SAFETY VIOLATIONS IN COMMERCIAL AQUATIC VENUES IN HOUSTON, TEXAS

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Background: Disease outbreaks, drowning and symptoms from exposure to pool chemicals may occur around aquatic facilities. The CDC derived Model Aquatic Health Code (MAHC) is a set of voluntary guidelines aimed at reducing the risk of disease, injury and drowning at aquatic facilities. However, the inspection of aquatic facilities and utilization of the MAHC varies across jurisdictions. A geographic-based grading of commercial swimming pools by safety code violations can identify areas of high risk and can inform injury prevention measures. The objectives of this study were to grade commercial swimming pools in Houston, Texas based on pool violations discovered during routine inspections using the MAHC. A secondary aim was to map these aquatic venues and study the relationship between pool violations, neighborhood socio-demographics and housing. We hypothesized that pools with failing safety grades are spatially clustered and located in areas of low socioeconomic capital.

Materials/Methods: This was a cross-sectional study of data from routine inspections of commercial swimming pools in Houston, Texas during 2016. We graded aquatic venues by assigning points based on MAHC violations and then a letter grade: 95-100% (A); 85-94% (B); 75-84% (C); <75% (F). Swimming pool addresses were geographically coded using GIS. Pool violations were examined for spatial clustering using the Nearest Neighbor Hierarchical Cluster (Nnh) algorithm. To relate pool violations to predictive factors, a Markov Chain Monte Carlo (MCMC) Poisson-Lognormal-Conditional Autoregressive (CAR) spatial regression model was tested at the census tract level.

Results: There were 3107 commercial aquatic venues that were inspected during 2016. Of those, 2,525 pools had addresses listed in the city of Houston. Venues were graded as follows: (A): 1968, 63%; (B): 971, 31%; (C): 154, 5%; and (F): 14, 1%. Spatial analysis revealed clustering of (F) graded pools in the southwest quadrant of Houston, which has historically been an area of lower socioeconomic status. Clustering did not occur in pools graded (A), (B) or (C). For Grades A, B and C no significant predictive variables were observed; however, failed swimming pools inspections were best predicted by buildings with 50 or more housing units.

Conclusions: Failed commercial swimming pool inspections are spatially clustered in an area of lower socioeconomic status. Swimming pool inspection failure is more likely to occur in multifamily apartment complexes with more than 50 units.