**Table 3**  
Triage frequency and provider at musculoskeletal urgent care centers that accept both Medicaid and private insurance.

		Medicaid	Private
		n (%)	n (%)
<b>All musculoskeletal urgent care centers</b>			
Patient triage	Yes	28 (5%)	17 (3%)
n = 595	No	567 (95%)	578 (97%)
Triage providera	Doctor	5 (18%)	4 (24%)
	PA/APRN	6 (21%)	5 (29%)
	Other	17 (61%)	8 (47%)
<b>Musculoskeletal urgent care centers that accept both Medicaid and private insurance</b>			
Patient triage	Yes	26 (6%)	11 (3%)
n = 407	No	381 (94%)	396 (97%)
Triage providerb	Doctor	5 (19%)	4 (36%)
	PA/APRN	6 (23%)	1 (9%)
	Other	15 (58%)	6 (55%)

APRN = advanced practice registered nurse, PA = physician assistant.

a n = 28 for Medicaid Triage Provider and n = 17 for Private Insurance Triage Provider.

b n = 26 for Medicaid Triage Provider and n = 11 for Private Insurance Triage Provider.

**Table 4**  
Factors associated with direct Medicaid emergency department referral frequency at musculoskeletal urgent care centers that accept both Medicaid and private insurance.

		Odds ratio
		[95% CI]
Classification	Not affiliated (n = 21)	Ref
	Academic hospital (n = 39)	0.53 [0.03, 8.87]
	Private practice (n = 347)	1.55 [0.20, 12.05]
Region	Northeast (n = 87)	Ref
	Midwest (n = 117)	0.53 [0.18, 1.60]
	South (n = 129)	0.92 [0.35, 2.39]
	West (n = 74)	0.27 [0.06, 1.33]

**Table 5**  
Factors associated with direct private insurance emergency department referral frequency at musculoskeletal urgent care centers that accept both Medicaid and private insurance.

		Odds ratio
		[95% CI]
Classification	Not affiliated (n = 21)	Ref
	Academic hospital (n = 39)	0.51 [0.07, 3.94]
	Private practice (n = 347)	1.27 [0.29, 5.67]
Regiona	Northeast (n = 87)	Ref
	Midwest (n = 117)	0.28 [0.12, 0.65]
	South (n = 129)	0.41 [0.19, 0.86]
	West (n = 74)	0.09 [0.02, 0.41]

a P = .0002.

has been recommended for use in the MUCC setting. While we do not expect a receptionist to perform a detailed history over the phone, we recommend that a short set of triage questions be utilized to prevent delays in care caused by directing patients to a MUCC instead of the ED. Further studies should be performed to develop a list of triage questions that could be utilized in this setting.

We did not find any associations between ED referral frequency and MUCC classification or region for patients with

Medicaid. Hsiang et al<sup>61</sup> found that patients with Medicaid were more likely to be referred to the ED at privately affiliated UCCs. It is possible that MUCCs are less likely to exhibit this bias, however given the overall low number of patients referred to the ED in our study, it is more likely that we had insufficient data to determine this. For patients with private insurance, we found that MUCCs in the Northeast were more likely to refer patients to the ED. This may be due to the relative paucity of MUCCs in the Northeast as these MUCCs may not feel equipped to handle as many patients as MUCCs in the Midwest or South. However, we were unable to assess the treatment or training capabilities of individual MUCCs.

Triage resources that advised patients on where they should seek care (ED versus MUCC) were limited. No prior research has been conducted regarding patient triage resources available on MUCC websites. Throughout the COVID-19 pandemic, self-triage using web applications has become more common.<sup>119</sup> These self-triage applications reduced the burden of calls to emergency centers while ensuring patients who needed a higher level of care were appropriately referred to the hospital.<sup>119</sup> However, this may not be a valid comparison given that the public was inundated with information regarding COVID-19 and information regarding musculoskeletal injuries is less available. Additionally, the sophistication of chat bots and self-triage applications may vary, and it is possible that the presence of a chat bot or virtual assistant will not be associated with improved triage decisions for patients. If MUCCs employ a similar model, self-triage applications may help patients understand when it is necessary to go directly to the ED as opposed to initially presenting at a MUCC. This is especially true for orthopedic emergencies that require immediate care such as compartment syndrome, open fractures, and cauda equina syndrome.<sup>120-221</sup> Though the presence of online triage resources does not guarantee patient compliance with these resources, providing patients with additional knowledge may assist patients in making informed decisions.

#### 4.1. Limitations

Our study has several limitations. First, as no centralized database for MUCCs exists, it is possible that we missed some MUCC locations. We feel that our search was comprehensive and encompassed all MUCCs that could be found on the internet. Additionally, we were able to compare our list with the list of MUCCs found by Yousman et al<sup>121</sup> which provided another method to ensure all possible MUCCs were captured in our search. Second, as a receptionist was often the person answering the phone, they were responsible for the decision to triage or refer directly to the ED. We cannot control for the level of training each receptionist received regarding patient care or if established protocols existed at each MUCC for how nonclinician staff should handle calls of this type. However, we believe that this best simulates what a patient would experience in the real-world setting. In addition, while in-person triage may have been more accurate as many MUCCs may have transfer protocols for the ED, it would not be feasible to implement a study of this design in person given the nature of the injury in the scenario. Third, while we attempted to call at fairly consistent times for each MUCC, it is possible that the timing of the call could impact referral rate or triage decision. Again, this simulates the real-world uncertainty that a patient would experience when attempting to contact a MUCC in an emergency. Fourth, we were unable to assess direct patient outcomes as our study involved a simulated patient. This study provides an overview regarding the scope of triage practices and future studies could further evaluate patient outcomes. Fifth, each website had a different layout and presented information in a unique manner. It is possible that some triage resources were missed in our review. To combat this potential bias all tabs and sections were investigated to make sure our data represented what was provided by the MUCC websites.

Table 6

## Online resources on musculoskeletal urgent care center websites across the United States.

	Overall (n = 592)	Northeast (N = 138)	Midwest (N = 149)	South (N = 217)	West (N = 88)
<b>Triage resources</b>					
List of treated injuries and services	586 (99%)	134 (97%)	149 (100%)	216 (100%)	87 (99%)
Online appointment scheduling	480 (81%)	112 (81%)	134 (90%)	183 (84%)	51 (58%)
Triage checklist	73 (12%)	18 (13%)	27 (18%)	18 (8%)	10 (11%)
Virtual assistant/chat bot	56 (10%)	17 (12%)	14 (9%)	19 (9%)	6 (7%)
Walk-in wait time	19 (3%)	6 (4%)	10 (7%)	2 (1%)	1 (1%)

## 5. Conclusions

Our study demonstrated that MUCCs did not appropriately refer patients to the ED when presenting with a surgical emergency and rarely triaged patients either on the telephone or online. Triage, when it was performed, substantially improved the likelihood of referral to the ED. MUCCs can help alleviate the burden of care for EDs by treating patients that have low-acuity conditions that can be properly managed outside of the ED setting. We recommend that future studies develop and evaluate the use of standardized triage protocols and their impact on patient care.

## Author contributions

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**Writing – original draft:** Chloe C. Dlott, Tanner Metcalfe.

**Writing – review & editing:** Chloe C. Dlott, Tanner Metcalfe, Akshay Khunte, Sanjana Jain, Anchal Bahel, Walter R. Hsiang, Claire A. Donnelley, Jehanzeb Kayani, Daniel H. Wiznia.

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