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**ABSTRACT TITLE:** Kung Fu Fighting - An Epidemiological Study of Martial Arts Injuries in Patients Presenting to US Emergency Rooms

### **INTRODUCTION**

With the advent of mixed martial arts (MMA) growing in popularity since the early 2000s, with notable publicized promotions such as Ultimate Fighting Championship (UFC) and K-1 Pride Fighting Championship, there has been a described increase in martial arts participation internationally. The term MMA generally describes the hybridization of multiple combat disciplines including but not limited to: karate, judo, jiu-jitsu, wrestling, taekwondo, boxing, kickboxing, and muay thai. With increased participation in MMA and martial arts of various disciplines, differing physical demands are placed on participants than are observed with traditional sports given the complex interdisciplinary demands. Due to the physical nature of combat sports, there are expected resultant injuries associated with participation. The purpose of this study is to report the incidence and characteristics of injuries seen from various martial art disciplines in order to educate participants and providers alike about risks assumed with participating in martial arts.

### **METHODS**

The National Electronic Injury Surveillance System (NEISS) database was queried for martial arts-related injuries from 2010-2019. Cases were examined and data including patient age and gender, injury type and location, hospital disposition, and type of martial arts practiced were extracted.

### **RESULTS**

A total of 8,447 injuries were recorded, leading to a national estimate of 310,143 martial-arts related injuries over the 10 year period of 2010-2019 (95% CI 239,063-381,223). The most common types of injuries were strains/sprains (n=2,385, 28.2%), fractures (n=1,577, 18.7%), and contusions/abrasions (n=1,348, 16.0%). There were 260 dislocations, with shoulder dislocations being most common (n=96, 36.9%). Lower extremities were affected more frequently than upper extremities (n=3,093, 36.6% versus n=2,402, 28.4%), with the knee being the single most common location of injury (n=817, 9.7%). Males more commonly sustained fractures (19.6% versus 17.4%, p=0.03) and dislocations (3.4% versus 2.4%, p=0.01) when compared to females. Ankle injuries were more common in females than males (10.4% versus 6.0%, p<0.001). Only 2.2% of patients required admission to the hospital. Risk factors for admission included patients >35 years of age and male sex.

## **DISCUSSION and CONCLUSION**

Martial arts injuries are a significant source of musculoskeletal injuries among patients presenting to US emergency rooms, as popularity for the sport increases. Market research estimates that 18.1 million Americans practiced some form of martial arts in 2010, and of those 8.7 million were kids [Simmons Market Research]. Young adults are especially at risk, with an average patient age of 23.2 and most frequent patient age of 13. Lower extremity injuries are seen most frequently, with patients rarely requiring hospital admission. Although injury patterns differ from other popular contact sports such as American football or rugby, injury incidence is comparable. With participation in martial arts increasing alongside popularity of the sport, it is important for participants and treating providers to understand these injury patterns. Using this information, both providers and participants may be better equipped to make educated decisions on injury prevention and treatment.