

position. After each UOF event, the arresting officer would be required to submit a data collection form. Data collected included whether the subject was agitated, resisting arrest, the level of resistance the subject demonstrated and how long the subject resisted for after being placed in his final restraining position. Documentation also included whether or not the subject and any deputies were injured and if so what was the extent of the treatment were noted. Characteristics of the subject were also reported such as perceived intoxication, substance use or mental illness.

Study location and population

The SDSO sworn staff operate in the field setting covering approximately 4200 square miles with a population in San Diego County of 3.2 million people. The SDSO also operates in the County's six jail detention facilities that collectively have an average daily census in excess of 5000 inmates and over 100,000 bookings a year. The SDSO employs approximately 4200 staff of which 1200 are assigned to the law enforcement bureau and respond to over 200,000 911 calls annually and another half million that are non-emergency.

Human subject's approval

Human subjects' committee approval was obtained at the University of California, San Diego Human Research Protection Program.

Statistics

Data were entered into a database and spreadsheet (Access, Microsoft Corporation, Redmond, WA). Descriptive analysis was performed and observed proportions were determined with standard methods.

Results

Over the twelve-month study period, the SDSO had 524,427 documented subject encounters, of which 2431 (0.0046%) resulted in UOF being utilized [20]. In our population, 1934 (79.6%) subjects were males with a median age of 28 years. Of these subjects, 1079 (44.3%) appeared to be under the influence of alcohol or drugs per arresting officer. Three hundred forty seven (14.3%) appeared to be mentally impaired per arresting officers. Of the subject population, 2287 (94%) were unarmed at time of arrest. Fifty subjects were armed with a gun, 55 with a knife/blade and other weapons included bats, sticks, objects present on scene.

Differing levels of intensity in UOF included 1513 episodes of empty hand control actions such as grabbing/pushing, restraining holds, pressure points and striking. There were 1137 episodes of using tools or devices such as oleoresin capsicum (OC) agents, impact weapons, and canines. There were 299 episodes of less lethal weapons such as pepper bell launchers, TASER electronic control devices, 12 gauge super sock and NOVA shield. Numerous encounters required more than one type of UOF action. In these 2431 UOF events, 1808 initial uses of force were effective. Six hundred fifty two subjects required a second method of force.

Of these UOF incidents, 1535 (63.1%) patients ended up being placed in a prone restraint position, 43 (1.7%) were restrained lying face up, 64 (2.7%) were placed on their sides and 224 (9.2%) were placed in a sitting position. Of all of the subjects who were restrained, 1863 (76.6%) incurred no injuries. Three hundred fifty four (14.6%) subjects were treated at a hospital and then cleared for discharge. Two hundred eight (8.6%) subjects required hospitalization. No fatalities were noted in any subjects of the research population.

Discussion

A number of theories have been put forward as being responsible for the deaths in subjects placed in the prone position including underlying heart disease, obesity, respiratory disease, drug and alcohol toxicity and positional asphyxia. To date there have been numerous case reports of patients suffering sudden death while restrained [2-5]. Prone and hogtie positions were previously described as high risk [4,5]. Though subsequent research has since debunked the original work published by Reay, leading to the determination that the prone position is physiologically neutral with respect to ventilation [8,15,17,18]. Previous studies have even evaluated pulmonary function in individuals placed in a prone position and with up to 100 kg of weight on their backs [18]. These studies have shown no clinically significant changes in an individual's respiratory status. But criticisms have been that these are volunteers and do not reflect real world scenarios where subjects may be have been using drugs, alcohol or been involved in physical altercations prior to being restrained [21].

One similar study had been conducted in Canada to date. This was another prospective study which showed 42.8% of a subject set of 1255 subjects placed in a prone position without a single fatality. During that study, only one subject suffered a fatality and that subject was in a non-prone position. Our findings are similar in that there was not a single fatality and the Hall study also showed a profoundly low rate of sudden death for individuals in police custody after UOF incidents in general (1/1255). The incidence of sudden death is extremely low when looking at all police encounters and even in the subgroup of those who had UOF used against them.

Study Limitations

The data collected in this study were prospectively collected by the involved law enforcement officers and documented immediately after the event, however are subject to potential recall bias accuracies. Our study is likely to have been limited by the number of subjects enrolled. Because of the low rate of fatalities in our study, we were unable to statistically differentiate the rates of fatalities based on the modalities of restraint. However, our study does not seem to show an increased danger of the prone position in a restrained individual.

Conclusion

UOF incidents commonly result in individuals placed in a prone restraint position. Through our large population, we noted no fatalities of individuals placed in a prone restraint position. Likely there are numerous factors that place an individual in police custody at risk for sudden death including a history of mental illness, underlying heart disease, the presence of excited delirium syndrome and drug and alcohol intoxication. Future research should focus on high risk populations, including those suffering from drug intoxication, heart disease, obesity and chronic lung diseases.

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